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Michael P. SCHLAILE
Leibniz Centre for Agricultural Landscape Research (ZALF), Germany
Institut für Ökonomie, Hochschule für Gesellschaftsgestaltung (HfGG), Germany
Flying Faculty, Department of Economics, Turkish-German University, Turkey
Department of Innovation Economics, University of Hohenheim, Germany
michael.schlaile@zalf.de

Veronica HECTOR
Department of Societal Transition and Agriculture, University of Hohenheim, Germany
Institut für Ökonomie, Hochschule für Gesellschaftsgestaltung (HfGG), Germany
veronica.hector@uni-hohenheim.de

Luis PETERS
Institut für Ökonomie, Hochschule für Gesellschaftsgestaltung (HfGG), Germany
luis.peters@hfgg.de

Lukas BÄUERLE
Department of Socioeconomics, University of Hamburg, Germany
Institut für Ökonomie, Hochschule für Gesellschaftsgestaltung (HfGG), Germany
lukas.baeuerle@uni-hamburg.de

Beth SMITH
The Cynefin co (Cognitive Edge LTD), Wales, UK
beth.smith@thecynefin.co

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Annette HILT
Department of Philosophy, Karlsruhe University of Education, Germany
annette.hilt@ph-karlsruhe.de

Silja GRAUPE
President, Hochschule für Gesellschaftsgestaltung (HfGG), Germany
silja.graupe@hfgg.de

ABSTRACT

We present the results of an exploratory study of transformation processes in "wicked problem situations", faced by 623 German managers due to the COVID-19 crisis during summer 2021. Our study draws on a fruitful combination of sustainability transitions research, complexity theory, cognition in economics, meme theory, and sensemaking by using the SenseMaker® software platform as a data collection and analysis tool on patterns of meaning in managerial self-signification and interpretation of their own decisions. We contribute to current interdisciplinary debates by presenting an empirical study on sensemaking during the COVID-19 pandemic that uncovers the narrative patterns of managers during uncertain decision situations. Our results suggest that while new habits have emerged and human ingenuity and creativity is acknowledged, participants of our study appear to lack a strong vision of a sustainable future beyond green growth and the dominant techno-economic paradigm.

KEYWORDS: Innovation, Sensemaking, Narratives, Pandemic, Crises, Memes, COVID-19, Sustainability

JEL CODES: B59, D80, H12, I19, L21, M14, O31, O35, Z13

[1]Despite many serious and catastrophic consequences for social and economic systems, it has also been argued that the COVID-19 pandemic has opened "windows of opportunity" (*e.g.*, Kanda, Kivimaa, 2020; Dahlke

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et al., 2021; Alva Ferrari *et al.*, 2023) for re-thinking, re-imagining, and fundamentally innovating economic habits and narratives towards more sustainable and regenerative ones (Waddock, 2019; Riedy, 2020a, 2020b; Waddock, 2020a, 2021; Riedy, Waddock, 2022). Such *sustainability transitions* (such as the transition to a sustainable and circular bioeconomy; *e.g.*, Pyka *et al.*, 2022; Schlaile *et al.*, 2022) are usually long-term *system innovations* (Elzen *et al.*, 2004) in production and consumption modes that promote quality of life, inter- and intragenerational equity and ecosystem stability (for overviews of different approaches to sustainability transitions, see *e.g.*, Loorbach *et al.*, 2017; Schlaile, Urmetzer, 2021). Yet, one of the most important and effective points of intervention for system innovations – potentially even in the short term – are the paradigms, worldviews, or mindsets of economic systems and their agents (*e.g.*, Göpel, 2016; Waddock, 2020b; Friedrich *et al.*, 2021; Schlaile *et al.*, 2022). Against this background, new approaches in economic and organizational theory – especially in the field of decision theory – are beginning to incorporate new capabilities (and limitations) of human agents for both problem identification and problem solving in fundamentally uncertain environments (Kurtz, Snowden, 2003; Snowden, 2005; Johnson, 2019; Graupe, 2020; Bäuerle, 2021; Bäuerle, Graupe, 2023). However, the empirical operationalization of such sensemaking processes remains underexplored. We argue that for the emergence of a possible new paradigm of economic action, an exploratory, open-minded look at how managers already make sense of their actions as of today might be a good starting point. Instead of pitting a (possible) paradigm against, for instance, the still dominant rational choice paradigm (*e.g.*, Schlaile *et al.*, 2017; Bäuerle, 2023), we tacitly assume that a new paradigm might already be emerging in crisis-prone practices 'out there'. In this respect, the pandemic has been characterized by transboundary dynamics and a high degree of uncertainty and unpredictability, which has required rapid and innovative decisions by various leaders, innovators, and other economic actors (Kuckertz *et al.*, 2020; Crayne, Medeiros, 2021; Medeiros *et al.*, 2022; Schlaile *et al.*, 2023).

Previous research on managerial sensemaking and decision-making processes has often relied on applied psychology, linguistics, and respective constructivist and qualitative approaches, using methods such as text and discourse analysis, interviews, observations, and others (*e.g.*, see reviews by Brown *et al.*, 2015; Golob, 2018; Cristofaro, 2022). In this regard, however, the potential of combining narrative research with quantitative and mixed methods approaches informed by evolutionary theory, complex systems research, and cognitive science for both conceptual and empirical sensemaking studies remains underutilized (see also Snowden, 2011; Lynam, Fletcher, 2015; van der Merwe *et al.*, 2019; Cristofaro, 2022; Turner *et al.*, 2022). Our

contribution addresses this gap by tackling the following research question: *Which (memetic) patterns of meaning are reflected in managerial sensemaking during the COVID-19 pandemic?* In our exploratory study, we apply a rather novel mixed-methods approach, particularly informed by cognitive science and complexity theory, using the SenseMaker® software platform as an online data collection tool (*e.g.*, van der Merwe *et al.*, 2019; Guijt *et al.*, 2022). This tool allows us to merge and triangulate qualitative and quantitative data in a structured and systematic way (*e.g.*, Bryman, 2006), which complements qualitative studies of sensemaking and facilitates gaining a more fine-grained understanding of managerial sensemaking in the context of crisis situations and system innovations. The method utilizes a compositional statistics approach in which quantitative data is used as a means to describe and quantify the patterns that underlie the qualitative data, and as such all statistical inferences are relative to the qualitative data and are analyzed using compositional techniques (Aitchison, 1986; Upton, 2017).

During the summer months of 2021 (July 5 to September 20), we administered our questionnaire to 623 managers in a diverse set of organizations in Germany. While the SenseMaker® data collection and analysis software has already been applied in different empirical settings such as civic engagement and in the context of humanitarian issues (*e.g.*, Bakhache *et al.*, 2017; Mager *et al.*, 2018; Bartels *et al.*, 2019; van der Merwe *et al.*, 2020; Mausch *et al.*, 2021; Vasilescu *et al.*, 2021; Wagner *et al.*, 2022; Wamsler *et al.*, 2022a; Cunningham *et al.*, 2023), we are – to the best of our knowledge – the first to run a SenseMaker® project on a national scale in a managerial and business context. Moreover, Germany is an important case due to its leading role in the European economy and the national and international impact of its legislation on COVID-19 protective measures on businesses and managerial decisions. Our survey is characterized by an open-ended prompting question and several follow-up questions that enable the participants to formulate stories of their own experiences with the COVID-19 pandemic and to make sense of their shared stories (self-signification) using quantitative and qualitative methods[2]. This approach also promises to facilitate the capture of emergent patterns within the shared stories, thus enabling transformation-oriented researchers to uncover potential levers for system innovation, particularly in unordered problem situations during the current crisis (Snowden, Rancati, 2021). It should be noted, however, that while participants shared stories of varying length, in this article, we do not focus on the (qualitative) details of the themes and narratives of the stories themselves but rather report and

2. Note that the self-signification of one's own narrative also works to decentralize and increase validity in the quantitative outputs (Guijt *et al.*, 2022; van der Merwe *et al.*, 2019).

interpret the quantitative results of our survey, in particular by means of plotting and discussing collective patterns of signifiers, primarily using *triadic* measures (see also Lynam, Fletcher, 2015; van der Merwe *et al.*, 2019, for details). However, to illustrate the connection between the patterns and the narratives, we complement these quantitative findings with selected quotes from the stories the managers shared.

In general, our study contributes to the current debates on sensemaking and cognition in economic theory and organizational theory, in particular by empirically exploring the patterns that emerge from the stories shared by the managers on the SenseMaker® platform. More specifically, our study reveals that in dynamic and uncertain decision-making contexts, individuals seem to become increasingly aware of the potential for innovations in institutions and thought patterns (memes), suggesting a growing belief in their ability to bring about transformative change. However, it is also observed that people's ability to envision compelling and sustainable futures does not currently match their creative potential and ingenuity. Thus, our study also contributes to the literature on sustainability transitions by pointing to some blind spots that should be addressed in future research.

The paper is structured as follows: The next section presents a brief overview of the relevant literature at the intersection of (organizational) sensemaking and meme theory in the context of (changes in) complex systems. The following section describes the sample and method of our online survey. We then present the results from this survey and, thereafter, discuss our findings and their implications before we draw our conclusions in the final section.

