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# The Role of Psychological Safety in Team Training

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presented by

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Dear Stefano,

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“Greetings from Zurich!”

- Sonja

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## SUMMARY OF THESIS

Psychological safety is the central construct of my thesis. It defines the perception that interpersonal risk-taking is free from negative consequences (Edmondson, 1999). It allows individuals to voice ideas deliberately and gives them the confidence to make critical remarks (e.g., Morrison, 2014). Team training which leads to behavioral change and the translation of learning into practice align to enable a psychologically safe environment. This phenomenon-driven research was guided by the search for techniques and characteristics of facilitation, which help to establish safety. My interest was in investigating whether learning that becomes the basis of psychological safety can be transferred immediately into practice. The main research questions guiding my dissertation are: 1) How is psychological safety built; and 2) What is its effect on behavioral change within and beyond the training environment. To address this gap, I draw on early theory on behavioral change (Lewin, 1947a, 1947b) and technologies of rationality/foolishness (March & Olsen, 1976).

Paper 1 (*conceptual*) explores how psychological safety accumulates. My coauthors and I chose the context of Design Thinking (innovation method) because of its deliberating and playful nature. We found that the facilitator in a Design Thinking team, and how they guide the team through the method, plays a central role in establishing safety. Paper 2 (*interviews & network analysis*) builds on the interplay between facilitation and psychological safety. We adopted a pre-/post design method to follow practitioners who participated in Design Thinking training. Our results support our observations on behavioral change (Paper 1); some participants did replace routinized practices with new practice after returning to the organization. Paper 3 (*microethnography*) links the insights on behavioral change and its cognitive underpinnings (Paper 2) to the context of medical training. We found that leaders who integrate facilitative features into their leadership style elicit upward voice. Voice, in turn, defines a marker of a safe

training environment (Edmondson, 2003: 1447).

This dissertation adds to work on organizational learning by exploring the buildup of psychological safety and the different types of facilitation involved. The link between safety and its positive effect on team performance and organizational learning has been widely recognized (Edmondson & Lei, 2014). Behavioral change (during or immediately after training) functions as a measure of the effect of facilitative antecedents. Facilitation surfaced in the form of behavioral characteristics, i.e. how the “facilitator” balanced traditional teacher/student assumptions but also became visible in form of structural aspects of training, i.e. to induce task ambiguity or time pressure to carefully guide participants to experiment. My research findings can be seen as a call for more purposeful co-design of the technical and “facilitative” aspects of training. This combination was shown to trigger immediate behavioral change and the transfer of learnings into practice, which has potential for both practitioners and scholars alike.

## ZUSAMMENFASSUNG

Zentrales Konstrukt der Dissertation ist die psychologische Sicherheit. Dies ist die Wahrnehmung, dass zwischenmenschliche Risikobereitschaft frei von negativer Konsequenz bleibt (Edmondson, 1999). Dabei äußern Personen zwanglos ihre Gedanken und Ideen und riskieren auch kritische Bemerkungen einzubringen (z. B. Morrison, 2014). Die phänomengetriebene Arbeit beschäftigt sich mit Charakteristiken und Techniken, die zum Aufbau psychologischer Sicherheit beitragen. Untersucht werden Trainingsinhalte und Verhalten, die sich auf die Präsenz psychologischer Sicherheit zurückführen lassen. Teamtrainings, die Verhaltensänderungen und den Transfer von Lerninhalten in die Praxis ermöglichen, setzen eine solche "sichere" Atmosphäre voraus. Die übergreifenden Forschungsfragen sind 1) die Untersuchung des Aufbaus psychologischer Sicherheit und 2) die Konsequenz psychologischer Sicherheit auf das Verhalten der Teilnehmer inner- und außerhalb des Trainingsumfelds. Um dieser Forschungslücke zu entgegen, wird sich der Theorie der sozialen Veränderung (Lewin, 1947a, 1947b) und dem zweckrationalen Organisationsmodell (March & Olsen, 1976) bedient.

Der erste Artikel (konzeptionelle Ausarbeitung) untersucht den Aufbau psychologischer Sicherheit. Als empirischen Kontext wird Design Thinking (Innovationsmethode) gewählt, weil diese Methode zweckrationale Aspekte mit verspielten Elementen kombiniert. Es ist festzustellen, dass die Workshop-Moderatoren und ihre Art und Weise Teilnehmer entlang der Methode zu führen, eine zentrale Rolle bei der Schaffung von Sicherheit einnehmen. Der zweite Artikel vertieft mit Interviews und Netzwerkanalyse das Zusammenspiel von fazilitativer Moderation und psychologischer Sicherheit. Um die Mitarbeiter, die bereits an einem Design Thinking-Training teilgenommen haben, auch an den darauffolgenden Wochen zu begleiten, wurde ein Pre-/Post-Design implementiert. Die Ergebnisse stützen die Beobachtungen bezüglich der Verhaltensänderungen aus dem ersten Artikel. Zudem ersetzen einige

Teilnehmer unmittelbar nach dem Training etablierte Arbeitsweisen. Die eigens gewonnenen Erkenntnisse zu den kognitiven Grundlagen der Verhaltensänderung werden innerhalb des dritten Artikels (Mikroethnographie) in den Kontext von Simulationstraining in der Medizin übertragen. Unter der Voraussetzung einer sicheren Trainingsumgebung ist festzuhalten, dass durch einen fazilitativen Führungsstil der Vorgesetzten, Mitarbeiter Verbesserungsvorschläge oder Kritiken häufiger äußern. In diesem speziellen Kontext wird die Präsenz von Sicherheit durch das Einbringen der Mitarbeiter manifestiert (Edmondson, 2003: 1447).

Die aufgeführten Studien erweitern Literatur zu organisationalem Lernen, indem sie den Aufbau psychologischer Sicherheit aus dynamischer Perspektive, dem graduellen Aufbau, betrachten. Verschiedene Formen der Moderation (*engl. facilitation*) stellten sich dabei als zentrales Instrument heraus. Der Zusammenhang zwischen Sicherheit und dessen positive Auswirkung auf Teamleistung und organisationalem Lernen ist ein etabliertes Konzept in der Management-Theorie (Edmondson & Lei, 2014). Verhaltensänderung (während oder unmittelbar nach dem Training) fungierte als Mass für die Wirkung fazilitativer Elemente.

Facilitation, als spezielle Form der Moderation, zeigt sich in strukturellen Aspekten des Trainingsformats aber auch in Form von Verhaltensmerkmalen, d. h. wie der Moderator traditionelle Annahmen bezüglich der Rollenverteilung von “Lehrern und Schülern” nivellierte. Ein Beispiel hierfür sind bewusst “Unsicherheiten” oder Mehrdeutigkeiten bezüglich der zu erfüllenden Aufgabe zu schaffen, um so das freie Experimentieren der Teilnehmer zu fördern. Die Ergebnisse der Dissertation können in der Aufforderung zusammengefasst werden, technische und fazilitative Aspekte in der Konzeption von Training parallel zu gestalten. Die Kombination beider Aspekte führt unmittelbar zu einer Veränderung des Verhaltens und ermöglicht Teilnehmern den Transfer in die Praxis—eine Erkenntnis, die sowohl für Praktiker als auch für Wissenschaftler grosses Potenzial birgt.

## CORE CONCEPTS

Organizational learning is a central concept and phenomenon in management scholarship (e.g., Levitt & March, 1988). The abilities to learn and to adapt are crucial for organizations' long-term success (Argote & Miron-Spektor, 2011: 1123). Organizational responsibility for ensuring that the firm accumulates these abilities rests on the firm members. However, organizational learning far exceeds the aggregate of individual learning efforts; rather, it can be considered a supra-individual concept (Fiol & Lyles, 1985: 804; Levitt & March, 1988). Organizational culture is one of the contextual factors, which shape the way individuals interact and learn from their experience (Schein, 1983, 1996a, 1999a, 1999b). Schein's pioneering work discusses what characterizes a culture favorable to learning, and how it is induced (Schein & Bennis, 1965, Schein 1993, 1996b). Schein proposed the notion of psychological safety, which has become a widely recognized concept, and further developed Lewin's early theory of social change (Lewin, 1947a, 1947b). Schein's contributions to organizational culture and learning comprise the theoretical underpinning of this dissertation. I use his constructs and their interaction to explain the different modes and antecedent forces of behavioral change, which emerged from my fieldwork. The principal research questions addressed in this thesis are:

*(1) How is psychological safety built?*

*(2) How does psychological safety affect behavioral change within and beyond the training environment?*

In what follows, I introduce the concepts central to my dissertation, namely psychological safety, facilitation, and behavioral change. I highlight some gaps in the literature in relation to each of these concepts and describe how I address them. My contribution to filling these gaps is based on the ongoing exchanges with my supervisor, who helped me derive my line of reasoning over the last few years. Thus, although throughout this introductory chapter I



use the first person singular, it should be understood as a very grateful “we”. I further summarize each of the attached papers and discuss how the findings relate to the research questions. I conclude by highlighting the theoretical, methodological, and managerial implications and contributions of this thesis research.

*Psychological Safety.* Safety is the belief shared by the team that interpersonal risk-taking is safe (Edmondson, 1999: 350). This allows individuals purposefully to share knowledge, engage in activities aside from their formal roles, and to voice critical remarks (e.g., Edmondson, 1999, 2003; Baer & Frese, 2003; Morrison, Wheeler-Smith & Kamdar, 2011; Liang, Farh, & Farh, 2012). The concept of psychological safety was proposed first by Schein and Bennis (1965). They conceptualized safety as a condition favoring individual adaptations to behavior in response to changes in the environment. Interestingly, the notion of psychological safety did not receive further scholarly attention until the late 1990s (Edmondson & Lei, 2014). A recent review by Edmondson and Lei (2014) discusses the advances along the past two decades. Among them are the various conceptualizations of psychological safety, i.e. its mediating and moderating effects, and the idea of safety as an outcome. More importantly, Edmondson and Lei provide an overview of the direct positive link to organizational learning and performance. While a fair amount is known about how to measure safety and its substantial impact on performance, research on its buildup is scarce. Edmondson and Lei (2014: 38) call for a dynamic view in future research also because safety is a fragile state. Over time, teams develop routines and implicit norms. The degree of individual safety changes throughout the process of team growth and can be destroyed abruptly and sustainably by a single, negative event (e.g., a criticism from a supervisor). Hence, exploring how safety is accumulated might provide valuable insights related to the “repair” of safety and to build a baseline of safety for teams with changing membership (e.g., medical teams or industry task force teams). Paper 1

relies on observations to explain how safety is built. I propose a concept of safety, in which facilitation plays a moderating role, allowing the participants to achieve a deliberate state. To further advance research on the dynamic aspects of safety, I developed a mixed-method approach to move beyond self-reports as an established measure for safety (see Paper 2). Observations and interviews allowed me to explore how individuals reflect on experience of establishing a safe zone. The results of the network analysis shed light on the transfer of learning related to being “exposed” to psychological safety.

*Facilitation.* Schein argues that the occurrence of change and learning requires a sufficient level of psychological safety and positioned facilitation as lever to do so (Schein, 1996b). Schein introduced the term facilitation, which he defines in this context as the ability to establish a safe zone and as the “true artistry of change management” (Schein, 1996b: 30). Facilitation is the catalyst of behavioral change. The ability to adapt to change is necessary for organizations to respond to the demands imposed by today’s complex and fast-moving business environment. Regardless of whether the change is caused by an environmental push or by individuals choosing purposefully to experiment with new methods and “behaviors”, a safe environment will support their change effort. Again, Schein (1996b) provides explicit guidance on the establishment of such a favorable learning environment. He uses the term “parallel-system” to describe a context, in which individuals can detach from institutional norms and engage in change (Schein, 1996b: 30). Once “unfrozen” from ingrained behavior, the individual can experiment with new techniques and “refreeze” the new behavior on returning to the work context. The facilitator as the change agent plays a crucial role in steering the individuals in the time to achieve safety. Nevertheless, despite this early contribution and reasoning from Schein, the “soft” factors of training and its effect on the processing of learning remain underrepresented in the organizational change literatures. The focus of change lies often on

technical aspects, such as how organizations introduce new systems like Six Sigma or Lean Management (e.g., Parast, 2011; Barney, 2002). Monitoring the rollout of change and how the specific tools are fitted to the specific organizational context is one of the focuses of practitioner-oriented work (e.g., Bloom, Sadun, & Van Reenen, 2012). However, a recent exception is Google and its large-scale study of team performance. Its “Aristotle” project examined 180 teams and found that psychological safety was a common thread, which promoted team cohesion and efficient functioning (Duhigg, 2016). This finding might persuade other leading organizations to consider both the factual aspects of team composition as well as the “soft” factors, such as the importance of an atmosphere of mutual respect and deliberate risk-taking (Edmondson, 1999). Nevertheless, the establishment of safety remains an underinvestigated phenomenon among scholars and practitioners alike. To try to fill this gap, I focus on the role of facilitation in building psychological safety from two perspectives. First, I studied “experienced” facilitators who are familiar with establishing a safe zone. These facilitators teach students and practitioners as externals using a single teaching format (Papers 1 & 2). Second, I examined a set of leaders in relation to the facilitative aspects of their leadership style (Paper 3).

*Behavioral Change.* In the previous paragraph, I referred briefly to the three-step model of behavioral change. Lewin (1947a, 1947b) is the originator of the “unfreeze-change-refreeze” model, and this pioneering work was further developed by Schein in the 1990s (Schein, 1992, 1996a, 1996b, 1999a). What sets the Schein/Lewin model apart, among other attributes, is its integration of psychological safety and cognitive restructuring. Its major contribution is a more elaborated view of the factors that influence each of the three steps (Zand & Sorenson, 1975). Schein’s contributions to the model are central to my thesis since they highlight the role of balancing emotions for behavioral change. While Lewin stresses the presence of opposing

forces, Schein discusses facilitation as a way to balance these forces within a safe environment. Schein introduced learning anxiety (“fear of changing, based on a fear of the unknown”, Schein, 1995: 4) but then goes on to propose the notion of survival anxiety (“in order to survive and thrive, I must change”, Schein, 1995: 5). For change to emerge, survival anxiety must outweigh learning anxiety. Schein suggests a focus on reducing learning anxiety by means of psychological safety (Schein, 1995). The accumulation of safety is the responsibility of the facilitator. I build on his reasoning and rely on microethnography to shed light on the anxious state of the learner (tense posture as a manifestation of inhibiting forces) and individuals’ use of voice as a motivating force (Paper 3). Schein also developed the intermediary step in Lewin’s three-step model and introduced a more fine-grained reasoning in relation to the process of cognitive restructuring. Cognitive processing varies in individuals undergoing change but research on how it unfolds in organizational contexts is scarce. I found that participants in a Design Thinking workshop processed their experiences differently, and according to three modes of integrating (or not) what was learned in their practice (Paper 2).