Theoretical background

Sensemaking

Crises such as the COVID-19 pandemic can be understood as complex and potentially "wicked problem" situations (Rittel, Webber, 1973; Dahlke *et al.*, 2021; Schlaile *et al.*, 2023) characterized by a high degree of uncertainty and unpredictability (Iftikhar, Müller, 2019; Högberg, 2021), in which leaders, managers, and other decision makers are confronted with complex and dynamic decision situations that challenge and disrupt established patterns of meaning and action (Maitlis, Sonenshein, 2010; Christianson, Barton, 2020; Crayne, Medeiros, 2021; Förster *et al.*, 2022; Medeiros *et al.*, 2022; Roth *et al.*, 2022). Notably, one of the main prerequisites for *deliberation* in such highly uncertain and complex contexts is the creation of new patterns of

meaning (see also Hilt, 2005, on a related note). These processes of seeking orientation, structuring information and knowledge, and acting in the world by creating new meaning have frequently been labelled *sensemaking*. However, various schools of thought have emerged around the question of how humans make sense of and create meaning in situations when confronted with new information (and the necessity of making sense thereof). Consequently, the literature on sensemaking (sometimes explicitly spelled with a hyphen to highlight the connection to a particular school of thought, *e.g.*, some of the approaches mentioned below), has been divided into (at least five) rather distinct but also somewhat overlapping perspectives (Browning, Boudès, 2005; Klein *et al.*, 2006a, 2006b; Urquhart *et al.*, 2016; Dervin, Naumer, 2017; Golob, 2018; Cristofaro, 2020, 2022).

One of the most well-known approaches to sensemaking (especially in the management literature) was developed by Weick (1995) and focuses on organizational settings. According to Weick, sensemaking is a retrospective process that occurs when the environment is perceived as uncertain or different from the expected state and helps to structure the unknown and create order (Weick *et al.*, 2005; Maitlis, Sonenshein, 2010; Lam, 2014).

Similarily, Snowden's *naturalized sense-making* (NSM) aims at exploring and understanding complexity first and foremost within organizational contexts (Snowden, 2011; Turner *et al.*, 2022). However, NSM can be distinguished from Weick's approach as it is much more rooted in the natural sciences and uses an evolutionary model to approach uncertainty (Jones, 2015; Snowden, 2021). The NSM school of thought is closely linked to the Cynefin® sensemaking framework (Snowden, 2021; Snowden, Rancati, 2021) and the SenseMaker® software platform (van der Merwe *et al.*, 2019; Guijt *et al.*, 2022).

Dervin's (1998) *sense-making methodology* has been developed since the 1970s and is mostly applied in the field of library, communication, and information science (Dervin, Naumer, 2017). It was developed as a means of studying users of knowledge systems and designing systems according to their needs (Dervin, 1998).

Klein *et al.* (2006b) conceptualize sensemaking as an individual mental model (frame) that represents the state of the world. In their *data/frame theory of sensemaking*, the authors distinguish between the mental model formation, that is, a backward-looking process, which explains past events, and mental simulation, a forward-looking process that explains how the future might unfold (Klein *et al.*, 2006b).

Finally, Russel and colleagues (1993) have developed another perspective of sensemaking in the field of human-computer interaction. Accordingly,

sensemaking involves the process of finding, collecting, and (re)organizing information available in the digital world in order to achieve a deeper understanding and find ways to cope with huge amounts of data (Pirolli, Russel, 2011).

In this article, we draw primarily on the NSM approach that has been mainly developed and promoted by Snowden and colleagues (Kurtz, Snowden, 2003; Greenberg, Bertsch, 2021). For the sake of a working definition, we follow van der Merwe *et al.* (2019) in understanding sensemaking as "*a cognitive process that allows us to structure the unknown, to understand and explain the world, and to inform action [...]. Through sensemaking processes, information is interpreted and meaning assigned so as to inform behavior on both the individual and collective scale*" (p. 1).

Memes in the Context of Systemic Change

Notably, sensemaking processes are strongly influenced and informed by the cultural context, prevalent memes and narratives, individual experiences, and knowledge (Caracciolo, 2012; van der Merwe *et al.*, 2019; Schlaile, 2021; Cristofaro, 2022; Schlaile *et al.*, 2024). Memes can be understood as the culturally evolved informational instructions that have been argued to shape the narratives and schemata prevailing in our economic systems and thus are at the core of (intentional and unintentional) changes in our ways of doing business (Waddock, 2015; Schlaile, Ehrenberger, 2016; Waddock, 2016, 2019, 2020a, 2020b; Schlaile, 2021; Waddock, 2021). Memes can be argued to have an impact on decision-making on several dimensions, including a cognitive one (*e.g.*, as interpretative frames or schemata; see also Schlaile, Ehrenberger, 2016; Cristofaro, 2022) and an emotional one, particularly in the sense that emotional states and affective cues can have a strong impact on the resistance (or willingness) to adopt and diffuse particular memes (*e.g.*, Schlaile *et al.*, 2018, and references therein). While we are well aware of the controversies around the notion of memes (*e.g.*, Fomin, 2021; Gill, Price, 2022), we deliberately use this term in line with the recent literature on the relationships between memes, narratives, worldviews, mindsets, paradigms, and sustainability transitions (Hedlund-de Witt, 2013; Waddock, 2015, 2016; Schlaile *et al.*, 2017; Waddock, 2019; Riedy, 2020b; Waddock, 2020a, 2020b; Laszlo *et al.*, 2021; Waddock, 2021; Schlaile *et al.*, 2022). Consequently, investigating and mapping memes as elements of complex (cultural and knowledge) systems by way of capturing their codified or reified representations (*e.g.*, as narratives) has been suggested as one important pathway for studying and potentially "managing" changes of complex systems (*e.g.*, Waddock, 2020a), including both organizations and entire innovation systems (*e.g.*, Schlaile *et al.*, 2017;

2021a). For a more detailed discussion of the theoretical background of the conceptual relationships between memes, stories & narratives, and discourses in the context of systemic transformations, we refer to Riedy (2020a, 2020b), Waddock (2020b, 2021), and Riedy and Waddock (2022). In our view, the SenseMaker® methodology offers a way to capture, visualize, and analyze these narrative representations of memes.

Methods

Various methods can be used to study narratives during crises, including semi-structured interviews with experts. Another interdisciplinary approach, drawing on findings from cognitive science, complexity theory, and the sensemaking literature (among others), is the use of the SenseMaker® software platform (https://thecynefin.co/about-sensemaker/) developed by The Cynefin Company (formerly known as Cognitive Edge). SenseMaker® can be used as a survey tool (https://thecynefin.co/how-to-use-sensemaker/) to collect and analyze short stories from people about a concrete lived experience. It allows participants not only to share their stories but also to self-interpret them by tagging themselves in a set of predetermined signifier questions which generates quantitative numerical data (Mager *et al.*, 2018; van der Merwe *et al.*, 2019; Guijt *et al.*, 2022; Wagner *et al.*, 2022; Wamsler *et al.*, 2022a). Therefore, this method facilitates the processing and statistical interpretation of larger amounts of data and micronarratives than more conventional narrative analysis techniques, while reducing researchers' interpretation bias (Lynam, Fletcher, 2015). SenseMaker® has thus served as an instrument for mixed-methods research in various types of settings (van der Merwe *et al.*, 2019).

For our study, we applied the SenseMaker® method to conduct a survey among managers residing in Germany. We developed a questionnaire consisting of a prompt (an open-ended question asking participants to share a story about an important moment that illustrates their decisions during the COVID-19 pandemic)[3], various multiple-choice questions, and clarification questions through which participants could self-signify the stories they shared using widgets such as triads, dyads, and stones (*e.g.*, van der Merwe *et al.*, 2019; Guijt *et al.*, 2022, for terminology and further methodological details). The method deliberately departs from the use of traditional scales

3. Prompt: *The COVID-19 pandemic has put decision-makers like yourself in unprecedented situations. Imagine that, after a long time of protective measures against the virus, you are meeting a business partner in person again. Which example of a particular course of action you took during this time would you tell them about? Please share your story below.*

as a means to increase the cognitive load placed on respondents, in order to encourage them to consider the issue in more and different dimensions than they typically would and to reduce gaming of responses (van der Merwe *et al.*, 2019; Clark, 2023). The questionnaire framework was designed and implemented based on an extensive literature review on possibilities of and limitations to economic sensemaking procedures under uncertainty and building on previous and ongoing conceptual work by Graupe (2019, 2020), Ötsch and Graupe (2020), and Bäuerle and Graupe (2023). The process of drafting, testing[4], and finalizing the framework took approximately three months (April-June 2021). This work was done by the project team in collaboration with partners from The Cynefin Company (who also provided a helpful signifier compilation from previous SenseMaker® frameworks). Our framework is divided into three main parts: 1) an inquiry into the narrative of the present (how were decisions influenced during the pandemic, items 1-9 in the appendix), 2) an inquiry into the narrative of the future (how will decisions be influenced after the pandemic, items 10-14 in the appendix), and 3) multiple-choice questions (MCQs) about the respondents themselves (items 15-21 in the appendix). The signifier questions are designed based upon relevant literature and represent abstractions of concepts (see also Bäuerle, Graupe, 2023); the signifiers each relate to a culturally broadly understood concept but are subject to a degree of interpretation and adaptation to the individual respondent context. Since the study addresses managers in Germany, the framework was designed in German, but the results are translated by the authors and presented in English for this article. An English translation of the complete framework can be found in the appendix for reference.

We combined probability sampling with a convenience and purposive sampling strategy (Douglas, 2022) to capture a large number of narratives and to include diverse perspectives around decision-making in times of uncertainty. Study participants were invited through our own networks[5] and through a market research company and panel service provider (Bilendi)[6] to obtain a diverse sample regarding the management level and organizational background. After quality checks (*e.g.*, deleting duplicate data, removing all questionnaires completed in less than 150 seconds, or where no stories were shared, etc.), our final sample consists of N = 623 participants (about 30% female and 70% male) occupying a managerial position (33% in upper

4. A pretest was carried out twice to test for possible technical errors, to receive feedback on the intelligibility of questions and instructions, and to check for biases within responses and non-item responses.
5. As well as those of our collaborators from Senat der Wirtschaft (https://www.senat-deutschland.de), Deutsches Netzwerk Wirtschaftsethik (https://www.dnwe.de/), and Weltethos Institut/Global Ethic Institute (https://weltethos-institut.org/).
6. The planned sample contained managers from middle management to board/executive management residing in Germany.

management, 22% in middle management, 21% in lower management, 20% in strategic/administrative management, and 4% in "other" management positions) in a German private or public organization (heterogeneous sample with regard to size and background of the organizations). The survey was made available through both the SenseMaker® collector web version and app and ran for 77 days from July 5th to September 20th, 2021. After participants had shared their story in the free text box, they were asked to answer pre-determined follow-up questions. These were divided into three parts (as mentioned above: present narrative, future narrative, MCQs). The follow-up questions (eight triads, one dyad, two stones items, and two single select MCQs [MCQ0; MCQ3 in the appendix]) aim at uncovering underlying choice architectures and their affective signification (as calling forth positive or negative feelings), for instance, asking how the participants perceive(d) the world during the pandemic, whether they have developed new habits, how they evaluated this change (as appearing positively or negatively grounded), and which values guide(d) their decisions (see subsequent section)[7]. The framework also enables inquiries into the narrative of the future and transformative tendencies (see also Bäuerle, Graupe, 2023). Here, the study is primarily interested in how participants perceive the future and evaluate their own agency for shaping it. Finally, the five single-select (MCQ1-2 and 5-7 in the appendix) and one "select all that apply" (MCQ4 in the appendix) MCQs included, concerning the socioeconomic position of the respondents, not only help to ensure a diverse sample but also enable the detection of patterns/contrasting results as presented in the following section.

Data analysis was conducted in an iterative process as outlined by Mager *et al.* (2018). For this reason, we first analyzed emerging patterns within the triads, the dyad, and stones, checked for outliers, and filtered triads with MCQs and other questions of interest. We used Pearson's goodness of fit test to test the quality of the data and visualized correlations both by filtering data (using the statistical analysis software integrated into the SenseMaker® platform) and through cobweb diagrams (*e.g.*, Agresti, 2013; Upton, 2017; as also done by Wamsler *et al.*, 2022b; see part 2 of the appendix for details). Finally, we complemented the quantitative analysis with the shared stories, which we analyzed inductively to explore the topics addressed.

7. Note that the final selection of values and principles that we chose to inquire about was, to a large extent, inspired by and based on the decades of work done in the "Projekt Weltethos"/"Global Ethic Project" (*e.g.*, Hemel, 2019; Küng *et al.*, 2019). The five universal values they have identified are "*non-violence*", "*justice*", "*truthfulness*", "*equality & partnership*", and "*ecological responsibility*" (*e.g.*, see https://projektweltethos.de/en/about-weltethos/).

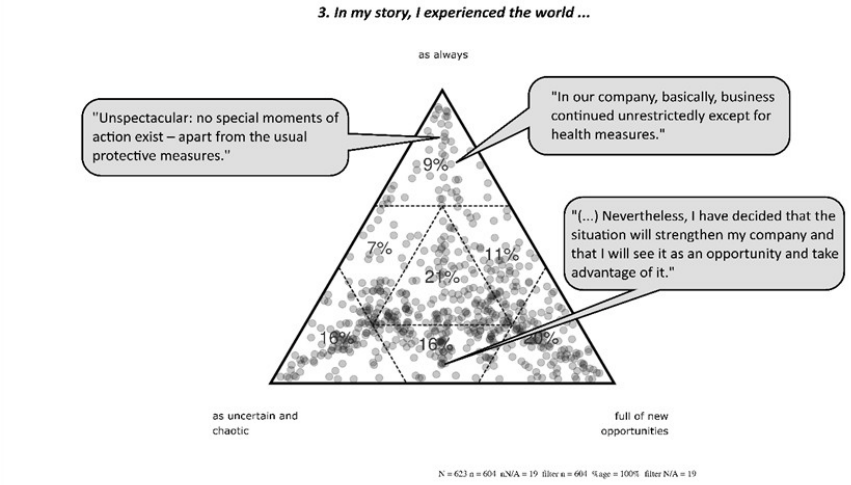
Results

Narrative of the Present

Experiencing the World

For the first triad (item 3), which asks about the general way in which the world was experienced, there is a strong tendency towards the bottom with large clusters of stories in the lower left, center, and right parts of the triad (as shown by the percentages in Figure 1) (note that each plotted data point is connected to a shared story as illustrated by the examples in the text bubbles in Figure 1). During the pandemic, the majority of respondents had experienced the world as uncertain and chaotic and/or full of new opportunities. Unsurprisingly, only few respondents indicated that everything remained the same. This is also reflected in the shared stories: At the bottom of the triad, stories were mostly about challenges with organizing health measures, teleworking, or financial issues, while in the stories tagged in the top corner, respondents mainly stated that their companies were not affected by the pandemic, or that they had nothing significant to report from that time.

Figure 1 – Experiencing the world



Another, more interesting result can be found when we look at this question in combination with the affective MCQ (MCQ0 in the appendix) about the participants' feelings towards the story they shared: Participants

with negative feelings about their story tend to regard the world as rather unpredictable and chaotic, whereas those with very positive feelings towards their story tend to view the world much more as being full of new opportunities. Another interesting insight can be gained by combining this triad with the question of whether the participants have founded the organization they are working for. Founders tend to cluster rather on the bottom right (full of new opportunities), whereas those that have not founded the organization are much more evenly distributed among this triad. This finding is also supported by Figure 3, which presents the results of a Pearson's goodness of fit test of the relationship between the variable 'non-founders' and the seven anchors of the triad "I experienced the world" in the form of a cobweb plot (following Upton, 2017, as also done by Wamsler *et al.*, 2022b). Accordingly, there is a significant negative relationship (grey line) between not being a founder and experiencing the world as being full of new opportunities, that is, the right anchor received significantly fewer responses from 'non-founders' than theoretically expected. The opposite is true for founders: there is a significant positive relationship between experiencing the world as being full of new opportunities and having founded the organization (again, we refer the reader to part 2 of the appendix for more details).

Figure 2 – Experiencing the world (founders vs. non-founders)

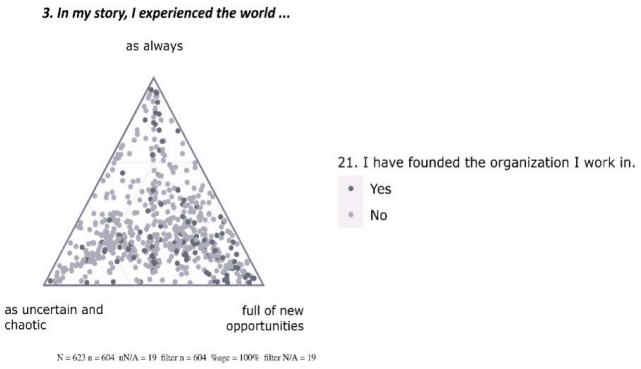
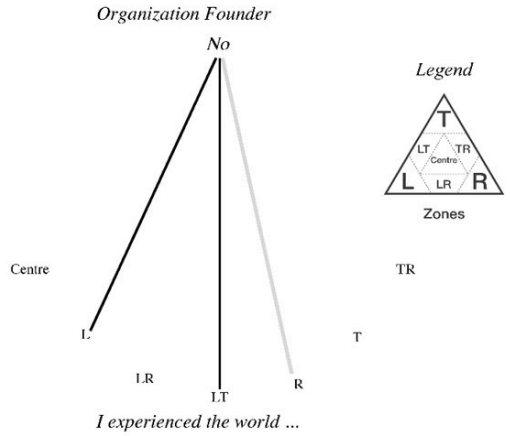


Figure 3 – Cobweb plot: non-founder and triad 3 "I experienced the world …"

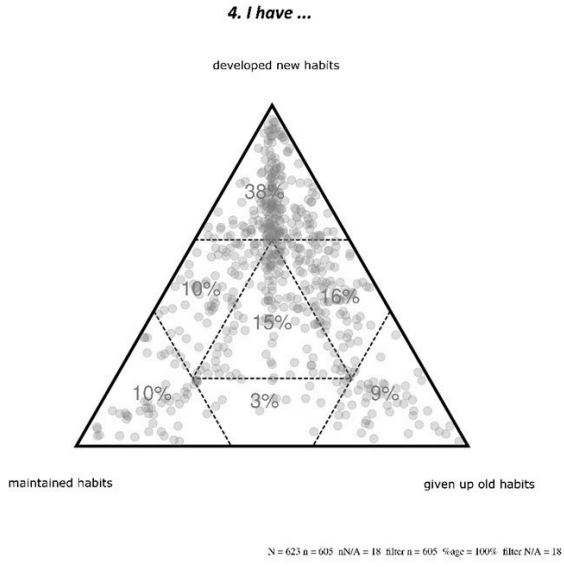


Note: The lines indicate the category combinations that have the largest standardized residuals (black = positive, gray = negative)

Habitualization

The fourth question asks about the evolution of habits during the pandemic. As we can see in Figure 4, a very clear pattern emerges: 37% of the respondents stated that they developed new habits during the pandemic. These new habits mainly revolved around working from home[8], setting up health measures, and increasing collaboration and team cohesion[9]. There are only small outliers toward the center and right, and toward the center and left of the triad, indicating that relatively few people gave up old habits or maintained their habits during the pandemic. In the bottom left corner of the triad, the topics addressed are very diverse, ranging from business as usual, neglecting or downplaying the pandemic, to very context-specific stories, such as the report from a nursing home where visits continued to be allowed (tagged in the left corner)[10]. In the right corner, the stories were somewhat similar to the top as respondents mostly talked about changes in their work and lifestyle due to working from home.