*Phenomenon and Unit of Analysis.* The introduction of core concepts helps to collapse these insights into an overarching phenomenon, which is the aim of my thesis—to explore the role of psychological safety and facilitation for organizational learning. Argote and Todorova (2007: 197) argue that “psychological safety is likely to lead to more mindful processing of experience, where members feel free to express their views (Edmondson, 1999)”. Connecting the idea of mindful processing to Schein and Lewin’s theorizing highlights the importance of cognitive restructuring for behavioral change. Mindful processing describes the revisiting of known concepts, their broadening, and their translation into behavioral change (Schein, 1996b: 30). As Dewey (2019) puts it: “We do not learn from experience [...] we learn from reflecting on experience”. Since organizational learning is a multidimensional concept, I employ different

units of analysis. However, there is a central dimension, which defines the team-level, since psychological safety is a belief developed and held by the team within a closed system. In contrast, behavioral change due to experiencing safety (in the moment) or having experienced it (post-dimension) occurs at the individual level. The influence of emotions on change, which I integrate, is also linked to the individual level. In terms of organizational learning, I explored how structural aspects such as the firm's strategic orientation, allow (or not) for behavioral change to occur. In a more indirect and implicit way, I studied how ingrained organizational norms make it more difficult to "unfreeze" behavior, which is the initial step in change.

*Empirical Context.* I studied the role of psychological safety in training provided to innovation and medical teams. Papers 1 and 2 focus on Design Thinking as a teaching format for innovation teams. Design Thinking is aimed at delivering radical product and service innovations via a structured design-inspired process. The term "Design Thinking" goes back to Archer's work in the 1950s (see Bayazit's (2004) review of design research). However, it was in 1991 that David Kelley founded his design consultancy IDEO and popularized the approach used widely today (e.g., Camacho, 2016). While the "technical" aspects of Design Thinking have received fairly extensive scholarly attention (e.g., Carlgren et al. 2016, Liedtka 2011), less is known about the softer aspects of this approach (Johansson-Sköldberg et al., 2013, Elsbach & Stigliani 2018, Fixson & Rao, 2014). I began to participate in Design Thinking workshops for students and practitioners, which proved to be enjoyable and light-hearted with the result that these early observations became my motivation to study how this light and safe ambiance arises. The importance of facilitation for creating this ambiance prompted me to explore whether my findings held for a dissimilar empirical context. The facilitation I explore in Papers 1 and 2 provides a "baseline", which emerges from the rigidity of the Design Thinking process but leaves the participants sufficient space for deliberate exploration. The generation of novel

ideas by innovation teams is generally not time-critical and relies on stable team membership. In contrast, medical teams work under extreme conditions: Time is scarce and the patient's well-being is an immediate indicator of how well the team performed (Klein et al., 2006). My interest was in whether medical team facilitators (team leads) demonstrate facilitative features, and if so, how their efforts are made visible and “measurable” in this specific context.

*Analytical Approach.* To study the dynamic aspects of psychological safety and facilitation, I deployed a mixed-method approach. I summarize the findings from my initial observations on Design Thinking in Paper 1, which is a conceptual piece. I relied also on interviews (Gioia method) and sociometric data (network analysis) to explore behavioral change in and beyond the training environment (Paper 2). Video analysis (microethnography) revealed the facilitative aspects of leadership and the emotional underpinnings of behavioral change (Paper 3).

## SUMMARY OF PAPERS

Psychological safety supports a more nuanced processing of experience (Argote & Todorova, 2007; Edmondson & Lei, 2014). The visible outcomes of this cognitive breadth include a positive impact of psychological safety on team performance and organizational learning (Edmondson, 1999, 2003). How psychological safety emerges and the contextual and behavioral factors that promote it, remain underexplored. Little is known also about the transferability of behavioral change adopted in a safe environment. In what follows, I summarize each of the attached papers and link the findings to my research questions:

*(1) How is psychological safety built?*

*(2) How does psychological safety affect behavioral change within and beyond the training environment?*

The processual view model below is used to describe my findings. This model combines the insights from each of the papers in an inductive manner—by moving back and forth between the raw data and the initial findings until saturation. I organize my findings along the environment in which they occurred: during (*training environment*) and after training (*organizational context*). I differentiate between *contextual* (e.g., a “playful”, craft shop-like training space) and *facilitative antecedents* (e.g., voice-engaging leadership style). These activities and behaviors in aggregate lead to the accumulation of psychological safety during team training. Behavioral change as the result of exposure to safety emerges during training (e.g., a more “upward” voice during teamwork) and after return to the organizational environment. Figure 1 does not provide an explicit view of behavioral change but treats it as a manifestation of the presence of psychological safety. In Design Thinking (Papers 1 & 2), behavioral change emerges as the deliberate behavior of workshop participants—a

manifestation of a safe and judgment-free atmosphere. Paper 3 relies on Edmondson’s conceptualization, which defines speaking up (i.e., verbalizing an idea, contributing a critical remark) as a “behavioral manifestation of [psychological safety]” (Edmondson, 2003: 1447). In terms of the post-processing of experience of a safe environment, I introduce the distinction between *technical learnings* (e.g., early prototyping or the application of empathy tools) and *safety-enabled learnings*, which includes learning that allows the replacement of previous practice with the techniques acquired during training. Safety-enabled outcomes entail application of mechanisms in practice that lead to establishment of safety. This distinctive type of transfer builds on two notions. First, that the participant is able to understand the uniqueness of the atmosphere in the safe zone and to replicate it in practice. Second, a novel conceptualization of psychological safety as both the means to enable change and the content of the change. Paper 2 discusses the reasoning supporting this finding. Paper 1 identifies facilitation as an important lever to establish safety. Paper 3 investigates facilitation in relation to a set of leaders in the unique context of medical simulation training.

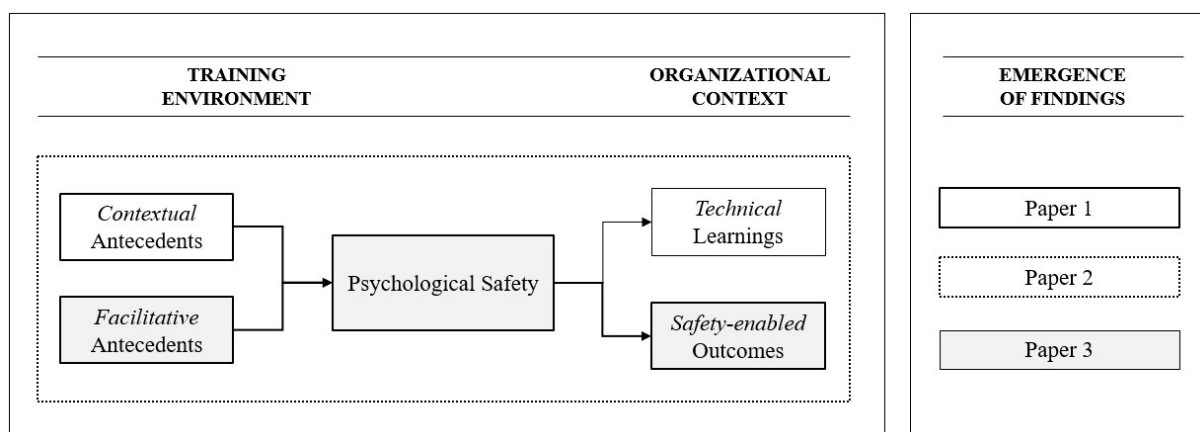


Figure 1: Processual View on the Role of Psychological Safety in Team Training



– Paper 1 –

**Designing New Directions:**  
Using Design Thinking to blend the Rational and Foolish Aspects  
of Problem-Solving

If we teach today's students as we taught yesterday's, we rob them of tomorrow.  
— John Dewey (online source, 2019)

What is the best way to train decision makers for an increasingly disruptive business environment? In this conceptual paper, we introduce a teaching strategy to engage students in a discussion of problem-solving strategies, which are both “foolish” and “rational”. For educators, we provide a detailed explanation of the rationale behind this strategy.

We suggest that the key challenge for teachers and mentors is embracing and systematically addressing the inherently dynamic nature of the problems that their students encounter. Problems evolve over time, passing from phases of high uncertainty to phases of greater stability and predictability, and back again. We argue that insights from design sciences could help us to overcome the primacy of pure, instrumental rationality and develop better methods to support business leaders to navigate these evolutionary processes. In particular, we suggest moving beyond the traditional taxonomic approach to problem solving—within which problems are either ill-defined or well-structured—toward a more flexible and realistic approach in which the problem is a “moving target”, evolving dynamically in response to both environmental change and purposive behavior. We argue that management students benefit from rational-foolish elements to overcome the primacy of pure rationality. Strategies such as Porter's five forces (Porter, 1980) provide a neat example of a rational-analytic grid used to teach students how to fit a variety of problems. Yet, ill-defined problems demand a more versatile approach and different tools.

We propose Design Thinking as a way to reconcile alternative problem-solving strategies (“rational” and “foolish”) and argue that psychological safety plays an important enabling role. We suggest also that design sciences more generally can allow a rethinking of how business schools should train tomorrow’s industry leaders. To do so, we borrow from March and Olsen’s (1976) early “technology of foolishness” and treat Design Thinking as an operationalization of their proposition. Design Thinking is a problem-solving method is popular with practitioners and provides a platform featuring both structure (rational-analytic) and play (rational-foolish). Our teaching strategy presents a combination of well- and ill-structured tasks which support students understanding of how different strategies fit better (or not) with the problem at hand. First, we engage students in a discussion on the dichotomy of problems making them play different tasks. Second, we guide them through the implementation and discussion of Design Thinking as a method that allows decision-makers to follow the evolution of a problem over time. In so doing, we discuss the role of psychological safety in making this methodology successful. In addition to providing versatile tools, Design Thinking allows the accumulation of psychological safety. How is this achieved? Our observations suggest two factors that create a safe environment: 1) ego depletion (*contextual antecedent*) through familiarization exercises within the team; and 2) a creatively oriented physical work environment or ideation space (*contextual antecedent*). In addition, facilitation, a distinctive teaching style (*facilitative antecedent*) acts as a moderator and helps the team gradually to attain psychological safety and reduce self-restraint. Reduced self-restraint (*safety-enabled outcome*) refers to more open and fearless display of imperfection to peers. We argue that soft factors, such as a safe atmosphere, are a necessary condition for the shift between rational and foolish behavior, which is required for creativity.

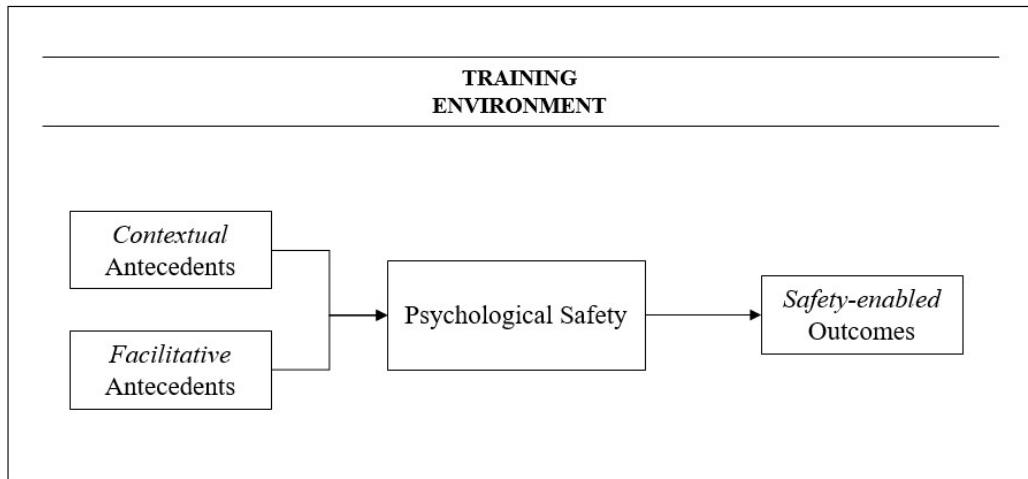


Figure 2: Buildup of Psychological Safety in Design Thinking

To conclude, Paper 1 addresses the first research question of how psychological safety is built by providing the following answer: Design Thinking relies on familiarization games (ego depletion) and an engaging, playful work environment (ideation space) to achieve a state we describe as reduced self-restraint. Achievement of this safety-enabled state is moderated by facilitation, an “against tradition” teaching style. For example, our observations showed that facilitation reduces the hierarchical distance based on traditional assumptions about teacher/student roles.

Paper 1 addresses the second research question about how psychological safety affects behavioral change within and beyond the training environment by providing the following answer: We studied the training environment. As students and practitioners worked through the Design Thinking task sequence, they gradually achieve reduced self-restraint and behavioral change. In this unique state, certain group dynamics are discouraged; these include power play, pointing out mistakes, and generic ruling-out of (seemingly) unfeasible ideas. In contrast, intuitive judgment, improvisation, and prompt action emerge as guiding principles for the phases of the process of building psychological safety. Participants steadily move towards this deliberating state. For example, we observed an abandonment of implicit rules when towards

the end of one teaching session, some students were walking around the room with seating cubes balanced on their heads while the team continued to discuss its findings.

– Paper 2 –

**Better Safe than Sorry:**  
Design Thinking as Episodic Change

[L]earning organizations have to have the shared belief that the world around them is malleable, that they have the capacity to change their environment, and that ultimately they make their own fate. If we believe that the world around us cannot be changed anyway, what is the point of learning to learn. Relax and make the best of your fate. A learning culture must be pro-active and pragmatic in its world view.

— Edgar Schein (1995: 13)

How does episodic organizational change, in the form of a Design Thinking intervention, unfold? To study how and to what extent participants process and integrate learning, we followed a world-leading water-systems firm, which introduced Design Thinking to trigger innovation. We study how workshop participants changed or not their behavior in its aftermath. We develop a process model of change which explains the different possible outcomes of an episodic change initiative, in response to both emotional and cognitive triggers.

To investigate the effect of this intervention, we relied on a mixed-method approach and a pre-/post-test design. We employed this hybrid approach to capture behavioral changes using different units of analysis. We measured the time individuals spent in close proximity to each other (using sociometric data) and explored how innovation activities were organized (based on observation and interviews). Sociometric analysis allowed us to study individuals across work units, and to analyze changes in how they exchanged and shared learning through face-to-face interactions. Our pre-/post-test design revealed individual modes of “cognitive restructuring” and “refreezing change” (Schein, 1996b), while the sociometric data shed light on the changes to network structures.

Taken together, our findings show how a single episode of Design Thinking is capable of triggering three modes of integrating change. First, some participants failed to implement change; they either required external support to internalize the learning (*technical learnings*) or considered the current organizational structure as immutable (*no learnings*). Second, some participants immediately implemented design-inspired procedures (*safety-enabled learnings*) based on the ability to distinguish between the technical and “soft” elements of Design Thinking.

Our findings suggest also that psychological safety plays a key role in Design Thinking by enabling participants to balance the positive (composure) and negative (anxiety) emotions, which arise during the process. *Contextual antecedents*, which define the anxiety-inducing antecedents to psychological safety, include time pressure, inhibition, and task ambiguity. In the case of *facilitative antecedents*, the elements that induced composure as a positive emotion include holism, facilitation, interdisciplinarity, equality, and detachment. The rationale for this operationalization of behavioral change is based on psychological safety and resonates with Schein/Lewin’s theory of change (Lewin, 1947a, 1947b; Schein, 1990, 1996b). We build on their three-step model by linking the change process to behavioral responses, and show that some participants replaced institutionalized practices in the post-phase.

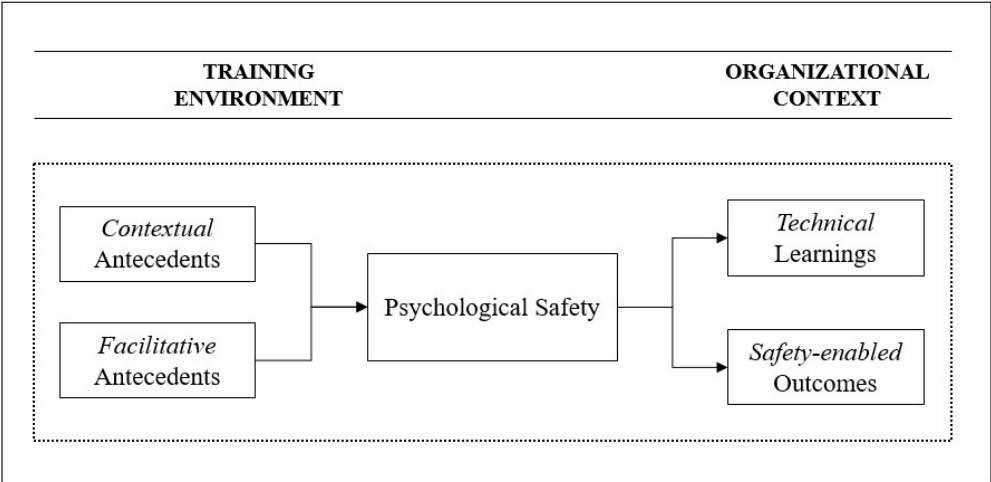


Figure 3: Transfer of Psychological Safety in Design Thinking

To conclude, Paper 2 addresses the first research question of how psychological safety is built by providing the following answer:

We build on the findings from Paper 1 and focus on the four steps involved in the Design Thinking process to depict the structural aspects of facilitation. So far, we have treated facilitation as teaching style. Paper 2 revealed the existence of task ambiguity, time pressure and inhibition as anxiety-inducing aspects of the Design Thinking process. Inducing anxiety might seem counterproductive but it pushed the participants to explore the unknown and to experience that it is safe to display fallibility when verbalizing immature ideas for instance. The experience that negative consequences of such behavior are absent leads to repeat this experience and the further accumulation of safety.

Paper 2 addresses the second research question about how psychological safety affects behavioral change within and beyond the training environment by providing the following answer: Once psychological safety accumulated, it leads to behavioral changes during training similar to those observed in the first study (Paper 1). Following participants after they returned to the organization revealed how the experience of safety and the related content of training were processed. Decoupling emerged as mode of cognitive restructuring, which led some participants to integrate safety-enabling mechanisms in their daily routines, for example, by inducing more time pressure into existing meeting routines.

– Paper 3 –

**Standing at the Tipping Point:**  
How Facilitative Leadership engages Speaking Up

All problem-solving groups should begin in a dialogue format to facilitate the building of sufficient common ground and mutual trust, and to make it possible to tell what is really on one's mind.

— Edgar Schein (1993: 42)

How can facilitation as a specific leadership style be implemented in medical teams? What are cues for the emotional stimulation of individuals who decide to speak up? The hierarchical distance in medical teams and the volatility of the tasks involved define extreme conditions. Voicing one's ideas and views might be considered unsafe although the choice to remain silent could threaten the patient's well-being. We conceptualize upward voice as "ideas, suggestions, concerns, information about problems, or opinions about work-related issues [...] with the intent to bring about improvement or change" (Morrison, 2014: 174). We define voice as a *safety-enabled outcome* and rely on prior conceptualizations of voice as the act of "speaking up [as] a behavioral manifestation of [psychological safety]" (Edmondson, 2003: 1447). In addition, voice has been shown to impact directly team performance (e.g., Detert et al., 2013; Edmondson, 2003; MacKenzie et al., 2011). We deployed a microethnographic approach to analyze the unfolding of upward voice based on vocal, emotional, and spatial cues. Our sample includes twelve acute care teams, which solved cases in the simulation suite of a leading hospital.

Facilitation emerged as a leadership style, which resulted in more speaking up, i.e. to acknowledge the input from a team member and to provide an explanation for acting (or not) on the comment (*facilitative antecedent*). We build on Nembhard and Edmondson's (2006:



947) finding that it is the “words and deeds by a leader [...] that indicate an invitation and appreciation for others’ contributions”. We propose facilitative leadership as a strategy to overcome silence. To convert cognitive dissonance into behavioral change requires psychological safety, well-balanced learning anxiety, and facilitation (refer to Schein/Lewin’s theory of change).

Switching from silence to voice means that in a given moment promotive forces outweigh restraining ones. While the act of speaking up provides evidence of a psychologically safe state (Edmondson, 2003), facilitation was shown to ease the balancing of emotions (Schein, 1992; 1985). Schein (1996b) stressed the importance of facilitation for unfreezing ingrained behavior. He described the establishment of psychological safety through facilitation as the “true artistry of change management” (Schein, 1996b: 30; Schein & Bennis, 1965). Facilitation enables the individual to escape the constraints of institutionalized power structures and team dynamics. Hence, learning anxiety will be reduced, which might be the implicit mechanism for participants to overcome the tipping point and to voice their views. Our findings show further that these inner tensions are sporadically visible on the outside. We argue that gesticulation and posture are markers for the presence of inhibiting forces.



Figure 4: Facilitative Leadership as Antecedent to Upward Voice (as Safety-enabled Outcome)

To conclude, Paper 3 addresses the first research question of how psychological safety is built by providing the following answer: In Paper 3, we rely on prior conceptualizations by assuming that there is sufficient safety present in a team if upward voice occurs. We argue that daring to speak up “against” the team lead implies that the individual feels “safe enough” to do so. Facilitation emerged as a distinct leadership style employed by some of the observed team leads. This considerate way of leading includes responding to upward voice from colleagues by explicitly acknowledging it and explaining why (or not) their reasoning is being integrated in the next steps.

Paper 3 addresses the second research question about how psychological safety affects behavioral change within and beyond the training environment by providing the following answer: Similar to the study in Paper 1, this study was limited to the training environment. We observed teams that participated in simulation-based training. We conceptualized behavioral change as demonstration of upward voice. This was more frequent in teams led by facilitating leaders compared to other leadership styles. Some participants displayed tense gestures while engaging in voice, which accounts for the presence of inhibiting forces in these moments. However, these forces were overshadowed by motivating forces, which translated into behavioral change (upward voice).

## CONTRIBUTIONS

Psychological safety has a direct impact on team performance (e.g., Edmondson, 1999, 2003). Safety-enabled outcomes such as upward voice or the overwriting of routines are affected strongly by this team belief. I set out to explore the role of facilitative antecedents in the specific context of team training. All three of the attached papers provide insights on the operationalization of facilitation. Paper 1 highlights its moderating role and which other techniques (contextual antecedents) contribute to safety. Paper 2 discusses a distinct mode of cognitive restructuring which explains how exposure to facilitation and safety translates into learning. I conceptualized learning as behavioral change, which included the adoption of safety-building practices immediately after returning from training. This finding responds to the call to link the influence of contextual aspects to organizational learning, which moderates the processing of experience (Argote & Todorova, 2007). Paper 3 sheds light on facilitative leadership and shows how it allows individuals to voice their ideas or concerns. Ultimately, these contributions allow for a more elaborate decision-making and organizational learning. My findings respond to a call for more purposeful co-design of the technical and “facilitative” aspects of training. Their combination can trigger behavioral change and the transfer of learning into practice—which has potential for practitioners and scholars alike.

Below I highlight the theoretical, methodological, and managerial implications from these studies.

*Theoretical Contributions.* Paper 1 provides more knowledge about management education in the context of trying to engage students to progress beyond a bimodal perspective for classifying problems. We also want to raise awareness that problems change over time and that this requires different strategies to approach them efficiently. We argue that Design Thinking methods are valuable in this context because they provide a platform to combine

elements of rational choice (selecting alternatives on the basis of evidence) with elements of foolishness (pursuing an unjustifiable course of action), which enable problem-solvers to experiment and play (March & Olsen, 1976). We identified psychological safety as an important construct underpinning Design Thinking interventions, and suggest that it has the potential to unleash creative capacity and push participants to reflect on their everyday decision-making and how they might integrate more arbitrary action into otherwise rational procedures (Newark, 2018). Paper 2 extends the literature on episodic change by focusing on behavioral change as a measure of the process through which change unfolds. Our findings suggest that behavioral change constitutes a meaningful measure of the impact of episodic change. We shed light also on an emerging theme in Design Thinking scholarship that relates to the depiction of design tools and their ability to develop organizational culture (e.g., Elsbach & Stigliani 2018, Fixson & Rao, 2014). We also discuss the emotional aspects of change. We respond to a recent call management to reconnect discussions about change to that on emotions. We examined how Design Thinking balances negative and positive emotions and enables change through psychological safety. Paper 3 contributes in three ways. First, it extends work on voice by proposing a distinct facilitative strategy that nurtures the leader-member exchange in the discrete moment of speaking up. Second, it builds on Morrison's (2014) suggestion to apply Lewin's view that voice is being preceded by emotional imbalance. We show that the discrete moment of speaking up involves positive and negative emotions. Third, Paper 3 contributes to an emerging theme in management, which explores the mechanisms allowing effective coordination in medical teams, and discusses the importance of facilitation as an engaging leader etiquette.

*Methodological Advances.* In Paper 2, we employed a mixed method, pre-post design, which combines traditional data sources (interviews and observations) with novel sociometric

techniques to trace changes in individual behavior. A novel feature is that we study the perceptions and behaviors of both workshop participants and immediate colleagues who did not participate in the workshop. By combining interviews with sociometric data, we contribute to filling a methodological gap in the literature on psychological safety (Edmondson & Lei, 2014). Prior studies are mostly survey-based and rely on the measurement of psychological safety using Edmondson's (1999) seven-item scale. We capture individual-level changes based on self-reports, while network data allow us to shed light on the positioning of individuals in their networks. Exploitation of this hybrid design responds to a recent call from Edmondson to move the field towards cross-level research (Edmondson and Lei 2014). We provide a comprehensive picture of the impact of a single "innovation" event in an established organization. In Paper 3, we extend prior work on voice and leadership (e.g. Farh & Chen, 2018) with a dynamic, processual view of leadership which results, or not, in speaking up and rely on the fine-grained methodological approach of microethnography. The advantage of video-based ethnography is that it allows the analysis of "snippets" of behavior (Christianson, 2019; Balogun, Best & Lê, 2015). Moments of speaking up as the unit of analysis enabled us to disentangle "participants' talk (who says what, when, and how) [from] their embodied behavior (the relative location, movement and orientation of people and things)" (LeBaron, 2008: 1). This processual view of speaking up sets our study apart from recent work on voice and emotion regulation (Grant, 2013) and task-related leadership styles (Farh & Chen, 2018).

*Managerial Implications.* The teaching module proposed in Paper 1 introduces a format that will familiarize students with well- and ill-defined dimensions and different problem-solving strategies. One of the tasks requires an agile, playful approach, and invites students to explore in more detail the benefits of foolish behavior. We further explain how this logic is embedded in Design Thinking in combination with an evidence-based (rational) approach. We

want to equip students with design-inspired tools that will enable them to respond to multistage problems—types of problems displaying a continuum of variable features, where feedback on prior decision-making is scarce. The findings in Paper 2 suggest that Design Thinking could be implemented in the whole organization, regardless of the context, hierarchical position, or background of employees. It provides the tools to introduce safety as an interpersonal construct and to improve teams' innovative output. We consider it a useful method to achieve immediate integration of tools and mechanisms following just a single intervention. Scholars and practitioners alike should aim to identify existing training formats that offer “built-in” psychological safety to extend managers' repertoires of methods that are highly effective in practice. At the same time, managers responsible for implementing change programs could enrich existing formats by incorporating design tools, and a Design Thinking approach to facilitation would be useful for employees responsible for setting up and leading internal training. The distinct voice strategy proposed in Paper 3 could enhance simulation training and also help medical students. It is hardly surprising that some physicians describe themselves as “accidental leaders” (Collins-Nakai, 2006: 68). A “balcony view” is required to handle task complexity. Leadership training and specifically, leader-member exchange is underrepresented in the physician and resident training curricula (e.g., Blumenthal et al., 2012; Webb et al., 2014). Our findings could be integrated into debriefing sessions to raise awareness of the prevalence of silence and the difficulties involved in overcoming it—vocally and emotionally.

## PUBLICATION STATUS

Paper	Title	Authors	Contributions by PhD Candidate	Status
1	<b>Designing New Directions:</b> Using Design Thinking to blend the Rational and Foolish Aspects of Problem-Solving	<b>Sonja Förster</b> Philipp Bubenzer Stefano Brusoni	Conception of paper; analysis of and theorizing from trial data; drafting and revising the paper	<b>Under Review:</b> Academy of Management Learning and Education
2	<b>Better Safe than Sorry:</b> Design Thinking as Episodic Change	<b>Sonja Förster</b> Sebastian Feese Stefano Brusoni	Conception and design of the study; data collection; analysis of and theorizing from qualitative data; integration of results from quantitative data into theorizing; drafting and revising the paper	<b>Under Review:</b> Organization Science
3	<b>Standing at the Tipping Point:</b> How Facilitative Leadership engages Speaking Up	<b>Sonja Förster</b> Stefano Brusoni Michaela Kolbe Bastian Grande	Conception and design of the study; data collection; analysis of and theorizing from observational and video data; drafting and revising the paper	<b>Under Review:</b> Academy of Management Discoveries

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## **FULL PAPERS**

# PAPER 1

**DESIGNING NEW DIRECTIONS:  
USING DESIGN THINKING TO BLEND THE RATIONAL AND FOOLISH  
ASPECTS OF PROBLEM-SOLVING**

**Abstract:**

What is the best way to train decision makers for an increasingly disruptive business environment? We suggest that the key challenge for teachers and mentors is embracing and systematically addressing the inherently dynamic nature of the problems that their students encounter. Indeed, problems evolve over time, passing from phases of high uncertainty to phases of greater stability and predictability, and back again. This paper argues that insights from design sciences can help us overcome the primacy of pure, instrumental rationality and develop better methods to support business leaders who must navigate these evolutionary processes. In particular, we suggest moving beyond the traditional taxonomical approach to problem-solving—within which problems are, for example, either ill- or well-structured—toward a more flexible and realistic approach in which a problem can remain a “moving target,” dynamically evolving in response to both environmental changes and purposive behavior. We propose design thinking as a way to reconcile alternative problem-solving strategies (“rational” and “foolish”), argue that psychological safety plays a key enabling role, and suggest that design sciences more generally can help us rethink how business schools should train the industry leaders of tomorrow.