Figure 4 – Developing, maintaining, or giving up habits

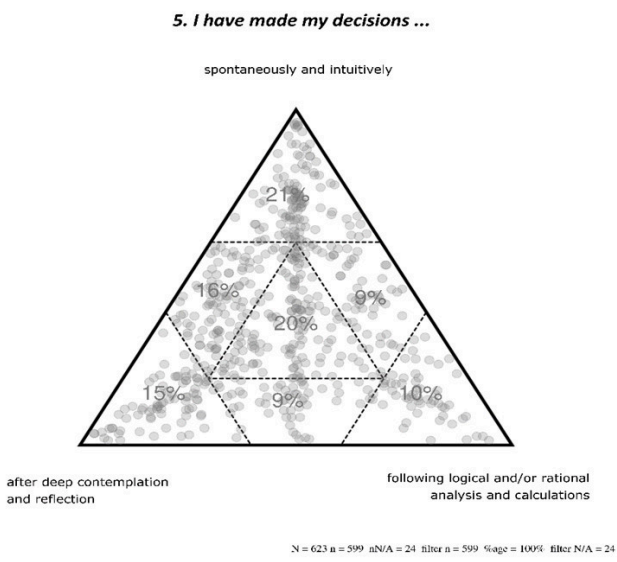


8. Sample narrative: "*It was impressive how quickly we switched to remote working from one day to the next, and how well we coped with it and still do. We took this situation as an opportunity to change our way of working in general and make it more flexible—in the interests of our employees, too.*"
9. Sample narrative: "*Calling on all colleagues to work even more closely together in the difficult time during the pandemic in order to overcome this time well and perhaps also become stronger…*"
10. Sample narrative: "*Allowed the visit of relatives when all nursing homes closed their doors. In my opinion, this is an act of benevolence, and it's also necessary in times of crisis.*"

Decision-making Approach

Triad 5 (Figure 5), which asked respondents how they made decisions, presents a more mixed picture. A slight emphasis on the top corner of the triad demonstrates that most respondents decided spontaneously and intuitively in their shared stories (21%). The topics in these tagged stories mainly revolved around implementing or dealing with telework and health policies. There are also a few conspiracy stories in this corner[11]. There is also a tendency toward the center (20%) and left (16% and 15%) sides of the triad, indicating that people have different approaches for decision-making, either acting spontaneously or after a process of deep contemplation and reflection[12].

Figure 5 – Making decisions



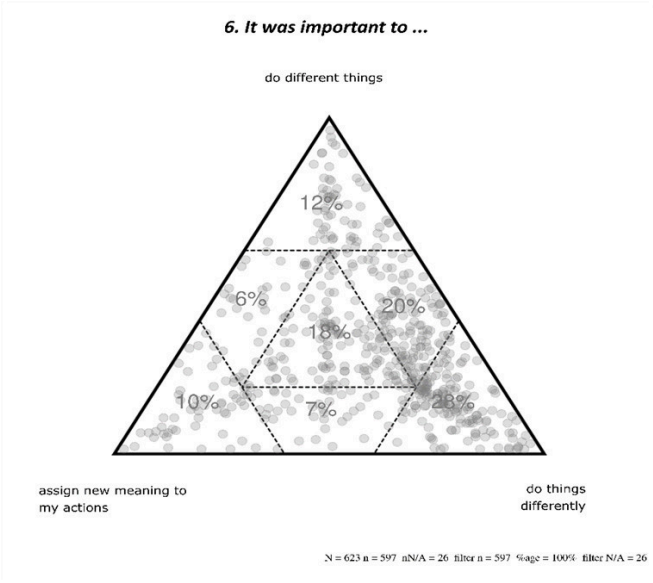
A very clear pattern becomes evident in triad 6 (Figure 6). Here, participants were asked whether they did different things (top), did things differently (right), or assigned new meaning to their actions (left). The majority of stories were plotted in the right corner (28%), with a notable outlier towards the center right of the triad. This shows that most people shared stories where they did things differently (*e.g.*, working from home). However, due to the

11. Sample (conspiracy) narrative: "*It's madness what was constructed here on the basis of a virus, which does not concern 99.7% of the population. Now I know how 1933 came about.*"

12. Sample narrative (positioned at the bottom in the middle, slightly biased towards left corner): "*The … pandemic not only showed people why we need to be more careful with our environment, but also made a number of people rethink various processes that can contribute to accelerating the pace of the world and move it toward further technological advancement. The lockdown gave me more time to work more on a few personal aspects, including my family.*"

outlier towards the center right of the triad, there also seems to be a connection with doing different things. We find ambiguous results for the stories associated with 'assign new meaning': While many respondents reflected on working from home and implementing health measures, employee safety, team cooperation, and humanity were particularly emphasized and positively grounded. In contrast, there are also some "conspiracy stories" related to the pandemic in this sub-sample of stories[13].

Figure 6 – Doing different things, doing things differently, or assigning new meaning



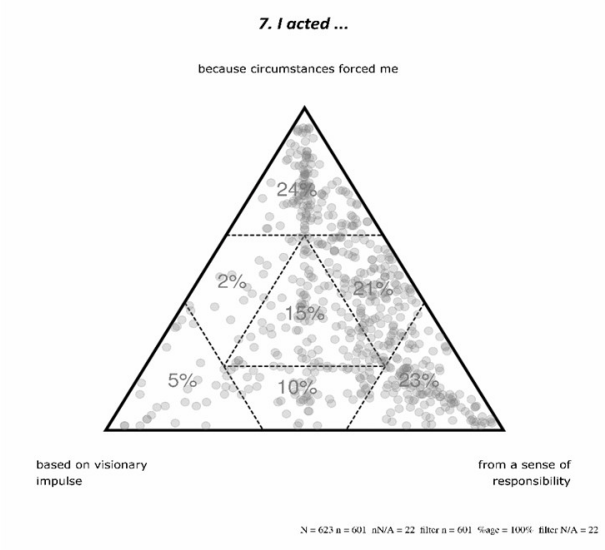
Individual Driving Forces

In the seventh triad (Figure 7), there are various clusters. However, the strongest cluster is in the top corner (I acted because circumstances forced me) with 24% of the data points. Two other clusters can be observed in the right corner (I acted from a sense of responsibility) and the middle right part of the triad. This cluster demonstrates a strong relationship between acting out of circumstances and acting out of a sense of responsibility. Stories tagged in the right corner reflect health measures and teleworking but can be differentiated from the notion of forced circumstances as respondents highlight

13. For example: "*It would take a lot more common sense to realize that the so-called "protective measures" are first and foremost instruments of domination. Only in the second place it is about health. Merkel's statement that the "pandemic" would not be over until vaccines are used was treacherous. So, it was all about becoming Big Pharma's vicarious agent.*"

the need to care for their employees and assume responsibility for their organization[14].

Figure 7 – Acting because of circumstances, sense of responsibility, or visionary impulse



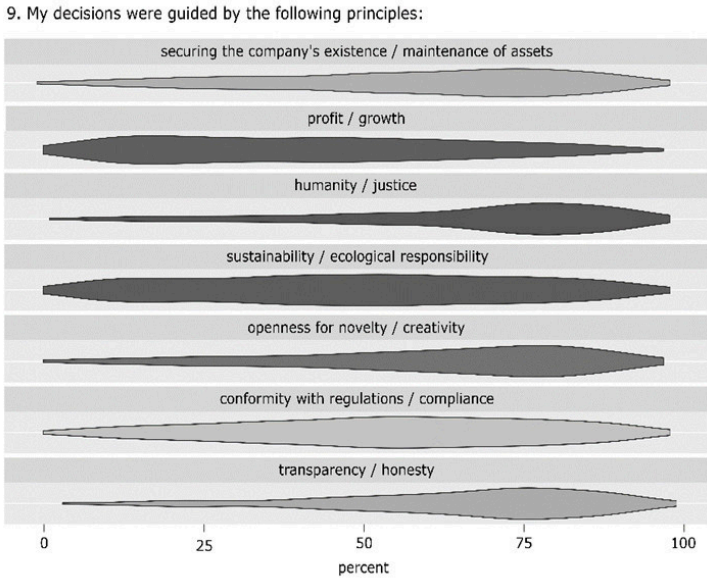
Guiding Values and Principles

Looking at the (multiple) values and principles that have guided the decisions reported in the story (see violin plots in Figure 8), some interesting observations can be made. First, many participants claim that securing the company's existence/maintaining of assets has mostly guided their decisions (as represented by the thickness of the diagram), whereas profit and growth do not seem to have played a major role for most. Interestingly, almost all participants indicated that humanity (in the sense of humaneness)/justice has played a rather important part in their decisions. Sustainability—especially in the sense of ecological responsibility—presents a rather ambiguous picture, suggesting that this value was not that important for current decisions during the pandemic. The other three values of openness for novelty/creativity, conformity with regulations/compliance, and transparency/honesty have also been claimed to be rather important (to varying degrees as shown in Figure 8). While not shown here, an interesting observation can be made when looking at whether participants expect these values to be

14. For example, as reflected in the following narrative: "*Responsibility of all for all takes precedence over the freedom of us as individuals in such a crisis situation*."

important in their future decisions: Whereas there are no significant changes in most values, both profit/growth and sustainability/ecological responsibility are skewed to the right, suggesting that both of these values are expected to become more important again in the future.

Figure 8 – Values and principles (violin plots)

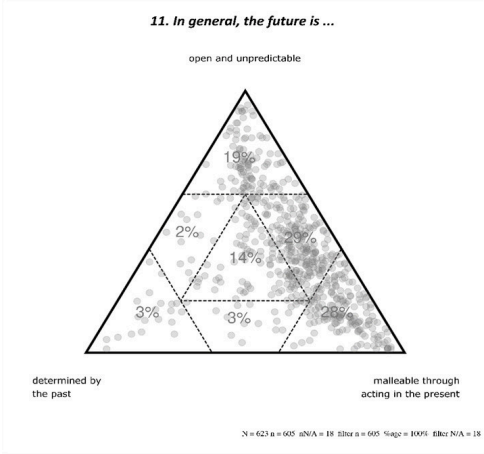


Narrative of the Future

General Perception of the Future

Regarding the future, while participants were not asked to share a whole story about their future expectations, they were asked to imagine the future and self-signify their imagined futures (triads 11-13). A clear pattern emerges in item 11 (Figure 9), which asks how participants perceive the future in general: There are two strong emphases in both the right corner and the right center of the triad. Hence, in relative terms (all three corners compared), most respondents believe that the future can be shaped by acting in the present (right corner, 28%). However, the second significant cluster in the right center (29%) shows that there is a strong connection with the statement in the top corner, that is, that the future is "open and unpredictable". Another, yet smaller, cluster can be identified in the top corner (19%), which underscores this connection.