**Keywords:** Design Thinking, Technologies of Rationality and Foolishness, Psychological Safety, Problem-Solving, Lego Man Task, Marshmallow Challenge, Strategy Tools

## INTRODUCTION

To sustain their success in today's complex business environments, organizations must constantly make sense of ambiguity by interpreting and integrating distributed signals of dubious quality. Scholars have labored long and hard to develop tools and methods that help decision-makers to interpret these ambiguous signals, organize them somehow, and discern patterns that will help them attribute cause-effect relationships (Gambardella et al., 2018). The traditional, rational approach to problem-solving has addressed the issue by providing toolkits (e.g. Porter's Five Forces, 1980) that essentially reduce or negate uncertainty (March & Simon, 1958). While business schools have excelled in teaching this traditional, rational-analytic approach, it may have led them to produce "technocrats": students who are well prepared for addressing well-structured problems with low uncertainty, but wrong-footed by messy, multi-stakeholder challenges, as Maranville argues (Maranville, 2011). In consequence, and as March and Olsen proposed decades ago, such challenges may call for "technologies of foolishness" to complement the prevalent "technologies of rationality" (March & Olsen, 1976). March and Olsen make the argument in simple but forceful terms: "Individuals and organizations need ways of doing things for which they have no good reason. Not always. Not usually. But sometimes. They need to act before they think" (March & Olsen, 1976:75).

However, acting before thinking means letting go of conventional decision-making logic, allowing foolishness to preempt rational behavior. Following appropriateness-based frameworks steers our everyday decision-making process—as Weber, Adler, Foucault and other critics of the rationalization of society claim (Gordon, Whimster & Lash, 1987; Adler & Borys, 1996). The shackles of bureaucracy promise maximum output in return for minimal effort and resources. Teaching students to temporarily leave their pragmatic reasoning behind, and switch towards a more foolish, seemingly unjustifiable course of action is, we argue, precisely what design thinking exercises provide. They integrate conventional and foolish

thinking, and expand students' repertoires of problem-solving approaches. With the teaching module we propose, we not only respond to the call that business schools should equip students with more nuanced approaches to solving complex and ill-structured problems, but also introduce a format that integrates a refined version of rationality into the management curriculum (Dunne & Martin, 2006; Kark, 2011; Johansson-Sköldberg, Woodilla & Çetinkaya, 2013; Glen, Sucio, & Baughn, 2014).

### **Positioning**

From here on, we use the term “rational” as shorthand for “rational-analytic,” while “foolish” denotes “rational-foolish,” drawing on Simon’s (1993) view of rationality and its subcategories. Simon defines behavior as “rational” when action is well adapted to reach certain predefined goals. “Irrational,” in contrast, denotes poor adaptation towards such goals (Simon, 1993). Hence, “rational-foolish” thinking falls into the broader classification of rational, because it can help us to reach goals; if it were completely irrational, it would have no such usefulness.

In this article, we argue that there is value in both rational and foolish approaches, and that we should consider how to integrate them. In fact, it is true that problems may be classified as ill- or well-structured, and that each requires a different approach. However, limiting ourselves to these two alternatives might blind us to the fact that real-life problems evolve over time, often in non-sequential ways—particularly at times of radical transformation. We posit that the core challenge facing the field is to move beyond bimodal approaches and categorical distinctions to look at how problems (and the strategies they demand) change over time. We argue that design thinking<sup>1</sup> methods are invaluable here, precisely because they provide a

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<sup>1</sup> The term “design thinking” originated in L. Bruce Archer’s work in the 1950s (Archer, 1950). However, it was David M. Kelley, at Stanford and his design consultancy IDEO, founded in 1991, who popularized the approach that is widely used today (Camacho, 2016).



platform to combine elements of rational choice (selecting alternatives on the basis of evidence) with elements of foolishness (pursuing an unjustifiable course of action) that enable problem-solvers to experiment and play (March & Olsen, 1976).

### **The Dual Challenge Teaching Module**

To show how design thinking can be deployed, we propose a teaching module that unfolds as follows. First, students work through the Dual Challenge: a game where teams must solve two problems, one ill defined and one well defined, against the clock. Students are then debriefed on the problem-solving approaches they applied, after which the facilitator explains design thinking, its integration in practice, and the underlying mechanisms that define its value.

In this sequence, tackling the Dual Challenge allows students to experience the opposing dimensions of well- and ill-structured problems, and to discuss the commonalities and discrepancies of the approaches they apply. Then, keeping these contrasts in mind, they can learn design thinking as a blended approach that combines both rational and foolish elements. As design thinking is particularly well-suited for ill-defined endeavors, a discourse about the integration of design principles in practice—from staff training right through to design-infused organizational structures—lays the foundation for discussing the method’s key operating principles.

The final part of the teaching module is spent discussing the change in atmosphere that students perceive when they work in a “designerly” way. We argue that an atmosphere of *psychological safety* is crucial in allowing individuals to open up and explore. Such enhanced creative potential does not just fuel the output of the foolish exercises, but also supports switching between foolish and rational phases, and helps reassure the team that there are no negative consequences for taking interpersonal risks. The speed with which the method establishes such a cohesive team-level belief explains why participants often leave a design-

thinking intervention wondering what caused them to act so fearlessly. As Elsbach and Stigliani (2018) highlighted, these emotional, intangible experiences of design exercises cry out for further investigation. Through observations and informal discussions, we identified psychological safety as a key construct underpinning an effective design-thinking intervention, and believe it carries the potential not only to unleash creative capacity and experimentation temporarily, but also to prompt participants to reflect on everyday decision-making, and how they might integrate a little more arbitrary action into otherwise rational procedures (Newark, 2018).

## **Structure**

The rest of this article details the use and objectives of the teaching module for educators. It is structured as follows. First, we argue that while the distinction between ill- and well-structured problems does capture a fundamental, categorical difference, it is of little help in so-called “multistage settings” (Fang & Levinthal, 2009) where a given choice will not lead to a definite result, yet will still form the input for the upcoming decision. Therefore, we need to extend established teaching methods so that they do not merely focus on solving encapsulated problems, but instead introduce a method that can deal with variance across multiple stages. In design thinking, the problem space is explored via a structured sequence of actions, and continuously narrowed down towards a final, tangible prototype. We aim to build on prior work that has identified why design-thinking principles, with their foolish characteristics, should be introduced to the management classroom (Glen, Sucio, & Baughn, 2014), and set up a comparative approach: the Dual Challenge.

The Dual Challenge shows that there are different problem-solving strategies (“rational” and “foolish”) that lead to more or less beneficial results depending on the problem to which they are applied. Besides illustrating rational and foolish strategies, the Dual Challenge invites

students to reflect on the type of problems they face in daily life, and what repertoire of “algorithms” or routines they use to solve them. Its limitation is its simplification: It reduces problems to two distinct types, while in real life, problems might take on ill- or well-defined features at first, before evolving or moving along a continuum. In a section on firms’ initiatives to introduce design principles, we present examples of “foolish” concepts that are being integrated into corporate settings to account for precisely this reality. We posit that the structured combination or alternation of rational and foolish elements, as provided by design thinking, is particularly well suited for approaching this kind of volatility.

As students work through the foolish phase, they become more confident that there will be no harm or penalty for thinking aloud and voicing imperfect ideas—that is, that they are *psychologically safe* (Edmondson, 1999). As an underlying construct, psychological safety is vital not only for generating and building on each other’s ideas, but also to support effective collaboration and learning. Edmondson (2002) suggested translating psychological safety—a set of intangible interpersonal beliefs—into actionable steps to provide tangibility for practitioners. Closing our article, we argue that design thinking answers this need, offering the means to create a safe learning environment, which is crucial for solving ill-structured problems.

### **THE PROBLEM WITH PROBLEMS THAT DON’T STAND STILL**

Strategy tools such as Deming’s Plan-Do-Check-Act cycle (Imai, 1986), Porter’s Five Forces (Porter, 1980), the BCG growth–share matrix, or SWOT analysis (Humphrey, 2004), to name a few prominent examples, are classificatory instruments that are widely accepted and help practitioners to formalize their strategy-making process (Mintzberg, 2000). They are widely taught and commonly used, and with good reason. These tools enable managers to simplify the environment; identify and classify relevant variables; and transform messy processes into linear

sequences of tasks. Yet, their impact on performance is hard to assess. On the one hand, strategy tools compensate for the limitations of cognitive abilities in the face of complex scenarios by enabling simplification—often through visual representation (Cabantous & Gond, 2011; Kaplan, 2011; Jarzabkowski & Kaplan, 2015). On the other hand, their rigidity excludes the emotional and motivational attributes of the actors who deploy them, and does not necessarily leave much space for alternative logics (March, 2006). Hence, scholars are paying increasing attention to problem-solving strategies that suit the characteristics of ill-defined problems. As noted by Elsbach & Stigliani (2018), Simon’s (1969) analysis of problem-solving laid the foundations of the modern discussion about tools and methods for solving, mainly, well-structured problems. In so doing, Simon paved the way for the rationalist approaches to strategy-making, and their related toolkit. Yet, plenty of problems are not in fact well structured, but actually ill defined: goals are unclear; choice criteria are vague; and means and ends cannot easily be distinguished.

The relevance of the discussion on design coincides neatly with the conversation about ill-structured problems (Elsbach & Stigliani, 2018). Design approaches emphasize a combination of abductive, evidence-based reasoning with experimentation and playfulness (e.g., Dodgson, Gann, & Salter, 2005). They are iterative and open-ended. They are pragmatic, as they tend to focus on solving a problem for a specific user group. They demand playfulness, as March’s call for “technologies of foolishness” stressed long ago, in order to complement “technologies of rationality (March & Olsen, 1976). “For March, ‘[a] strict insistence on purpose, consistency, and rationality limits our ability to find new purposes,’ but in contrast, ‘play relaxes that insistence to allow us to explore alternative ideas of possible purposes and alternative concepts’ (March & Olsen, 1976: 77)” (Dodgson, Gann, & Phillips, 2013: 1359). Design-driven approaches use this foolishness (e.g., when thinking aloud in the ideation phase) to complement their rational components (e.g., when applying an evaluation grid in the idea-

evaluation phase). In recent years, design thinking has emerged as a platform to develop the conversation about the role of “foolishness” in solving ill-structured problems (e.g., Fixson & Rao, 2014; Liedtka, 2015, 2016; Elsbach & Stigliani, 2018).

Moreover, real-world problems comprise multiple life-cycle stages, with shifts between well- and ill-defined states. This characteristic is well captured by the extensive literature on multistage problems—i.e., situations in which a given decision does not generate immediate feedback from the environment, or those where a viable solution has been reached through experimentation, but it remains uncertain whether the same approach could also be applied to other ill-structured problems (e.g., Fang & Levinthal, 2009). Empirical work in strategy identifies several such multistage situations, in which outcomes can only be determined after passing intermediate stages, which in turn require different actions leading to intermediate outcomes (Fang & Levinthal, 2009).

For example, firms engaged in the effort to move away from their traditional core competencies to adopt new, emerging ones face this kind of situation; they must invest in and learn about a new technology without the benefit of market feedback. Mazzoleni (1999) looked at the adoption of control software in the machine-tool industry, and Henderson, Orsenigo, and Pisano (1999) studied the rise and impact of molecular biology in the pharmaceutical industry. Cattani (2006) analyzed Corning’s entry into the fiber-optics market, while Danneels (2011) focused on the transition from mechanical to electric typewriters. Tripsas and Gavetti (2000) elaborate on Polaroid’s failure to commercialize digital photography technologies, in which the firm had originally played a pioneering role. The ongoing discussion about 3D printing and additive manufacturing also looks at similar issues (e.g., Rosli, Beltagui, & Candi, 2017; Berman, 2012).

Such transitions require firms—often well-established ones—to depart step by step from the areas of technical competence on which their current products build, and invest in new

technologies well before they can use them to commercialize new products. To do so, they have to take a sequence of decisions without immediate market or environmental feedback. As this process unfolds, so the problems faced by the firms evolve: Some elements become more clearly understood, others less so. How problems evolve also depends on how and to what extent new capabilities replace, or must be integrated within, existing processes. For example, Henderson et al. (1999) show that molecular biology was simultaneously competence-destroying and competence-enhancing for pharmaceutical firms: Those who had already adopted rational drug-design techniques could diversify into molecular biology far more easily than those firms that still relied on random screening.

How do we prepare managers for such situations? We have learned much about how to mentor those who need to take decisions while facing well-structured problems—those for whom problem-solving methods and end states are known, yet there is uncertainty about the outcome (which, incidentally, means they are not actually all that “easy” to solve) (e.g., Simon, 1976; Laureiro-Martinez & Brusoni, 2018). Ill-structured situations, in contrast, involve loosely defined current and end states. The route to an ambiguous end state can be uncovered and explored through experimentation. We have growing knowledge on how to approach ill-structured problems, and how we should support those who are challenged by them with teaching and mentorship. Yet, how we train managers for the iterative back-and-forth *between* these two categories is less understood. We argue in the following that design thinking, its tools, and its rationale have the potential to create a learning environment specifically well suited for approaching exactly this kind of situation. Our argumentation is based on several years of experience with design-thinking methods, applied with both pre- and post-experience students, as facilitators of the method or as observers of such formats. Beyond the academic environment, we borrow from discussions with practitioners and firms who integrate design thinking as a new way to find disruptive solutions.

## THE DUAL CHALLENGE

The first step in engaging students in a discussion about alternative problem-solving strategies is convincing them that profoundly different types of problems do indeed exist, and that they require different approaches. The “Dual Challenge” provides an ideal context for students to visualize these differences and the varying performance of rational vs. foolish strategies.

### **Rationale for Task Selection**

The two chosen problem types reflect the extremes of the well-/ill-structured continuum. The well-defined setting is represented by the Lego Man task. Here, a Lego structure is shown upfront as a model, and the student teams must then reproduce it using an individual set of Lego bricks. The start and end states of this task are unambiguous, and the evaluation rationale and transformation activities to reach the final structure are equally well specified and structured (Goel, 1992). The ill-defined task, in contrast, is represented by Wujec’s Marshmallow Challenge, in which participants compete to construct the tallest freestanding structure they can, topped by a single marshmallow, using uncooked spaghetti sticks, string, and adhesive tape provided. In this case, the starting point, evaluation, and transformation activities are ambiguous, “dubious,” and less clearly framed. (For further instructions and references for both tasks, see the Teaching Note included in the Appendix.)

Transposing the logic behind these tasks to an organizational context, one example of a Lego Man-like scenario is budget planning. Determining budget allocation, scope, required personnel, and financial resources for specific projects constitutes a well-defined problem. Conversely, strategic planning is more like the Marshmallow Challenge, being characterized by severe ambiguity and uncertainty, both throughout the problem-solving process and about the final outcome. Forecasting the increase of earnings per share for a given period provides an example for a common financial objective. Indeed, some strategy scholars claim that it is almost

impossible to forecast goals that depend heavily on the development of (for instance) technological disruption or an increase in prices (Mintzberg, 1994).

Keeping the opposing dimensions of both tasks in mind, students experience how each problem type activates different cognitive processes, which influences the decision-making rationale (Schraw, Dunkle, & Bendixen, 1995). In terms of visual-haptic features, both challenges incorporate tactile interaction and immediate feedback (e.g., the collapse of a precarious spaghetti tower). Research in surgical training equipment, ergonomics, and human-machine interfaces has shown that haptic (as opposed to visual) feedback, as an isolated component, supports learning advances and facilitates the ability to alter subsequent activities (Morris et al., 2006; Birrell, Young, & Weldon, 2013).