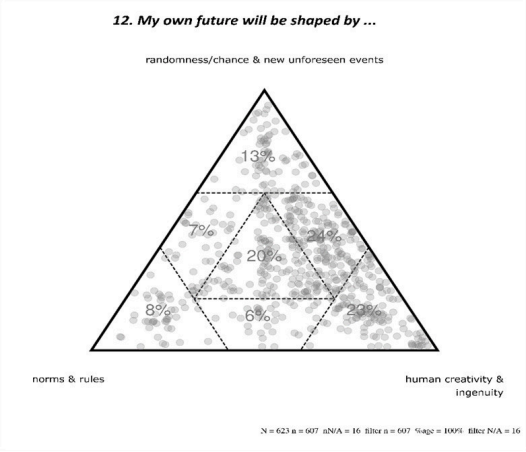
Figure 9 – General perception of the future



Imagined determinants of personal future

In item 12 (Figure 10), participants were asked how they imagined that their own future will be shaped. As in item 11 above, there is again a strong emphasis on the center right part (24%) as well as the right corner (23%) of the triad. Accordingly, in relation to all three corners, most respondents indicated that their future will be shaped by human creativity and ingenuity. The strong emphasis on the center right connects this view with the statement of the top corner: the future will be shaped by chance and new, unforeseen events. In addition, there is an outlier in the center of the triad with a skew to the right that further emphasizes this connection.

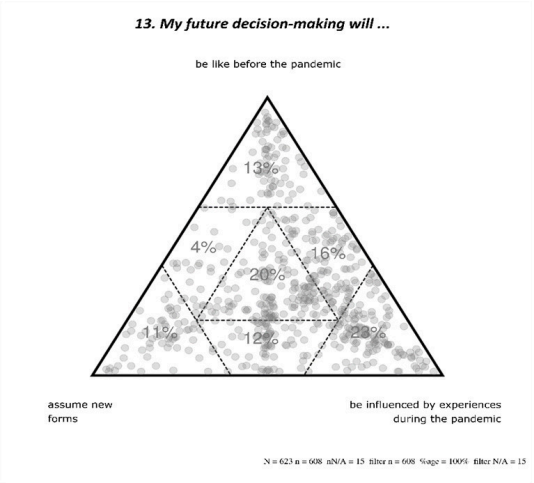
Figure 10 – Imagined determinants of personal future



Expected Characteristics and Path Dependence of Future Decisions

In the last triad (Figure 11) included in our study, various clusters can be identified. The strongest emphasis is in the right corner. Hence, most participants indicated (again in relative terms comparing all three corners) that they imagine their future decision-making to be influenced by experiences during the pandemic. Two further clusters can be identified in the center (with a tendency towards the right center and the middle bottom part of the triad). This shows a certain connection with the other two statements: decision-making will be like before the pandemic (top); decision-making will take new forms (left).

Figure 11 – Shaping future decisions



The role of emotions

Finally, since emotions have generally been found to play an important role in decision- and sensemaking processes (*e.g.*, see Cristofaro, 2020, 2021, 2022; Ötsch, Graupe, 2020), we decided to take a closer look at the feelings that participants reported having towards the story and if/how these correspond to a position in a particular area of one of the triadic signifiers. Although not shown here for the sake of brevity, we can, for example, observe significant positive correlations between neutral feelings towards the story and the top corner of triad 7 (*i.e.*, "I acted … because circumstances forced me") and between the feelings towards the story and how the world was perceived (triad 3). For triad 3, we observed significant positive correlations between negative feelings and experiencing the world as uncertain and

chaotic, and also between very positive feelings and perceiving the world as full of opportunities.

Discussion

Our findings have multiple implications for research on managerial decision- and sensemaking and organizational change in times of uncertainty. For example, triad 5 (Figure 5) identifies the neoliberal heuristic of the rational, utility maximizing, and growth-oriented "homo economicus" as inapplicable and unhelpful from the agents' perspective in uncertain decision situations. Rather, spontaneity and intuition seem to play the driving role in these situations, as opposed to planning and calculation, or at least the latter are challenged by the former – which is in line with the heuristics for unpredictable (complex and chaotic) decision situations as promoted by the Cynefin® framework (*e.g.*, Snowden, Rancati, 2021). At the same time, however, the dominant strategy shared in the stories seemed to be the pursuit of rather incremental adjustments, rather than using this unprecedented cesura for radical change and rethinking the mission or purpose of the organization. In other words, changing economic habits (including habits of thought) seems to depend on an already perceived horizon of opportunities. Whereas all agents act far beyond the simplistic homo economicus model, the sustainability of these patterns depends on their general ability to productively read and seize wicked problem situations.

Given that remote working is a ubiquitous decision-related issue, the rather prominent "doing things differently" cluster for triad 6 (Figure 6) is also rather unsurprising. However, in combination with the other clusters to the right side and top of this triad, we can take this as evidence that the "window of opportunity" for changing our ways of doing business towards more sustainable ones – as claimed by sustainability transitions researchers (*e.g.*, Bodenheimer, Leidenberger, 2020; Kanda, Kivimaa, 2020; Alva Ferrari *et al.*, 2023) – has not yet (fully) closed. That said, clear and strong visions for this new future do not seem to exist (as indicated by Figure 7). Most managers seem to have acted either because they felt compelled by circumstances or by a sense of responsibility, rather than because of a strong vision or imagined future. Combining these findings with the fact that both profitability and growth as well as (environmental) sustainability/ecological responsibility are expected to gain more importance again in the future seems to indicate that there remains a strong belief that "green growth" is not just possible but desirable, possibly reflecting the prevalence of the dominant

techno-economic paradigm as described, among others, by Blok (2021) and Joly (2017), and supported empirically by Bogner and Dahlke (2022).

In the three triads concerning the future, we observe a somewhat optimistic view of agency and imaginative capacities, which could be read as evidence for the awareness of decision makers that habits, rules, norms, institutions, and memes more generally are indeed malleable and subject to what might be called "*systems entrepreneurship*" (Schlaile *et al*., 2021b). However, given the path dependence of cultural evolution and creativity from a memetic point of view (Schlaile, 2021; Schlaile *et al*., 2024), this malleability may depend on "the right circumstances" (or – as sustainability transitions researchers call it – "*landscape events*"; *e.g.*, Geels, 2002), that is, the intentional or unintentional destabilization, exnovation, and collapse of previously stable institutional arrangements combined with the selection pressure of a transboundary crisis that forces us to adapt and thus shape the co-evolution of a new organizational ecology of (more sustainable) memes.

Finally, although we did not explicitly focus our study on emotions or affective states, the significant positive correlations between some of the feelings towards the stories shared by participants and their perceptions of the world as uncertain and chaotic (correlated with negative feelings) or as being full of new opportunities (correlated with very positive feelings) highlight the relevance of emotions and affective states of managers for decision- and sensemaking as also explained in detail, for example, by Cristofaro (2020, 2021, 2022). Moreover, these correlations point to the need for further in-depth research on the role of emotions for managing under uncertainty and in the context of sustainability transitions in general (see also Coops *et al*., in press; Martiskainen, Sovacool, 2021).

Conclusion

In this paper, we address the exploratory research question: "*Which (memetic) patterns of meaning are reflected in managerial sensemaking during the COVID-19 pandemic*?" Using SenseMaker® as a survey tool, we were able to uncover interesting patterns and clusters, revealing that in uncertain, fluid decision environments, people are indeed gaining more and more awareness of the fact that institutions and habits of thought (memes) can be innovated (arguably reflecting a sense of transformative capability). At the same time, however, the imaginative capacities to create powerful visions of alternative and sustainable futures are not yet on par with the creative power and ingenuity ascribed to human beings. Ongoing turmoil and global challenges beyond the pandemic, such as the war in Ukraine, suggest that

decision-making under conditions of uncertainty is likely to continue or even increase for managers around the world. This development has the potential to both support and, arguably, hinder sustainability transitions. Against this backdrop, our results suggest that there are multiple avenues for translating (a) experiences of agency (Figures 4, 6, 13), (b) ethical convictions (Figures 7, 8), and (c) the perceived designability of the future (Figures 11, 12) into directed action in the present. However, in order to actually guide future practice and possibly transform it into new habits and institutions, each of these pathways has to be addressed, from an agent-centered perspective, through respective capacitation of managers in higher education or on-the-job training. In this respect, approaches such as (a) action learning (Pedler, 2011), (b) transformative moral education (Joseph, Mikel, 2014), or (c) futures literacy (Miller, 2018) might prove to be crucial resources, among other "*future skills*" (Spiegel *et al.*, 2021).

Although this study is exploratory in nature, we must acknowledge several limitations. First and foremost, in this article, we only focus on the patterns and quantitative results of our SenseMaker® study. A more elaborate and detailed picture of weak signals and narratives of change may be revealed by delving deeper into the stories shared by the participants, for example, by means of thematic or content analysis. Another limitation is the scope (managers in Germany) and time frame of the study (which was, however, also due to the nature of the funding). Potentially more fine-grained and robust insights could have been gained by means of a more comparative (*e.g.*, cross-national) or longitudinal survey, or by repeating this survey at a later point in time to examine the actual (evolutionary) dynamics of these patterns. In this regard, the same caveat applies as to previous studies on organizational memetics (Schlaile *et al.*, 2021a): we have presented an insightful, yet only static, snapshot of an evolving complex system. Moreover, future research on sensemaking processes of decision makers under uncertainty could also aim at using SenseMaker® in a more participatory way, for example, already during the stage of framework/questionnaire development together with participants (or as a potential evaluation tool for interventions), as suggested by Bartels *et al.* (2019), Lindeman and McAusland (2020), and others.

Despite these limitations, our findings paint a picture of sensemaking during the pandemic that opens up several avenues for future research: While it may not have been too surprising that those who have negative feelings towards their story also tend to perceive the world as chaotic and unpredictable, it would be interesting to investigate why founders tend to see more opportunities rather than chaos. Does this perception of opportunities

come from an entrepreneurial mindset rooted in systems entrepreneurial schemata (Schlaile, Ehrenberger, 2016; Schlaile *et al.*, 2021b), or is it simply a result of the fact that founders usually tend to have more decision-making power in their own organizations? Moreover, while the development of new habits (Figure 4) during the crisis itself is rather unsurprising, it would be important for future research to follow up on this question in order to investigate whether these new habits have taken root or if they are being pulled towards the "old normal". Finally, more research is also advisable on the methodological implications and specifics of using the SenseMaker® software platform in empirical research projects, especially since it is not a free or open-source software environment.

REFERENCES

AGRESTI, A. (2013), *Categorical Data Analysis*, Hoboken, NJ, Wiley.

AITCHISON, J. (1986), *The Statistical Analysis of Compositional Data*, London, New York, Chapman and Hall.

ALVA FERRARI, A., BOGNER, K., PALACIO, V., CRISOSTOMO, D., SEEBER, N., EBERSBERGER, B. (2023), The COVID-19 Pandemic as a Window of Opportunity for More Sustainable and Circular Supply Chains, *Cleaner Logistics and Supply Chain*, 7, 100101.

BAKHACHE, N., MICHAEL, S., ROUPETZ, S., GARBERN, S., BERGQUIST, H., DAVISON, C., BARTELS, S. (2017), Implementation of a SenseMaker® Research Project Among Syrian Refugees in Lebanon, *Global Health Action*, 10(1), 1362792.

BARTELS, S. A., MICHAEL, S., VAHEDI, L., COLLIER, A., KELLY, J., DAVISON, C., SCOTT, J., PARMAR, P., GEARA, P. (2019), SenseMaker® as a Monitoring and Evaluation Tool to Provide New Insights on Gender-Based Violence Programs and Services in Lebanon, *Evaluation and Program Planning*, 77, 101715.

BÄUERLE, L. (2021), Beyond Indifference: An Economics for the Future, *Real-World Economics Review*, 96, 82-97.

BÄUERLE, L. (2023), *Transformation, Agency and the Economy: The Case for a Grounded Economics*, London, Routledge.

BÄUERLE, L., GRAUPE, S. (2023), Reframing Economic Agency in Times of Uncertainty, *International Journal of Pluralism and Economics Education*, 14(1), 31-46.

BLOK, V. (2021), What Is Innovation? Laying the Ground for a Philosophy of Innovation, *Techné: Research in Philosophy and Technology*, 25(1), 72-96.

BODENHEIMER, M., LEIDENBERGER, J. (2020), COVID-19 as a Window of Opportunity for Sustainability Transitions? Narratives and Communication Strategies Beyond the Pandemic, *Sustainability: Science, Practice and Policy*, 16(1), 61-66.

BOGNER, K., DAHLKE, J. (2022), Born to Transform? German Bioeconomy Policy and Research Projects for Transformations towards Sustainability, *Ecological Economics*, 195, 107366.

BROWN, A. D., COLVILLE, I., PYE, A. (2015), Making Sense of Sensemaking in Organization Studies, *Organization Studies*, 36(2), 265-277.

BROWNING, L., BOUDÈS, T. (2005), The Use of Narrative to Understand and Respond to Complexity: A Comparative Analysis of the Cynefin and Weickian Models, *Emergence: Complexity and Organization*, 7(3-4), 32-39.

BRYMAN, A. (2006), Integrating Quantitative and Qualitative Research: How Is It Done?, *Qualitative Research*, 6(1), 97-113.

CARACCIOLO, M. (2012), Narrative, Meaning, Interpretation: An Enactivist Approach, *Phenomenology and the Cognitive Sciences*, 11(3), 367-384.

CHRISTIANSON, M. K., BARTON, M. A. (2020), Sensemaking in the Time of COVID-19, *Journal of Management Studies*, 58(2), 572-576.

CLARK, A. (2023), *The Experience Machine: How Our Minds Predict and Shape Reality*, New York, Pantheon Books.

COOPS, F., BOGNER, K., HUMMELS, C. (in press), Letting Go in Sustainability Transitions: Designing Spaces for the Unavoidable Companion of Change, in Egenhoefer, B. (ed.), *Routledge Handbook of Sustainable Design, 2nd Edition*, London, Routledge.

CRAYNE, M. P., MEDEIROS, K. E. (2021), Making Sense of Crisis: Charismatic, Ideological, and Pragmatic Leadership in Response to COVID-19, *American Psychologist*, 76(3), 462-474.

CRISTOFARO, M. (2020), "I Feel and Think, Therefore I Am": An Affect-Cognitive Theory of Management Decisions, *European Management Journal*, 38(2), 344-355.

CRISTOFARO, M. (ed.) (2021), *Emotion, Cognition, and Their Marvellous Interplay in Managerial Decision-Making*, Newcastle upon Tyne, UK, Cambridge Scholars Publishing.

CRISTOFARO, M. (2022), Organizational Sensemaking: A Systematic Review and a Co-Evolutionary Model, *European Management Journal*, 40(3), 393-405.

CUNNINGHAM, C., VOSLOO, M., WALLIS, L. A., CANZAN, F. (2023), Interprofessional Sense-making in the Emergency Department: A SenseMaker Study, *PLOS ONE*, 18(3), e0282307.

DAHLKE, J., BOGNER, K., BECKER, M., SCHLAILE, M. P., PYKA, A., EBERSBERGER, B. (2021), Crisis-driven Innovation and Fundamental Human Needs: A Typological Framework of Rapid-response COVID-19 Innovations, *Technological Forecasting and Social Change*, 169, 120799.

DERVIN, B. (1998), Sense-making Theory and Practice: An Overview of User Interests in Knowledge Seeking and Use, *Journal of Knowledge Management*, 2(2), 36-46.

DERVIN, B., NAUMER, C. M. (2017), Sense-making, in McDonald, J. D., Levine-Clark, M. (eds), *Encyclopedia of Library and Information Science*, CRC Press, 4113-4124.

DOUGLAS, H. (2022), Sampling Techniques for Qualitative Research, in Islam, M. R., Khan, N. A., Baikady, R. (eds), *Principles of Social Research Methodology*, Singapore, Springer Nature Singapore, 415-426.

ELZEN, B., GEELS, F. W., GREEN, K. (eds) (2004), *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*, Cheltenham, UK, Northhampton, MA, USA, Edward Elgar.

FOMIN, I. V. (2021), Как экономистам изучать мемы? Чего недостает (эконо) меметике? (Размышления о книге Михаэля Шлайле «Меметика и эволюционная экономика») [How Can Economists Study Memes? What Does (Econo)Memetics Lack? (Reflections on Michael Schlaile's «Memetics and Evolutionary Economics»)], *METHOD: Moscow Yearbook of Social Studies*, 11, 422-442.

FÖRSTER, C., PAPARELLA, C., DUCHEK, S., GÜTTEL, W. H. (2022), Leading in the Paradoxical World of Crises: How Leaders Navigate Through Crises, *Schmalenbach Journal of Business Research*, 74(4), 631-657.

FRIEDRICH, J., BUNKER, I., UTHES, S., ZSCHEISCHLER, J. (2021), The Potential of Bioeconomic Innovations to Contribute to a Social-ecological Transformation: A Case Study in the Livestock System, *Journal of Agricultural and Environmental Ethics*, 34(4), 24.

GEELS, F. W. (2002), Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-level Perspective and a Case-study, *Research Policy*, 31(8-9), 1257–1274.

GILL, J., PRICE, I. (2022), A Meme-based Research Programme for Management and Organization Studies, *International Journal of Management Reviews*, 24(3), 307-455.

GOLOB, U. (2018), Sense-making, in Heath, R. L., Johansen, W. (eds), *The International Encyclopedia of Strategic Communication*, Hoboken, NJ, Wiley, 1-9.

GÖPEL, M. (2016), *The Great Mindshift*, New York, NY, Springer.

GRAUPE, S. (2019), *The Basho of Economics: An Intercultural Analysis of the Process of Economics*, Frankfurt, Ontos Verlag.

GRAUPE, S. (2020), Change Is Always as a Last Resort Change in Habits of Thought: For a New Biodiversity of Cognition in the Face of Today's Crisis, *International Journal of Pluralism and Economics Education*, 11(3), 243-254.

GREENBERG, R., BERTSCH, B. (eds) (2021), *Cynefin: Weaving Sense-making into the Fabric of Our World*, Cognitive Edge – The Cynefin Co.

GUIJT, I., VERONICA, M., HANCHAR, A., DEPREZ, S., MUCKENHIRN, R. (2022), *The Learning Power of Listening*, Rugby, UK, Practical Action Publishing.

HEDLUND-DE WITT, A. (2013), Worldviews and Their Significance for the Global Sustainable Development Debate, *Environmental Ethics*, 35(2), 133-162.

HEMEL, U. (ed.) (2019), *Weltethos Für Das 21. Jahrhundert*, Freiburg, Herder.

HILT, A. (2005), *Ousia, Psyche, Nous: Aristoteles' Philosophie der Lebendigkeit*, Freiburg (Breisgau), Munich, Alber.

HÖGBERG, K. (2021), Between Hope and Despair Sensegiving and Sensemaking in Hotel Organizations during the COVID-19 Crisis, *Journal of Hospitality and Tourism Management*, 49, 460-468.

IFTIKHAR, R., MÜLLER, R. (2019), Taxonomy among Triplets: Opening the Black Box, *International Journal of Management*, 10(2), 63-85.