### **Data Collection and Measures**

We collected data for the Dual Challenge in 2012, supplementing the Lego Man task data with data collected under the same conditions in 2010 and 2015. All participating students were enrolled in the part-time or full-time bachelor of science programs at the management school of a Swiss public university, and participated in the Organizational Behavior class taught by one of the authors. Also, all participants had at least one year's work experience. Before we introduce our results, we would like to highlight that the data collection and representation of results was meant for teaching purposes only. With this kind of feedback on students' performance, we intend to engage them in the discussion about alternative problem solving strategies, and wanted to support their reflection about what problems different strategies serve best. To do so, we embedded the Dual Challenge in two sessions in the middle of the term. The rationale for performing the tasks was not revealed to students upfront; however, a subsequent debriefing session provided detailed explanations of the underlying lessons and was used to



discuss their reflections. All study participants were randomly assigned to groups before beginning their tasks.

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Insert Table 1 about here  
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In 2012, students could choose either challenge; at other times, all students attempted only the Lego Man task. Table 1 provides an overview of student teams and measured variables. Planning time and construction performance were measured by student volunteers, who handled timekeeping throughout the tasks.

The Lego Man task allows a total of 40 minutes to complete the assignment, with a maximum of 30 minutes for the planning phase. Teams independently decided how long to spend on planning vs. assembly. However, the planning phase had to precede the assembly phase, and teams were asked to explicitly state when the switch was taking place, to guarantee accurate timekeeping. *Construction performance*, as the dependent variable, was assessed through teams' assembly times.

The Marshmallow Challenge, in contrast, provides 18 minutes in which teams can try any approach to construct the tallest freestanding structure they can. After 18 minutes, the height of the marshmallow from the table surface was measured as *construction performance*.

### **Results from Trial Data**

We performed a simple linear regression to predict construction performance based on planning time. To establish comparability across both tasks, *construction performance* and *planning time* were scaled. Our results (see Figure 1 & Table 2) serve the purpose of presenting an initial inference from our data in class and, in this manuscript, to discuss dissimilarities between problem-solving strategies. Our findings offer insights regarding the assumption that well-

defined problems benefit from a prolonged initial planning phase followed by execution (implementation phase as one-loop approach). In contrast, the ill-defined problem set requires frequent iterations and an early start of testing activities to derive adequate results (frequent iterations as pivoting approach). This evidence, generated by the students themselves, is important to convince them that problems do indeed differ, and that different strategies are needed. This is particularly important when facing students with a background in engineering and hard sciences, who tend to give a lot of credence to rational-analytical techniques, which they perceive as “naturally” better than others.

Translating the results into March’s categories of rational and foolish, the Lego Man task can be tackled more efficiently by applying a traditional, thinking-before-acting approach, which in turn implies a prolonged planning time to theoretically craft the single “right” approach before actually carrying out the assembly. Conversely, trial-and-error-like strategies (“doing precedes thinking”) appear to be a promising approach for an ill-defined problem set, as it remains uncertain whether, how, or by when a working solution can be found, or at what stage teams should declare the status quo as their chosen final solution.

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Insert Figure 1 and Table 2 about here  
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## **CONNECTING THE DOTS—FROM DICHOTOMY TO CONTINUUM**

### **In the Classroom: From “Between Tasks” to “Within Tasks”**

The Dual Challenge, in our experience, provides a reasonable starting point to engage students in a discussion about different types of problem-solving strategies and their pros and cons. It is

a pragmatic way to visualize the discussion about bounded rationality; foster a conversation on the basis of some evidence (generated by the class itself); and enable students to map the tasks they attempt on to more realistic cases that will be discussed later in the teaching module. An advantage of this exercise concerns its transferability from theory into real-world scenarios. Both tasks serve as neat settings to introduce the differences between problem dimensions and to discuss their interplay; however, educators should aim to provide examples from students' everyday life (well- and ill-structured problems from finance, engineering etc.) to account for tangibility and an easier translation from learnings in class into practice. The limitations of the exercise, on the other hand, lie in its simplification. The two tasks present a pedagogically useful dichotomy, but real-world problems evolve along a continuum with well- and ill-structured states as its extremes. In themselves, the tasks are not enough to teach students a combined approach; instead, they allow the facilitator to demonstrate opposing problem states and to introduce design thinking as a platform that integrates both problem-solving approaches. This, then, raises the question of how to engage students in a conversation about problems whose fundamental structure evolves over time.

As argued above, multistage settings present many examples that can be leveraged to engage the students in such a discussion. Multistage problems have two characteristics that make them quite useful for teaching purposes. First, they evolve over time. Second, problem-solvers may only rely on environmental feedback to a certain extent. At this stage, it is useful to look at what problem-solving strategies firms deploy in real-life settings, and reflect on their characteristics together with the students. The New Product Development area provides many examples. For example, the Stage-Gate process (Cooper, 2006) is a well-known and commonly applied method to structure new product development processes from their fuzzy front end to product launch. Within this approach, predefined performance criteria are applied to structure and monitor an idea's evolution towards operationalization via a sequence of intermediary

gates. At each gate, the idea is evaluated with formal mechanisms including specified requirements and documentation. Thus, problem solving follows a process that is “rational” overall—i.e. the sequence of actions and objectives is predefined. Any deviation from “getting it right” should be minimized through cautious analysis (Glen, Sucio, & Baughn, 2014). Indeed, this approach has been criticized for being overly deterministic and rigid (e.g., Basadur & Gelade, 2014). In response to these critiques, the method has evolved to include more pre-attentive, rapid, and flexible behavior—the core of “foolish.”

How so? Recent advances in problem-solving methods challenge well-established rational approaches with design-thinking principles as a lever for radical innovation (e.g., through built-in iterations to receive feedback and revise ideas early on in the process). Popular phrases used to describe these agile, iterative approaches include “user-centered design,” “empathy-building,” “ethnographic techniques,” “rapid ideation,” and “failing forward” (Martin, 2009). In order to design a next-generation stage-gate process that provides a platform for more disruptive innovation, companies have begun to experiment with scalable variations on the traditional grid, i.e. Stage-Gate Full (for major projects), Lite (moderate-risk projects), and Xpress (minor projects) (Cooper, 2014). Matching project types to different versions of the process reduces the administrative load for R&D staff when ideas are discarded.

Another refinement to the linear nature of the process is the integration of design aspects such as built-in prototype-test-revise iterations at each stage. This ensures early and continuous exposure to users’ pain points, needs, and feedback, which ideally leads to ideas either being discarded sooner, or accelerated to mature stages (Cooper, 2014). Tracing the evolution of the Stage-Gate approach helps to engage students in a discussion about how industry responds to the evolving challenges of problems that do not stand still. The evolution of the method is indeed evidence that a “one size fits all” problem-solving strategy does not accommodate the

needs of practice. Yet, Stage-Gate remains a method largely inspired by the rational-analytic approach.

An alternative set of tools that is also widely deployed in industry, and which is seemingly more related to the foolish end of the continuum, finds inspiration in the design sciences. These tools have been recently popularized using the expression “design thinking.” Design thinking has even been highlighted as distinct skillset—distinguished by its greater adaptability and creativity, among other characteristics (Razzouk & Shute, 2012). As an introduction, students should gain an understanding of the essential components and structure of the design-thinking process. Here, the goal is to demonstrate that a method exists that provides a structured approach to handling variance, and that provides guidance throughout the problem-solving process. The “double diamond” shape of the design-thinking process (see Figure 2) visualizes the structured approach that aims to explore an initial problem statement and derive solutions that meet a given need. The sequence of actions extends from discovery to delivery (steps I–IV). In a first phase (I. Discover), exploring the environment via market research, stakeholder maps, or user interviews provides external points of view. This empathy-based, human-centered evidence is then evaluated and translated (II. Define) into a reframed version of the initial problem statement. In the next step, ideation tools support the exploration of as many solutions as possible (III. Develop). In another phase of reconciliation (IV. Deliver), the most promising solution is selected and translated into a physical prototype. The approach described underpins most modern accounts of what design thinking is, and what it delivers (in both consultancies and the academic community).

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Insert Figure 2 about here  
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Companies picked up the design-thinking method decades ago, and management scholarship has been discussing its potential for many years (e.g., Glen, Suci, & Baughn, 2014). The reason is its ability to cater to both dimensions—well- and ill-defined problems—and therefore provide flexibility in fast-changing environments. Although industries evolve along trajectories, reading outward signals to forecast upcoming change is often imperfect and subject to “noise” (McGahan, 2004). In the case of a fundamental shock, design thinking can help the firm maneuver so it can quickly adapt to a given change (Brown, 2005).

However, companies have also begun to use design thinking not only in times of sudden change, but continuously. By introducing its principles across different organizational layers, they have adopted a “rational yet foolish” approach to tackling their current challenges. For example, more than a decade ago, Procter & Gamble (P&G) embarked on its five-year journey towards a consumer-centric design organization—which included, for example, the remodeling of physical workspaces and transforming the way market research was conducted. In addition, design functions were set up within all business units, as opposed to establishing a central function to serve them. These moves infused design principles into the everyday decision-making process through designer participation in business units’ specific routines. This ensured that a designer’s voice was ever-present, constantly molding organizational processes—but in a non-confrontational way.

Another prerequisite for such approaches to succeed, apart from operational integration, is that senior managers believe that the transformation is viable. To this end, P&G carried out applied design thinking exercises including workshops for its Global Leadership Team; feedback on ideas from an external “sounding board” that included renowned design experts; and sending senior managers out to collect hands-on user insights, working in tandem with designers to experience the many different sides of empathy work (Martin, 2009). A more recent example of how to embed design-as-strategy throughout an organization is offered by

Pepsi's CEO, Indra Nooyi. She recruited an experienced design practitioner as a new board member (Chief Design Officer), who then initiated the release of a platform for the internal publication of problem statements as a resource for cross-disciplinary project teams. Beyond this team-level initiative, the application of design-thinking principles was integrated into employees' yearly performance evaluations, to raise awareness about the firm's novel approach to problem-solving (Ignatius, 2015).

These examples show how design thinking and its elements are being introduced on different levels throughout organizations. On the individual level, such changes prompt people to reflect on their own problem-solving approach, and how they can enrich their current rationale with learnings from design exercises. On the team level, design thinking brings together employees from different domains and fosters the exchange of ideas through project platforms that span the organization. Moving to an upper management perspective, initiatives systematically integrate design principles into organizational structures, as shown by the design-infused Stage-Gate example.

Summing up these advances, design thinking is being introduced from both perspectives: "top-down" through structural redesign and teaching formats, and "bottom-up" to expand individuals' problem-solving repertoires. However, introducing design thinking, especially from both these perspectives at once, takes significant company resources, inevitably raising questions about the effectiveness and advantages of the method. Therefore, in the next section, we identify the elements that underpin design thinking's "a-ha effect."

## **FEARLESS DESIGN THINKING**

Participants frequently highlight a boost in creativity from design thinking. We argue that this can be traced back to the unique atmosphere of safety that arises in design-thinking environments. This atmosphere, in turn, translates into the temporary relaxation of rules and

trained behavior, resulting in more deliberate thinking and “fearless” exploration (Edmondson, 2018; March, Olsen, 1976; Mainemelis, Ronson, 2006). In the following, we elaborate how psychological safety is initiated through the method’s tools, then steadily grows, and finally transmutes into a team-level norm. We derive our line of reasoning from observations and informal discussions around design-thinking formats in classes and company workshops.

### **The Centrality of Psychological Safety**

Most of us are afraid to voice ideas and thoughts that we feel we have not fully thought through, or that we worry will bring negative consequences. Such fears can undermine a team’s ability to explore its full creative potential. There are many reasons for the withholding of thoughts, termed “employee silence” (Milliken et al., 2003), and most of us will be familiar with the experience. Typical reasons for failing to speak up, especially toward superiors, are the fear of being labeled as a troublemaker or complainer; a sense of futility (either in terms of not making a difference or simply not being heard); or the fear of retaliation and even punishment (Milliken et al., 2003). Psychological safety helps to break such silences. The foolish elements of design thinking create a safe space in which participants gradually dare to gesticulate, craft, and voice their ideas more and more, until they become almost “fearless”—free from the fear of judgment, critique, or derision. Once this state is reached, the atmosphere can be described as *psychologically safe*.

The construct of *psychological safety* is defined as “[a] climate characterized by interpersonal trust and mutual respect in which people are comfortable being themselves” (Edmondson, 1999: 354). This feeling of comfort catalyzes communication; fuels the sharing of knowledge; and enables individuals and teams to share deliberately, and ultimately to generate ideas that will lead to novel products and services (Edmondson & Lei, 2014; Baer &



Frese, 2003). In the creativity and innovation literatures, Fixson and Rao (2014) posit trust and psychological safety as essential preconditions for experimentation in design thinking—and, further, for the permission to fail. Edmondson and colleagues provide evidence for improved learning behavior in teams given the presence of psychological safety (e.g., Edmondson, 1999; Edmondson et al., 2001). Given this substantial empirical support for the effect of psychological safety in accelerating team learning and adjusting employees’ well-established routines, we argue that it fosters not only the voicing of unconventional ideas in design thinking, but also rapid adaptation to this unique mode of solving problems. This perception also aligns with Kark’s proposition that safety has a positive effect on play and personal growth (Kark, 2011). Teams that conduct a design-thinking exercise experience a novel way of making sense of environmental cues, and learn about tools and techniques for managing uncertainty. In addition, participants experience how they gradually grow as a team and establish their own safe zone. This not only promotes better performance, but is likely to shape future teamwork if the participants work together again.

An atmosphere of psychological safety is frequently mentioned as one of the most decisive and original components that helps participants generate “out-of-the-box” ideas. To get into the zone of creativity and experimentation, one must let go of established norms, which can be challenging (Schein, 1993). According to Schein (1996), it is vital to create a temporary parallel system to overcome this limitation. We argue that the foolish phases of the design thinking process (see Figure 3, Phases I. Discover and III. Develop) introduce participants to a novel way of collecting data and gathering insights, which helps to establish a parallel system within the process. Once this is in place, unconventional norms will flourish, and be further cultivated as the foolish episodes unfold.

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Insert Figure 3 about here  
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As an external observer of such formats, one can watch this state being gradually attained, even as institutionalized team dynamics and self-restraint dissolve. In a psychologically safe state, certain group dynamics are discouraged; these include power plays, calling out mistakes, or the generic ruling-out of unfeasible ideas. In contrast, intuitive judgment, improvisation, and prompt action appear as guiding principles to work through the phases of the process, and switch between them, in an agile fashion. Yet, it takes time and effort to awaken this condition: Students still expect to be evaluated, while facilitators still tend to fall into the role of content expert. To provide one example of abandoning implicit rules, towards the end of one teaching session, students were walking around with seating cubes balanced on their heads while the team continued to discuss their findings.

### **The Journey towards Reduced Self-Restraint**

How can such a state be reached? Our observations hint at two factors that create a safe environment: 1) *ego depletion* through familiarization exercises within the team; and 2) a creatively oriented physical work environment, referred to as an *ideation space*. In addition, *facilitation*, a distinct teaching style, functions as a moderator and helps the team to attain psychological safety and subsequently *reduced self-restraint* early on. Reduced self-restraint implies the open and fearless display of imperfection in front of peers, as well as the ability to switch easily between rational and foolish reasoning. Figure 4 visualizes the interplay of antecedents and the moderator towards *reduced self-restraint*, which we argue is the key to unleashing individuals' creative potential.

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Insert Figure 4 about here  
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Psychological safety begins the moment participants enter the room. Usually, workshops or courses take place in *ideation spaces*. These rooms have little in common with traditional lecture theatres or seminar rooms. They feature a variety of prototyping materials and devices; movable blocks and seating cubes to form ad hoc meeting areas; or writable walls for sketching, collecting, and sharing ideas, which are often captured on simple sticky notes. Entering such a receptive space encourages participants to let go of routinized behavior, but also to leave stereotypical teacher-student interactions behind (Fixson, Seidel, & Bailey, 2015).

According to Edmondson (2002), one of the mechanisms behind psychological safety is people displaying fallibility. In the design-thinking context, we term this state *ego depletion*. Demonstrating imperfection will empower the group to become more engaged, and contribute to shared success in a more enthusiastic, open-minded way (Edmondson et al., 2016). Therefore, sessions typically begin with short warm-up exercises that help participants get into a more “foolish” mindset, which is then further cultivated throughout the four phases of the process. An example activity that helps to break the ice is rattling through a series of tongue-twisters; everyone messes up sooner or later, and celebrates the silliness along with their teammates. Opening up to teammates by laughing at yourself, allowing for a little bit of foolishness, helps to balance hierarchical differences, both between participants and between the group and the facilitator. These brief games also serve to reconnect the rational and foolish phases of the process, and ease the transition between them.

Facilitation, as opposed to the traditional teacher role, positively moderates psychological safety by guiding students through the process. Facilitation is strict, but only in the sense of confining every exercise to a predefined time slot. Accurate timekeeping means participants must stop their current activity abruptly, leaving no time for correction, further elaboration, or suchlike. After the first few rounds, they get comfortable with sharing their current ideas and suggestions, despite knowing such thoughts are unrefined and error-prone. In

addition, introducing the “moderator” of the course as a *facilitator* sets a different tone regarding the rationale for communication (Yeager et al., 2016). Facilitation implies guidance—accompanying students as they craft a meaningful solution to their problem, rather than steering them towards an intuitive solution. Given the ill-defined nature of the problem statements for which participants deploy design-thinking techniques, there is no single “right” answer. The objective of facilitation is to establish an understanding that the facilitator provides the frame—namely, the task sequence (similar to the Stage-Gate grid)—but team outcomes are to be monitored by the participants themselves. While the teams learn to accept ownership and accountability for their problem statement, the facilitator limits their own intervention to on-demand feedback, and ensuring the phases of the process are being followed. Facilitation, therefore, helps to efface traditional teacher-student dynamics, in which students expect to be evaluated against tasks, or try to deduce what solution their teacher might deem meaningful.

Facilitation “forces” students to switch from task to task and from phase to phase. At the end of the ideation phase, for example, a switch is initiated by the facilitator that implies a change from brainstorming in silence to a quick presentation of findings—an example of a moment in which reduced self-restraint is being probed, and the facilitator can gauge whether students have indeed let go of judgment. In this context, advances in social psychology on power asymmetry provide insights into the “contagious” effect of openly disclosing reduced self-restraint. Especially when leaders and high-power team members feel comfortable in verbalizing imperfect thoughts and displaying shortcomings, peers tend to follow suit (Mammassis & Schmid, 2018; Edmondson, 2002). Our observations also align with findings from surgical and new product development teams, in which certain pioneering behavior led to the setting up of an implicit model for acceptable behavior among the team (e.g., Edmondson, Kramer & Cook, 2004). Transposing these insights to design thinking, one can observe how

students become familiar with stand-up situations and embrace the absence of power inequality as well as fearlessly voicing “silly” ideas.

The relaxation of rules fosters creativity and experimentation. It is the foolish mode that enables the exploration of new paths, which March and Olsen describe as the “deliberate, temporary relaxation of rules in order to explore the possibilities of alternative rules” (March & Olsen, 1976: 77). However, both rational and foolish thinking benefit from being integrated into a single approach, which the structure of design thinking provides. In a recent study, Berg (2016) showed that executives excel in creative forecasting when their daily work incorporates the application of both divergent thinking (idea generation, equals foolish mode) and convergent thinking (idea evaluation, equals rational mode)—as opposed to “only” stepping in for the idea-evaluation stage, and choosing between alternatives that a peer selected for them.

Linking these findings back to research on design sciences, the effect of design-thinking interventions and the frequency with which individuals should be trained to establish continuity remains underexplored. Once outside the classroom, when participants become content experts again, do they make different decisions? Or do they simply make the same decisions, but reach them via a different route? Future inquiries could borrow from mixed-methods approaches to gain insights into the after-effect of individual tools, and of psychological safety as an underlying construct.

Finally, psychological safety also enables participants to switch easily between rational and foolish reasoning. It is the contrast between modes that defines the method’s success—leveraging the “best of both worlds”. Taking on students’ learning objectives, the abrupt switch between orthogonal modes helps them become aware of their differences and ultimately to transfer the knowledge gained: how and when to best apply each mode for future problem-solving activities.

## CONCLUSION

Management students naturally expect business school curricula to train their decision-making competence. However, an awareness of problem dimensions, and the ability to choose an appropriate problem-solving strategy for a given problem, are capabilities that are difficult to translate into teaching interventions. Depending on the complexity of the problem, theoretical frameworks may not deliver satisfying results, especially for ill-defined endeavors. Unsurprisingly, discourse in management education is concerned with the integration of artistic theories and frameworks into today's business school curricula; aiming to account for flexibility, openness, and a more pluralistic dialogue (Pfeffer & Fong, 2002; Morrell & Learmonth, 2015).

With the Dual Challenge, we introduce a format that can be administered in a single teaching module and that familiarizes students with well- and ill-defined dimensions, as well as problem-solving strategies. The Marshmallow Challenge, which demands an agile, playful approach, invites students to dig deeper into the benefits of foolish behavior, and how design thinking embeds this logic alongside an evidence-based (rational) approach. As educators, we aim to equip students (both pre- and post-experienced) with design-inspired tools that enable them to respond to multistage problems—the type of problems with variable features, that move along a continuum, and where feedback on prior decision-making remains scarce. If individuals cannot adequately predict the consequences of a choice because they know too little about environmental contingencies, they will perceive decisions as ambiguous and, therefore, postpone them (Simon, 1978). Design principles relieve this perceived discomfort through their iterative nature, and by disentangling complexity into manageable components. Given the richness of input through different perspectives and data sources, decisions can be taken based on evidence—as opposed to being based on rules of thumb, a charge leveled against managers

all too often (Augier & Hariharan, 2016). The foolish elements, in contrast, aim at giving people the tools to explore new directions and dare to “think outside the box”.

We argue that it is easier to leave one’s comfort zone if the atmosphere is perceived as safe. Once the “technical” features of the design-thinking process have been outlined, the next step should be to introduce students to the construct of psychological safety—not only to explain how “foolish” thinking can be operationalized, but also to show how this interpersonal, team-level construct makes the method so effective and distinguishes it from other contemporary approaches. The tools that design thinking borrows from (problem framing, definition of hypotheses, collecting evidence from users and stakeholders, reframing and iteration etc.) have been merged and used in other formats, such as the Lean-Startup, Agile, or Stage-Gate approaches. But what sets design thinking apart is the creation of a safe zone and the accompanying reduced self-restraint. Multistage or “wicked” problems are fraught with contradicting information, demanding flexibility and openness from the problem-solver (Edmondson, 2016; Edmondson & Reynolds, 2016). Design thinking teaches students to leave their comfort zone by practicing imperfection and abandoning their inhibitions. The fast-paced, timebound way of presenting unpolished ideas in front of peers, and the discovery that there are no negative consequences to sharing seemingly underdeveloped ideas, gradually establishes the belief that risk-taking is the new team standard.

Such reflections should prompt practitioners and scholars alike to consider how this unique safe state can be recreated in everyday team settings such as brainstorming sessions or project work. Even though design thinking has predominantly been regarded as a problem-solving method that promises some great leaps forward, it is actually psychological safety as an underlying construct that deserves more scholarly attention, especially in educational studies. Design is a skill, not a subject—and the same is true for psychological safety. Discovering how safety can be established, separately from the content being taught, would

make a powerful “add-on” to shrink power distance and encourage participants to think aloud. Psychological safety could then be integrated into existing teaching designs, or used as a baseline before embedding teaching content and objectives.



## FIGURES AND TABLES

**TABLE 1**  
**Participating Teams and Measures**

	<b>2010</b>	<b>2012</b>	<b>2015</b>
<b>Lego Man Task</b>	9 teams	12 teams	13 teams
<b>Marshmallow Challenge</b>	-	15 teams	-

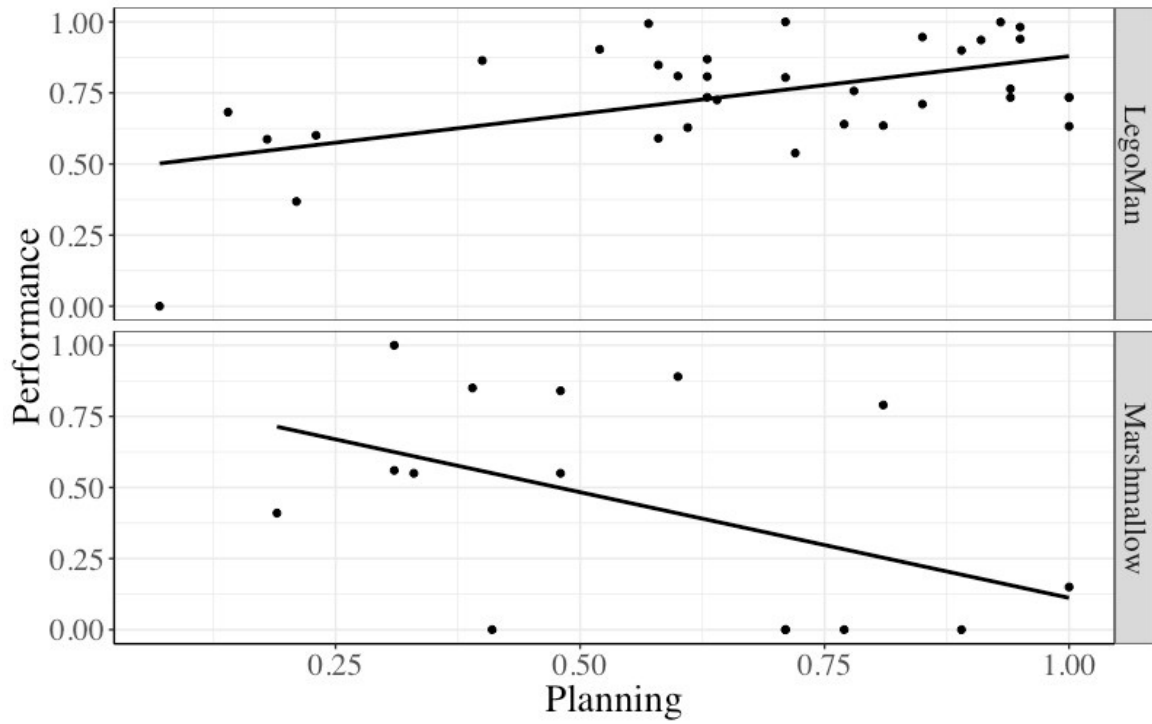
	<b>Time for completion</b>	<b>Measures</b>		
<b>Lego Man Task</b>	30 minutes	Planning Time (Mean: 20.25 minutes)	Assembly Time (Mean: 7.72 minutes)	Construction Performance: <i>Assembly Time</i>
<b>Marshmallow Challenge</b>	18 minutes	Planning Time (Mean: 5.84 minutes)	Assembly Time (Mean: 12.16 minutes)	Construction Performance: <i>Height of Marshmallow</i>

**TABLE 2**  
**Regression Results for Construction Performance**

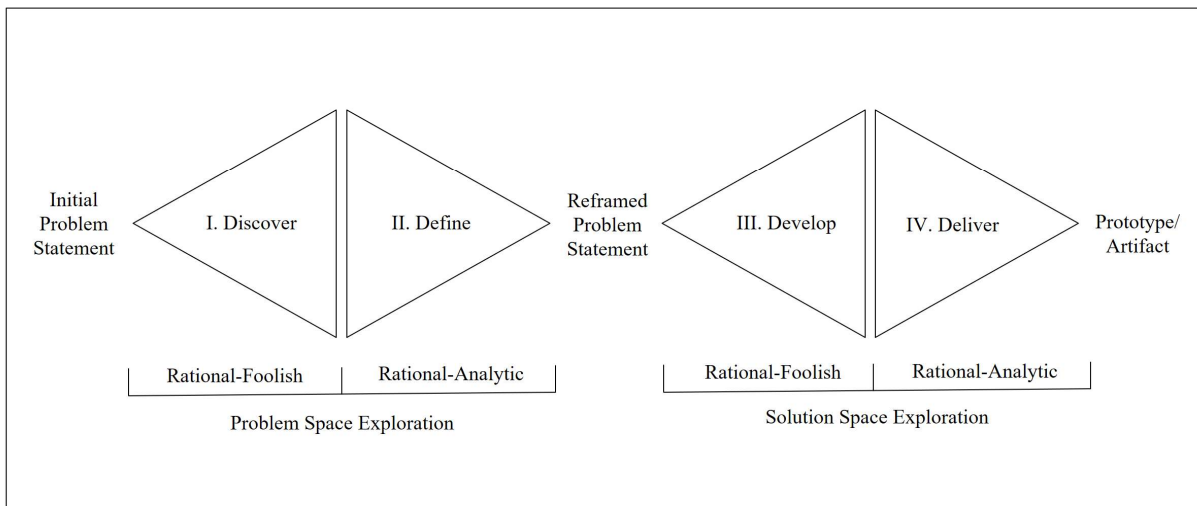
	(1) Lego Man Task	(2) Marshmallow Challenge
Planning Time	0.01*** (0.004)	-0.07* (0.04)
Constant	0.47*** (0.08)	0.85*** (0.23)
Observations	34	15
$R^2$ / Adjusted $R^2$	0.29 / 0.27	0.22 / 0.16
Residual Standard Error	0.17 (df=32)	0.35 (df=13)
F-Statistic	13.02*** (df=1, 32)	3.73* (df=1, 13)

*Note: Standard errors in parentheses, \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$*