JOHNSON, S. G. (2019), Toward a Cognitive Science of Markets: Economic Agents as Sense-Makers, *Economics*, 13(1), 20190049.

JOLY, P.-B. (2017), Beyond the Competitiveness Framework? Models of Innovation Revisited, *Journal of Innovation Economics & Management*, 22(1), 79-96.

JONES, P. (2015), Sensemaking Methodology: A Liberation Theory of Communicative Agency, *Epic: Advancing the Value of Ethnography*, [online, URL: https://www.epicpeople.org/sensemaking-methodology/, accessed March 24, 2022].

JOSEPH, P. B., MIKEL, E. (2014), Transformative Moral Education: Challenging an Ecology of Violence, *Journal of Peace Education*, 11(3), 317-333.

KANDA, W., KIVIMAA, P. (2020), What Opportunities Could the COVID-19 Outbreak Offer for Sustainability Transitions Research on Electricity and Mobility?, *Energy Research & Social Science*, 68, 101666.

KLEIN, G., MOON, B., HOFFMAN, R. R. (2006a), Making Sense of Sensemaking 1: Alternative Perspectives, *IEEE Intelligent Systems*, 21(4), 70-73.

KLEIN, G., MOON, B., HOFFMAN, R. R. (2006b), Making Sense of Sensemaking 2: A Macrocognitive Model, *IEEE Intelligent Systems*, 21(5), 88-92.

KUCKERTZ, A., BRÄNDLE, L., GAUDIG, A., HINDERER, S., MORALES REYES, C. A., PROCHOTTA, A., STEINBRINK, K. M., BERGER, E. S. C. (2020), Startups in Times of Crisis – A Rapid Response to the COVID-19 Pandemic, *Journal of Business Venturing Insights*, 13, e00169.

KÜNG, H., GEBHARDT, G., SCHLENSOG, S. (2019), *Walls to Bridges: The Global Ethic*, Mesa, AZ, iPub Global Connection LLC.

KURTZ, C. F., SNOWDEN, D. J. (2003), The New Dynamics of Strategy: Sense-making in a Complex and Complicated World, *IBM Systems Journal*, 42(3), 462-483.

LAM, L. M. C. (2014), *A Micro-Macro Sense-making Model for Knowledge Creation and Utilization in Healthcare Organizations*, Dissertation, Aberystwyth University.

LASZLO, C., WADDOCK, S., MAHESHWARI, A., NIGRI, G., STORBERG-WALKER, J. (2021), Quantum Worldviews: How Science and Spirituality Are Converging to Transform Consciousness for Meaningful Solutions to Wicked Problems, *Humanistic Management Journal*, 6(3), 293-311.

LINDEMAN, L. M., MCAUSLAND, A. (2020), *We Are Here. From Personal Narratives to Collective Insight: Applying SenseMaker in Palm Health Foundation's Healthier Together Communities*, West Palm Beach, FL, Palm Health Foundation.

LOORBACH, D., FRANTZESKAKI, N., AVELINO, F. (2017), Sustainability Transitions Research: Transforming Science and Practice for Societal Change, *Annual Review of Environment and Resources*, 42(1), 599-626.

LYNAM, T., FLETCHER, C. (2015), Sensemaking: A Complexity Perspective, *Ecology and Society*, 20(1), art65.

MAGER, F., SMITH, B., GUIJT, I. (2018), *How Decent Is Decent Work? Using SenseMaker to Understand Workers' Experiences*, Oxfam.

MAITLIS, S., SONENSHEIN, S. (2010), Sensemaking in Crisis and Change: Inspiration and Insights from Weick (1988), *Journal of Management Studies*, 47(3), 551-580.

MARTISKAINEN, M., SOVACOOL, B. K. (2021), Mixed Feelings: A Review and Research Agenda for Emotions in Sustainability Transitions, *Environmental Innovation and Societal Transitions*, 40, 609-624.

MAUSCH, K., HARRIS, D., DILLEY, L., CROSSLAND, M., PAGELLA, T., YIM, J., JONES, E. (2021), Not All about Farming: Understanding Aspirations can Challenge

Assumptions about Rural Development, *The European Journal of Development Research*, 33, 861–884.

MEDEIROS, K. E., CRAYNE, M. P., GRIFFITH, J. A., HARDY, J. H., DAMADZIC, A. (2022), Leader Sensemaking Style in Response to Crisis: Consequences and Insights from the COVID-19 Pandemic, *Personality and Individual Differences*, 187, 111406.

MILLER, R. (2018), *Transforming the Future: Anticipation in the 21st Century*, London, New York, Routledge.

ÖTSCH, W. O., GRAUPE, S. (eds) (2020), *Imagination und Bildlichkeit der Wirtschaft: Zur Geschichte und Aktualität imaginativer Fähigkeiten in der Ökonomie*, VS Verlag für Sozialwissenschaften.

PEDLER, M. (ed.) (2011), *Action Learning in Practice*, Farnham Burlington, Vt, Gower.

PIROLLI, P., RUSSEL, D. M. (2011), Introduction to This Special Issue on Sensemaking, *Human-Computer Interaction*, 26(1), 1-8.

PYKA, A., ARI, E., ALVA-FERRARI, A., URMETZER, S. (2022), The Bioeconomy Transition Process: Sailing Through Storms and Doldrums in Unknown Waters, *Journal of Innovation Economics & Management*, 38(2), 35-61.

RIEDY, C. (2020a), Discourse Coalitions for Sustainability Transformations: Common Ground and Conflict beyond Neoliberalism, *Current Opinion in Environmental Sustainability*, 45, 100-112.

RIEDY, C. (2020b), Storying the Future: Storytelling Practice in Transformative Systems, in Molthan-Hill, P., Luna, H., Wall, T., Puntha, H., Baden, D. (eds), *Storytelling for Sustainability in Higher Education: An Educator's Handbook*, Abingdon, Oxon, New York, NY, Routledge, 71-87.

RIEDY, C., WADDOCK, S. (2022), Imagining Transformation: Change Agent Narratives of Sustainable Futures, *Futures*, 142, 103010.

RITTEL, H. W. J., WEBBER, M. M. (1973), Dilemmas in a General Theory of Planning, *Policy Sciences*, 4(2), 155-169.

ROTH, F., KALUZA, B., PFEFFER, K., RÜMELIN, E., KIRCHNER, J., OVERMEYER, M., NEISSER, F., JACKWERTH-RICE, T., KILICASLAN, A., SAUTTER, J. (2022), Innovation in Times of Crisis: How Civil Protection Organizations in Europe Coped and Adapted During the COVID-19 Pandemic, *European Journal for Security Research*, 7(2), 139-161.

RUSSEL, D. M., STEFIK, M. J., PIROLLI, P., CARD, S. K. (1993), The Cost Structure of Sensemaking, in *Proceedings of the INTERACT'93 and CHI'93 conference on Human factors in computing systems*, 269–276.

SCHLAILE, M. P. (ed.) (2021), *Memetics and Evolutionary Economics: To Boldly Go Where No Meme Has Gone Before*, Cham, Springer International Publishing.

SCHLAILE, M. P., BOGNER, K., MUELDER, L. (2021a), It's More Than Complicated! Using Organizational Memetics to Capture the Complexity of Organizational Culture, *Journal of Business Research*, 129, 801-812.

SCHLAILE, M. P., EHRENBERGER, M. (2016), Complexity, Cultural Evolution, and the Discovery and Creation of (Social) Entrepreneurial Opportunities: Exploring a Memetic Approach, in Berger, E. S. C., Kuckertz, A. (eds), *Complexity in Entrepreneurship, Innovation and Technology Research*, Cham, Springer International Publishing, 63-92.

SCHLAILE, M. P., HECTOR, V., DAHLKE, J., PETERS, L., HILT, A., GRAUPE, S. (2023), Crisis-driven Economic Change: Insights into Innovation, Fundamental Human Needs, and Sensemaking During the COVID-19 Pandemic, in Henzler, I., Hues, H., Sonnleitner, S., Wilkens, U. (eds), *Extended Views: Gesellschafts- und wirtschaftswissenschaftliche Perspektiven auf die Covid 19-Pandemie*, Cologne & Vienna, Böhlau, 127-141.

SCHLAILE, M. P., KASK, J., BREWER, J., BOGNER, K., URMETZER, S., DE WITT, A. (2022), Proposing a Cultural Evolutionary Perspective for Dedicated Innovation Systems: Bioeconomy Transitions and Beyond, *Journal of Innovation Economics & Management*, 38(2), 93-118.

SCHLAILE, M. P., KNAUSBERG, T., MUELLER, M., ZEMAN, J. (2018), Viral Ice Buckets: A Memetic Perspective on the ALS Ice Bucket Challenge's Diffusion, *Cognitive Systems Research*, 52, 947-969.

SCHLAILE, M. P., URMETZER, S. (2021), Transitions to Sustainable Development, in Leal Filho, W., Azul, A. M., Brandli, L., Lange Salvia, A., Wall, T. (eds), *Decent Work and Economic Growth*, Cham, Springer International Publishing, 1067-1081.

SCHLAILE, M. P., URMETZER, S., BLOK, V., ANDERSEN, A., TIMMERMANS, J., MUELLER, M., FAGERBERG, J., PYKA, A. (2017), Innovation Systems for Transformations towards Sustainability? Taking the Normative Dimension Seriously, *Sustainability*, 9(12), 2253.

SCHLAILE, M. P., URMETZER, S., EHRENBERGER, M. B., BREWER, J. (2021b), Systems Entrepreneurship: A Conceptual Substantiation of a Novel Entrepreneurial "Species", *Sustainability Science*, 16(3), 781-794.

SCHLAILE, M. P., VEIT, W., BOUDRY, M. (2024), Memes, in Dopfer, K., Nelson, R. R., Potts, J., Pyka, A. (eds), *Routledge Handbook of Evolutionary Economics*, London, Routledge, 235-248.