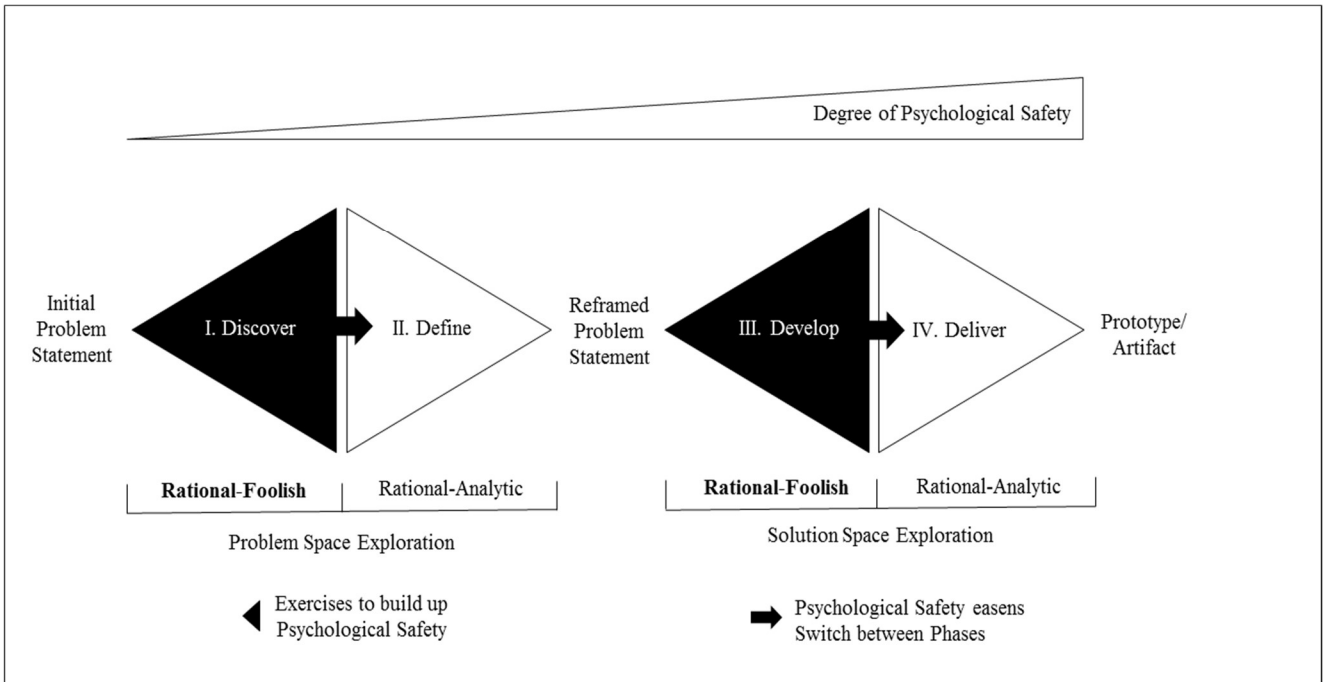
**FIGURE 1**  
**Construction Performance and Planning Time**



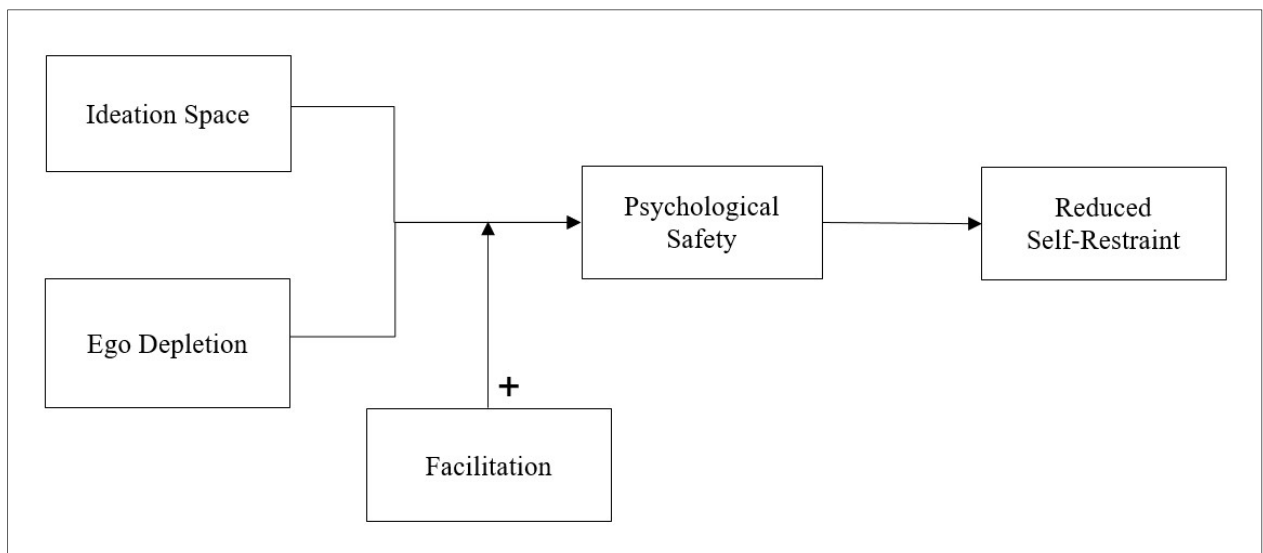
**FIGURE 2**  
**The Rational and Foolish Elements of the Design Thinking Process”**  
 (Adapted from Stanford’s d.school Process Model)



**FIGURE 3**  
**The Buildup of Psychological Safety**



**FIGURE 4**  
**Cause and Effect of Psychological Safety in Design Thinking**



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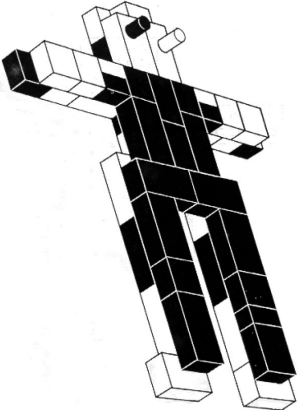

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**APPENDIX**  
**Dual Challenge Teaching Note**

<b>Lego Man Task</b>	<b>Marshmallow Challenge</b>
<p><b>Task description:</b> Teams compete to assemble an exact replica of a Lego model. Students are instructed that the process consists of two phases and that both phases are timed and shall not exceed 40 minutes in total:</p> <p>1) During the <i>planning phase (max. 30 mins)</i>, teams spend as much as time as needed to decide on a strategy for assembly.</p> <p>2) During the <i>assembly phase</i>, each team builds the actual figure.</p>	<p><b>Task description:</b> In 18 minutes, teams aim to build the tallest freestanding structure out of 20 sticks of uncooked spaghetti, one yard (91cm) of tape, one yard of string, and one marshmallow. The marshmallow needs to be placed on top of the structure.</p>
<p><b>Problem set:</b> Well-structured, as the final structure is presented upfront.</p>	<p><b>Problem set:</b> Ill-structured, as a variety of structures leads to a practical result.</p>
	
<p><b>Team size:</b> 8–15 students</p>	<p><b>Team size:</b> 4–5 students</p>
<p><b>Total required time:</b> ~85 minutes</p>	<p><b>Total required time:</b> ~45 minutes</p>
<p><b>Task itself:</b> 40 minutes in total for planning and assembly phase. Team members agree among themselves when to switch between the initial planning (max. 30 minutes) and the subsequent assembly phase.</p>	<p><b>Task itself:</b> 18 minutes. When the time is up, all teams must stop work and the height of the marshmallow is measured.</p>
<p><b>Reference:</b> <a href="https://www.toastmasters.org/~media/b7f339562bdd43819fc5e3b34dc3f4ad.ashx">https://www.toastmasters.org/~media/b7f339562bdd43819fc5e3b34dc3f4ad.ashx</a> (accessed January 2019)</p>	<p><b>Reference:</b> <a href="https://www.toastmasters.org/~media/8a6a24ead731427190be0352ea2996e7.ashx">https://www.toastmasters.org/~media/8a6a24ead731427190be0352ea2996e7.ashx</a> (accessed January 2019)</p>

## **PAPER 2**

**BETTER SAFE THAN SORRY:  
DESIGN THINKING AS EPISODIC CHANGE**

**Abstract:**

How does episodic organizational change, in the form of a Design Thinking intervention, unfold? To study how and to what extent participants process and integrate learning, we followed a world-leading water-systems firm that introduced Design Thinking to trigger innovation. To investigate the effect of this intervention, we relied on a mixed-method approach and pre-/post-test design. We interviewed, observed, and tracked a sample comprising both participants and non-participants in a Design Thinking workshop. Using our data, we pinpointed participants' changes in behavior and social interactions, and how they were perceived by non-participants. Our findings suggest that psychological safety plays a key role in Design Thinking, as it enables participants to balance the positive and negative emotions that arise during the process. The rationale behind this operationalization of change resonates well with Schein/Lewin's theory of change (Lewin 1947a, 1947b; Schein 1992, 1996). We build on their three-step model by linking the change process to behavioral responses, and show that some participants overwrite institutionalized practices in the post-phase. Our findings respond to calls raised in the management literature to connect the analysis of change to that of emotions.

**Keywords:** Design Thinking, Psychological Safety, Episodic Change, Organizational Learning, Emotions

## INTRODUCTION

Most organizations struggle to generate breakthrough innovation and deliver original products continually (e.g., Gibson and Birkinshaw 2004, O'Reilly and Tushman 2008). New product development demands creativity and flexibility in order to solve ill-defined problems. In the field of product design, Design Thinking has gained popularity because it promises ways to respond to such demands. Many have argued that Design Thinking provides a systematic approach to handle the complexity of ill-defined problems, and guides individuals toward the exploration of unconventional directions (Dunne and Martin 2006, Martin and Martin 2009, Brown 2008, 2009, Brown and Katz 2011, Fixson and Rao 2014, Liedtka 2018). This paper focuses on the case of a world leader in water-related technologies that decided to introduce Design Thinking to revamp its innovation activities. The firm initially did so by introducing Design Thinking in the form of an episodic change: i.e. something “infrequent, discontinuous, and intentional” (Weick and Quinn 1999, p. 365). Such ad hoc initiatives are crucial, since their success often determines whether or not the initiative will be developed into a continuous program of change.

We know a fair amount about the full implementation of new systems to manage complex decisions, such as Six Sigma (Barney 2002a, 2002b, Parast 2011) or Lean Management (Fullerton et al. 2014, Mostafa et al. 2013, Parker 2003). However, we know less about the impact of early, exploratory episodes in their adoption—even though such initiatives are likely to exert a powerful influence on any subsequent rollout.

We focus here on Design Thinking not just because it is often eulogized as an “essential tool for simplifying and humanizing,” but also because it is so enjoyable and playful to use (Kolko 2015, p. 6, Wylant 2008). While the “technical” aspects of Design Thinking have received fairly extensive scholarly attention (e.g., Carlgren et al. 2016, Liedtka 2011), less is known about the softer elements of the approach—that is to say, the “light and safe” atmosphere

it aims to generate, and how this atmosphere of safety comes into being (Johansson-Sköldberg et al. 2013, Elsbach and Stigliani 2018, Fixson and Rao, 2014).

To shed light on the role of psychological safety in Design Thinking, and how the technique goes on to impact the overall organization (if at all), we adopt a processual view of change (e.g., Van de Van and Poole 2005, Pettigrew et al. 2001). This approach aims to trace how behavior and action change over time, and in response to which stimuli. We explore two main questions: (1) *How, and to what extent, do individuals process and respond to episodic organizational change?* and (2) *How does Design Thinking contribute to generating change in the organization?*

To answer these questions, we frame our discussion around the interplay of the impact of the Design Thinking method and the behavioral responses of participants immediately after the intervention. To study the impact of episodic change, we followed Plexi (a pseudonym), a large family-owned company that set out to make its employees more innovative through Design Thinking. We deployed a mixed-method approach to capture behavioral changes from different units of analysis. We measured the time individuals spent in close proximity to each other (via sociometric data, Study 1) and explored how activities around innovation were organized (via observation and interviews, Study 2). Sociometric analysis allowed us to study individuals across work units, and to analyze changes in terms of their efforts to exchange and share learnings via face-to-face interactions. Our pre-/post-test design revealed individuals' modes of "cognitive restructuring" and "refreezing change" (Schein 1996), while sociometric data shed light on changes in network structures.

Taken together, our findings show how a single episode of Design Thinking is capable of triggering three modes of integrating change. First, some participants fail to implement change at all; they either demand external support to internalize learnings (*anchoring*) or deem current organizational structures to be immutable (*lethargy*). Second, some participants, in

contrast, immediately implement design-inspired procedures (*replacement*), provided they can distinguish between the technical and “soft” elements of Design Thinking (*decoupling*).

Our sociometric results show that participants extended their network across work units, even though working with distant units emerged as a delicate, political encounter. These participants’ immediate colleagues further strengthened this observation with the changes they reported in their colleagues’ behavior. The candidate participants integrated more diversity into their decision-making process, which translated into a network extension across units. We contribute to prior research on episodic change by connecting a design-thinking intervention and its unfolding to Schein/Lewin’s<sup>1</sup> three-step model of change. The buildup of psychological safety surfaced as an underlying mechanism for change. Psychological safety denotes “a climate in which people are comfortable being (and expressing) themselves” (Edmondson 2004, p. 1). This safe zone enables participants to unfreeze current practices (Step 1). Participants contrast their experiences with current organizational practices (Step 2) and (in ideal cases) immediately overwrite current practices (Step 3). To conclude, we identified behavioral change as a meaningful measure for the impact of episodic change.

Below, we review Lewin’s early theory of change and highlight the importance of psychological safety for the process of changing. We proceed with our methodological approach, present results from grounded theory work, and finally discuss our findings.

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<sup>1</sup> Kurt Lewin is the originator of the three-step “unfreeze–change–refreeze” model. We cite him as a single author when referring to these three distinct stages and his early theory of change (Lewin 1947). Edgar Schein adapted Lewin’s model in 1992, developing the three steps into “unfreeze/discomfort–cognitive restructuring–refreeze.” When discussing this adapted model, we refer to it as “Schein/Lewin”. If we focus on one of the specific constructs that Schein added to the original model (published in the 1960s or later), we refer to Schein as the sole author to acknowledge his contribution.

## THEORY

Organizational members operate according to a set of ingrained norms and routines that are particular to their organization. In order to implement change, these (often implicit) norms and routines must first be loosened, in what Lewin (1947a, 1947b) called “unfreezing.” Below, we outline Lewin’s three-step framework of change and an adapted version by Schein (1999), which together define the framework for our study.

Lewin’s original theory defines the three principal steps that individuals pass through when undergoing change (Lewin 1974a, 1974b). The numerous models to explain change created since then all build on Lewin’s early work, and can be reduced to the same three steps.

*Step 1: Unfreezing* describes the process of moving away from the current status quo—a state Lewin called “equilibrium.” The unfreezing process can be driven by members themselves, or by external forces (Zand and Sorensen 1975). These driving forces, and those restraining change, must be carefully balanced in order to loosen or “unlearn” old behavior (Burnes 2004a, 2012): “To break open the shell of complacency and self-righteousness it is sometimes necessary to bring about an emotional stir up” (Lewin 1947a, p. 229). Transparency, in form of an open dialog and team-building activities, helps individuals deal with the magnitude of forces during this initial step (Zand and Sorensen 1975).

*Step 2: Changing* defines the process of moving towards a new equilibrium. In the beginning, the direction of change must be defined. New input will then be processed and matched with current beliefs and individuals’ orientation (Lewin 1947a, 1947b). Reframing will be conducted in an iterative manner until consensus—a new equilibrium—is reached (Zand and Sorenson 1975).

*Step 3: Refreezing* entails the confirmation of the new equilibrium, and involves reinforcing the new condition until it is internalized as the status quo. Lewin stressed that successful

refreezing also requires team norms and routines to be refrozen, in order to ensure that individual-level changes survive this final step (Burnes 2004b).