SNOWDEN, D. (2005), Strategy in the Context of Uncertainty, *Handbook of Business Strategy*, 6(1), 47-54.

SNOWDEN, D. (2011), Naturalizing Sensemaking, in Mosier, K. L., Fischer, U. M. (eds), *Informed by Knowledge: Expert Performance in Complex Situations*, New York, Psychology Press, 223-234.

SNOWDEN, D. (2021), Twelvetide 20:10 the Fifth School, [online, URL: https://www.cognitive-edge.com/twelvetide-2010-the-science-question/, accessed March 23, 2022].

SNOWDEN, D., RANCATI, A. (2021), *Managing Complexity (And Chaos) In Times of Crisis: A Field Guide for Decision Makers Inspired by the Cynefin Framework*, Luxembourg, Publications Office of the European Union.

SPIEGEL, P., PECHSTEIN, A., TERNÈS, A., GRÜNEBERG, A. (eds) (2021), *Future Skills: 30 zukunftsentscheidende Kompetenzen und wie wir sie lernen können*, Munich, Verlag Franz Vahlen.

TURNER, J., SNOWDEN, D., THURLOW, N. (2022), The Substrate-independence Theory: Advancing Constructor Theory to Scaffold Substrate Attributes for the Recursive Interaction Between Knowledge and Information, *Systems*, 10(1), 7.

UPTON, G. J. G. (2017), *Categorical Data Analysis by Example*, Hoboken, New Jersey, Wiley.

URQUHART, C., LAM, L. M. C., CHEUK, B., DERVIN, B. L. (2016), Sense-Making/Sensemaking, in Moy, P. (ed.), *Oxford Bibliographies in Communication*, Oxford University Press.

VAN DER MERWE, S. E., BIGGS, R., PREISER, R. (2020), Sensemaking as an Approach for Resilience Assessment in an Essential Service Organization, *Environment Systems and Decisions*, 40(1), 84-106.

VAN DER MERWE, S. E., BIGGS, R., PREISER, R., CUNNINGHAM, C., SNOWDEN, D. J., O'BRIEN, K., JENAL, M., VOSLOO, M., BLIGNAUT, S., GOH, Z. (2019), Making Sense of Complexity: Using SenseMaker as a Research Tool, *Systems*, 7(25), 1-19.

VASILESCU, D., URSOI, A., PELEAH, M. (2021), *The Power of Thick Data: Unveiling the Hidden Facets of COVID-19 Impact and the Next Emerging Development Issues. Country Case Study from the Republic of Moldova*, Development Futures Series, UNDP Global Policy Network Brief, September 2021.

WADDOCK, S. (2015), Reflections: Intellectual Shamans, Sensemaking, and Memes in Large System Change, *Journal of Change Management*, 15(4), 259-273.

WADDOCK, S. (2016), Foundational Memes for a New Narrative about the Role of Business in Society, *Humanistic Management Journal*, 1(1), 91-105.

WADDOCK, S. (2019), Shaping the Shift: Shamanic Leadership, Memes, and Transformation, *Journal of Business Ethics*, 155(4), 931-939.

WADDOCK, S. (2020a), Thinking Transformational System Change, *Journal of Change Management*, 20(3), 189-201.

WADDOCK, S. (2020b), *Transforming Towards Life-Centered Economics. How Business, Government, and Civil Society Can Build a Better World*, New York, Business Expert Press.

WADDOCK, S. (2021), Wellbeing Economics Narratives for a Sustainable Future, *Humanistic Management Journal*, 6(2), 151-167.

WAGNER, A., STRASSER, J., SCHÄPKE, N. (2022), *Overcoming Polarization in Times of Crises: A Research Project on Trauma and Democracy with over 350 Citizens*, Wardenburg & Berlin, Pocket Project e.V., Mehr Demokratie e.V.

WAMSLER, C., OSBERG, G., PANAGIOTOU, A., SMITH, B., STANBRIDGE, P., OSIKA, W., MUNDACA, L. (2022a), Meaning-making in a Context of Climate Change: Supporting Agency and Political Engagement, *Climate Policy*, 23(7), 829-844.

WAMSLER, C., OSBERG, G., PANAGIOTOU, A., SMITH, B., STANBRIDGE, P., OSIKA, W., MUNDACA, L. (2022b), Meaning-making in a Context of Climate Change: Supporting Agency and Political Engagement – Supplementary Material [online, URL: https://ndownloader.figstatic.com/files/37605936, accessed September 20, 2023]

WEICK, K. E. (1995), *Sensemaking in Organizations*, Thousand Oaks, Sage Publications.

WEICK, K. E., SUTCLIFFE, K. M., OBSTFELD, D. (2005), Organizing and the Process of Sensemaking, *Organization Science*, 16(4), 409-421.

Appendix

Part 1: SenseMaker® Framework

1) Present Narrative

1a. The Corona pandemic has put decision-makers like you in unprecedented situations. Imagine that after a long time of protective measures against the virus you are meeting a business partner in person again. Which example of a particular course of action you took during this time would you tell them about? Please share your story below:

1b. Please give your story a title or #hashtag:

2. (MCQ0) My feelings towards my story are...

Very positive/Positive/Neutral/Negative/Very negative/N.A.

3. (Triad 1) In my story, I experienced the world...

as always/as uncertain and chaotic/full of new opportunitier/N.A.

4. (Triad 2) I have…

developed new habits/maintained habits/given up old habits/N.A.

5. (Triad 3) 5. I have made my decisions...

spontaneously and intuitively/after deep contemplation and reflection/following logical and/or rational analysis or calculations/N.A.

6. (Triad 4) It was important to…

do different things/assign new meaning to my actions/do things differently/N.A.

7. (Triad 5) I acted...

because circumstances forced me/based on visionary impulse/from a sense of responsibility/N.A.

8. (Dyad 1) In my story, I focused only on...

economic success/crisis management/N.A.

9. (Stone 1) My decisions were guided by the following principles:

Sustainability & ecological responsibility/profit & growth/transparency & honesty/openness for novelty & creativity /securing the company's existence & maintenance of assets/conformity with regulations & compliance/humanity & justice/N.A.

2) Future Narrative

10. Please look ahead to a post-pandemic future. Describe your vision of the future spontaneously with a title, keywords, or a #hashtag:

11. (Triad 6) In general, the future is...

open and unpredictable/determined by the past/malleable through acting in the present/N.A.

12. (Triad 7) My own future will be shaped by...

randomness/chance & new unforeseen events/norms & rules/human creativity & ingenuity/N.A.

13. (Triad 8) My future decision-making will...

be like before the pandemic/assume new forms/be influenced by experiences during the pandemic/N.A.

14. (Stone 2) My future decisions will be guided by the following principles:

Sustainability & ecological responsibility/profit & growth/transparency & honesty/openness for novelty & creativity/securing the company's existence & maintenance of assets/conformity with regulations & compliance/humanity & justice/N.A.

3) Multiple Choice Questions

15. (MCQ1) Gender

16. (MCQ2) Age

17. (MCQ3) Degree of affectedness by the pandemic

18. (MCQ4) Type of organization

19. (MCQ5) Duration of employment

20. (MCQ6) Role in organization

21. (MCQ7) Founders of organization

Part 2: Statistical Analysis (Example)

We performed Pearson's goodness of fit test to test the independence of categorical variables. We tested for independence for all variables mentioned in the article and produced cobweb diagrams on this basis. Below, an example of the variables "founder" and "I experienced the world" is presented.

Null hypothesis H_0: There is no relation between the variables "founder" and "I experienced the world"

Alternate Hypothesis H_A: There is a significant relation between the variables "founder" and "I experienced the world"

Significance level (α) = *0.05*

Data frequencies are considered as a table with *I* rows and *J* columns: Rows correspond to triad "I experienced the world" (with categories center, left (L), left-right (LR), left-top (LT), right (R), top (T), top-right (TR)); Columns correspond to MCQ "founder" (categories yes, no). We calculated the expected frequencies (calculated by the row and sum totals of the table) and compared every observed cell frequency with the estimated frequencies. We performed the chi-squared test to test for independence (for a detailed explanation, see Agresti, 2019; Upton, 2017).

Observed frequencies:

	L	**T**	**R**	**LR**	**LT**	**TR**	**Center**
Yes	9	14	34	22	2	8	15
No	89	39	85	76	40	56	113

Expected frequencies:

	L	**T**	**R**	**LR**	**LT**	**TR**	**Center**
Yes	16.93	9.16	20.56	16.93	7.26	11.06	22.11
No	81.07	43.84	98.44	81.07	34.74	52.94	105.89

Chi-squared standardized residuals:

	L	**T**	**R**	**LR**	**LT**	**TR**	**Center**
Yes	-2.3159065	1.8430211	3.6389470	1.4805502	-2.2242557	-1.0690637	-1.8742150
No	2.3159065	-1.8430211	-3.6389470	-1.4805502	2.2242557	1.0690637	1.8742150

Chi-squared standardized residuals squared:

	L	**T**	**R**	**LR**	**LT**	**TR**	**Center**
Yes	5.3634227	3.3967269	13.2419354	2.1920288	4.9473136	1.1428973	3.5126819
No	5.3634227	3.3967269	13.2419354	2.1920288	4.9473136	1.1428973	3.5126819

If the variables are truly independent, then approximately 95% of the s_{ij} values (standardized residuals) will lie between the range (-2, +2) (or the squared value < 4). Consequently, squared values greater than 4 represent good chances of variation from independence and will result in lines drawn in the cobweb diagram between the affected categories (the diagram represents the visual relationships of the residuals of the chi-squared test).

We accept H_0 if squared value < 4; we reject H_0 if squared value > 4

p-value = 0.0001

p-value is smaller than significance level 0.05. We can reject H_0 and the results are statistically significant at the 5% level. There is a significant positive correlation between being a founder and the right corner of the triad; significant negative correlations with T and LT.