Following its introduction, Lewin's work was deemed pioneering for future inquiries into the dynamic laws of change (Allport 1948a, 1948b, Marrow 1969). Lewin's impact was compared to that of Freud; together, they were hailed as "the two names which [...] will stand out before all others in the history of our psychological era" (Tolman 1948, p. 26, quoted in Burke 2004, p. 977). Yet, five decades on, the impact of Lewin's groundbreaking work had been less universal than his contemporaries expected—in mainstream management, at least. Instead, complexity theories gained scholarly attention and emerged as rivals to Lewin's theory, which some deemed a less adequate response to the demands of modern organizations (Burke 2004, Elrod and Tippett 2002). However, over the past 20 years, Lewin's grounded model for tackling change has re-engaged scholarly minds and regained popularity (for comprehensive reviews on organizational change, see Cummings et al. 2016, Armenakis and Bedeian 1999, Burnes and Cooke 2012, Burnes and Cooke 2013, Elrod and Tippett 2002).

Several scholars have aimed to adapt or rework Lewin's ideas for a contemporary readership. The first adaptations of his model date back to Lippitt and colleagues (1958). Schein and Bennis (1965) introduced the *Lewinian Model of Attitude Change*, followed by Kolb and Frohman's (1970) *Planned Change Model*, Tichy and Devanna's (1986) *3 Acts of Transformation*, Kotter's (1995) *8 Steps of Change*, and finally the Schein/Lewin (1996) *Model of Change/Learning*.

What sets the Schein/Lewin model apart, among other attributes, is its integration of psychological safety and cognitive restructuring. Its major contribution is a more fully elaborated view of the factors that influence each of the three steps (Zand and Sorenson 1975). Below, we describe the model in more detail.



*Step 1: Unfreezing/Discomfort.* The process of unfreezing is preceded by a state that Schein (1961, 1965) termed the “quasi-stationary equilibrium.” This state motivates individuals to change because of their discomfort or frustration with the current situation (Zand and Sorenson 1975). Additional drivers for the process of unfreezing are psychological safety and learning anxiety (Schein 1996). Schein (1992) suggests that in order for an organization to unfreeze, learning anxiety must be carefully balanced so that individuals feel safe to explore. Schein (1992) distinguishes between two types of anxiety. Type 1 is compared to a state similar to paralysis, which hinders individuals from exploring. Type 2, meanwhile, allows individuals to “still move” while anticipating failure and being reconciled to the potential consequences. Type 2 anxiety must be thoughtfully cultivated until a critical threshold is reached where people feel guided and safe, yet still emboldened to explore unknown paths (Schein 1992). Schein describes this state as “the providing of psychological safety” (Schein 1992, p. 11).

*Step 2: Changing/Cognitive Restructuring.* Once the organization is unfrozen, new information can be acquired by trial and error, imitation, or similar methods (Schein 2010). Schein shed light on the cognitive underpinnings of processing such new information (1996). Schein’s (1996) definition of cognitive restructuring is the adjustment of present cognitive frames into which data or new information can be fitted (Klein et al. 2007). This process may (but need not necessarily) include all of the following steps: 1) semantic redefinition, or the expansion of the repertoire of words and their meaning; 2) cognitive broadening, which entails extending the existing boundaries of known concepts; and 3) defining new standards for evaluation. The concept of cognitive restructuring is pivotal to this research, as we aim to explore the ways in which participants process their design-thinking insights and translate them into practice (or fail to).

*Step 3: Refreezing/Institutionalization.* In the last step, learnings are refrozen into a new, relatively stable form (Schein 2010). A prerequisite for refreezing is that changed behavior must

to some extent align with individuals' orientation, and fit with the organizational culture. Even if there is fit on the personal dimension, integrating change into an unsupportive culture will lead to frustration and discomfort (Schein 1996, Oreg et al. 2018). For example, clashes in leadership styles or manifested hierarchies can create such an unfavorable outcome.

As the summary of his concept outlines, Schein's contributions (1961–2010) augment Lewin's model with additional concepts that help or hinder the enactment of these three steps. The discussion about the role of psychological safety, in particular, resonates with the ongoing debate about the factors that make Design Thinking a useful innovation method—a value acknowledged by researchers and practitioners alike (e.g. Fixson and Rao 2014, Hassi and Lakso 2011). The increasing attention to psychological safety is linked to the role of the facilitator. The facilitator ensures that individuals feel sufficient anxiety leads to leave known paths, yet imposes rigor when working through the timed exercises of the Design Thinking process. Although the facilitator orchestrates the task sequence, teams work autonomously, and bear the responsibility to deliver solutions. Schein himself highlighted the establishment of safety as the “true artistry of change management” (Schein 1996, p. 30). In the past, much attention was paid to the technicalities of Design Thinking (e.g., Carlgren et al. 2016, Liedtka 2011, Plattner et al. 2010, Resnick et al. 2005). Yet, little is known about the role played by interpersonal constructs such as psychological safety.

Interestingly, Elsbach and Stigliani's review (2018) advanced the discussion from Design Thinking as a stand-alone tool to its cultural integration, shedding new light on the emotional markers that accompany Design Thinking efforts. The review distinguishes between emotions that surface when *individuals experience* the method (e.g., Vetterli et al. 2016), when *changes in the atmosphere* become evident (e.g., Yoo and Kim 2015), and when *emotions on the clients' side* surface and support the need-finding process (Smith 2015). This emotional aspect is also touched upon by Rauth and colleagues (2010), who studied the buildup of creative

confidence. Design Thinking educators were asked to reflect on their observations when teaching the method. The findings suggest that emotional skills—aside Design Thinking skills, such as prototyping, empathy, etc.—help students to accumulate creative confidence. Constant exposure to new challenges, the rapid visualization of results, and facilitation surfaced as drivers for this process. These examples emphasize that emotions are not merely a byproduct of a Design Thinking intervention, but play a central role.

Bridging these insights to the change process overall, the balance of emotions is crucial to the process of unfreezing current behavior (Schein 1996), as well as refreezing it after the change. Recent studies have explored the emotions that individuals experience when undergoing change, and found that institutionalizing change depends on many factors. Self-efficacy (e.g., the belief that change is possible) or personal valence (e.g., the belief that change is needed) are among the factors that shape people's interpretation of change events (see detailed review on organizational change from Armenakis and Bedeian 1999). If individuals are confronted with discrepancies, emotional responses are likely to follow. One example of such a discrepancy is potential interference with individuals' objectives (George and Jones 2001): If change is not congruent with individuals' orientation, the change program might fail (Pettigrew et al. 2001, Klarner et al. 2011, Walker et al. 2007). Stress, as an example of negative emotion, impedes change (e.g., Vakola and Nikolaou 2005, Schabracq and Cooper 1998). The implementation of change programs, for example, should foresee grace periods in between change events, which reduce stress for individuals (Huff et al. 1992, Sastry 1997). On the opposing spectrum of arousal lie positive emotions, such as optimism or resilience, which have been shown to facilitate change (e.g., Avey et al. 2008, Fredrickson, 2003). Building on these findings, we aim to explore how the emotional stir-up evoked by Design Thinking influences the process of cognitive restructuring and the refreezing of change.

Design Thinking is organized along team lines. If team members perceive the climate as safe, they exchange ideas and learn from each other (Edmondson and Lei 2014). Such a climate of safety flows from team norms that differ from those in everyday organizational life (Edmondson 1996, 2003). Lewin (1947a, 1947b) already stressed the importance of team norms, their unfreezing, and their refreezing into practice. We propose that psychological safety functions as an antecedent not only to unfreezing behavior (Schein 1961, Bennis and Schein 1965), but also to the process of cognitive restructuring and refreezing. Organizational scholars have investigated its effect on employee voice; knowledge exchange; new products and services; learning behavior; and technology adoption (e.g., Van Dyne and LePine 1998, Baer and Frese 2003, Edmondson 1999, 2003, Edmondson et al. 2001, Mogelof and Edmondson 2006). Despite the overwhelming evidence for the enabling effects of psychological safety on learning, we still lack an understanding of how it builds up and unfolds (Edmondson and Lei 2014).

Prior studies have mainly focused on the effects of psychological safety during continuous change. From an intervention-theory perspective, continuous change is “a pattern of endless modifications in work processes and social practice. [...] Numerous small accommodations cumulate and amplify” (Weick and Quinn 1999, p. 366). Hence, it is difficult to specify which factors actually have an impact on psychological safety. Episodic change, in contrast, is “an occasional interruption. It tends to be dramatic and is externally driven” (Weick and Quinn 1999, p. 366). Therefore, we argue that a Design Thinking episode provides a suitable context to study the buildup of psychological safety.

To conclude this review, how change unfolds and translates into practice defines our phenomenon of interest. Psychological safety plays a central role in episodic change (Schein 1999). Building on Schein/Lewin’s theory of change, we propose to distinguish between three conceptualizations of psychological safety, which we organize as follows. In step (1),

unfreezing, we view psychological safety as a *psychological condition* that can balance emotions such as discomfort and learning anxiety. In step (2), changing, psychological safety functions as *a means to change*. Safety antecedes cognitive restructuring: a cognitive state in which learnings are contrasted with current practices and known concepts are revisited. Finally, in step (3), refreezing, psychological safety figures as the *content of change*. Here, we aim to determine whether the same mechanism used to establish a safe zone during a Design Thinking episode can be translated into everyday organizational practice.

## METHODS

### Research Design

To explore the impact of a Design Thinking intervention, we deployed a single-case study. Limiting data collection to one site is regarded as viable for research designs that aim to investigate institutionalized practices, and that are guided by phenomenon-driven research questions (Feldman 2000, Eisenhardt and Graebner 2007). In order to study the unfolding of episodic change, we collected data in two phases: before the intervention took place and immediately after it. We collected sociometric data to derive network effects (Study 1) and conducted interviews during both phases (Study 2). By combining interviews with sociometric data, we account for a methodological gap in the literature on psychological safety (Edmondson and Lei 2014). Prior studies are mostly survey-based, and rely on the measurement of psychological safety with Edmondson's (1999) established seven-item scale. We capture individual-level changes with self-reports, while network data allows us to shed light on the positioning of individuals in their network. By deploying this hybrid design, we respond to a recent call raised by Edmondson herself to move the field towards cross-level research (Edmondson and Lei 2014).

## Research Site

Plexi (a pseudonym) is a pioneering, technology-intensive firm in the area of water technology. The introduction of Design Thinking to the organization was prompted by a perceived stagnation in terms of product innovation. Episodic change is initiated by a prime mover (Weick and Quinn 1999); at Plexi, the introduction of Design Thinking was begun by the executive member in charge of R&D, who chose it on the strength of its promise to deliver radical innovation. In its early stages, the intervention was intended as a one-off, possibly followed by an organization-wide rollout in the future. The first intervention was carried out as a four-day workshop attended by 18 participants from several different units (purchasing, sales, marketing, R&D, etc.). Most participants were middle or senior managers.

Our findings are based on observations, interviews, and sociometric data gathered at Plexi. The firm's core competence centers around high-precision parts that regulate domestic water supplies. It employs 1,700 workers spread over 17 countries and 12 production plants, with headquarters in Switzerland and Germany. Since the R&D unit is located in Germany, the data collection took place at the German headquarters, where the first author conducted fieldwork between May and July 2016.

The Design Thinking workshop followed the established four-step process known as “double-diamond” (Brown 2009): Discover, Define, Develop, and Deliver<sup>1</sup>. The steps guide participants through phases that demand different thinking styles (divergent and convergent reasoning) and switch between them. Based on an initial problem statement, participants deployed need-finding tools, tools for idea generation, and idea testing over the course of four days. Participants were selected by the executive member who initiated the workshop, the

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<sup>1</sup> For a detailed overview of recent studies on the Design Thinking process, its tools, and thinking styles, see Elsbach and Stigliani's review (2018).

workshop facilitator, and other key contacts at the firm. Participants also defined and discussed the initial problem statement: *What will the kitchens and bathrooms of the future look like?*

The authors knew the facilitator and were familiar with the four-day schedule. However, the facilitator was not affiliated with the institution where the authors work, which ensured an unbiased experience for the workshop participants. The workshop was conducted away from Plexi's headquarters, to ensure a detachment from everyday organizational life. The workshop was provided in return for a fee, which covered the basic costs for its execution and provided an incentive for participants. In order to bring in new perspectives, three experts (external to Plexi and drawn from three different industries) participated in the workshop.

### **Study 1: Network Analysis via Sociometric Data**

#### *Participants and Sampling Strategy*

To capture changes in the network, we probed a sample consisting of both workshop participants and non-participants, all of whom carried a device throughout the day that recorded their proximity to each other. We recruited nine workshop participants and 22 non-participants. (Even though 18 participants were selected to attend the workshop, we could only recruit nine, since the others were based at different Plexi sites or were not company members.) The non-participants were selected through nomination: We asked all our recruited workshop participants to name three colleagues with whom they had frequent interactions. The reason for the interaction could be sharing a work context (instrumental network), being a close “work friend” (expressive network), or both (Fang et al. 2015). Five of the 27 nominated colleagues chose not to participate in the study, which reduced the total sample size from 36 participants to 31 (refer to Figure 1). The sampling aims to capture whether and to what extent participants reach out to non-participants and talk about their experiences. Our research design follows an inductive approach, gathering and synthesizing data from a broad array of informants (Miles

and Huberman 1994). Accordingly, the sample covers all units of Plexi (except purchasing, IT, HR and controlling) and all its hierarchical layers (top management, members of central functions, middle and junior managers, as well as administrative staff).

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Insert Figure 1 about here  
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To probe our selection of non-participants, our interviews included a question on individuals' network in the pre-phase. We asked them to name their five most important contacts at the firm—that is, those colleagues they turned to with questions, or to seek feedback. We compared these choices to their initial nominations to help us, as outsiders, understand the closeness of ties within and between units.

#### *Data Collection and Measures*

During data collection, the devices were distributed among all participants. They were worn according to personal preferences—in most cases, attached to the belt or worn around the neck. The devices embed an application that continuously scans for nearby devices.

Data collection covered five weeks: 10 working days of measurement in the pre-phase, and 15 working days in the phase after the workshop. During these two phases, devices were distributed at the beginning of the day (7am–8am) and picked up from participants' desks at 3.30pm. Figures 2 and 3 provide an overview of data-hours collected per day over the course of 25 working days. In total, 4,629 hours of sociometric data were collected.

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Insert Figures 2 & 3 about here  
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The devices used were Sony Xperia Active smartphones, which come with a built-in ANT radio. ANT is a wireless protocol used to determine the proximity between devices. An application continuously recorded data and saved them on the internal memory card. The data included acceleration, orientation, and atmospheric pressure, as well as the exchange of ANT messages. Search strategy, intervals, and distance to operationalize proximity between individuals are explained in detail in prior publications from Feese and colleagues, who developed the application and its associated data-analysis framework (e.g., Feese et al. 2013a, Feese et al. 2013b). Figure 4 shows the logic for calculating the proximity between devices (adapted from Feese et al. 2013a, p. 100). For each time slice  $t$ , the binary elements of a proximity matrix indicate if device  $i$  received any message from device  $j$  within the last period  $P$ . Respectively, for each of the  $N$  individuals  $i$ , one cluster is created containing  $i$  and all its neighbors. In cases where another cluster already exists that contains at least one of the current members, the two clusters are merged (e.g., Feese et al. 2014, Feese 2014).

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Insert Figure 4 about here  
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## **Study 2: Interviews and Analysis**

### *Participants*

The sample for the qualitative phase of our research was identical to the network study, apart from the inclusion of one additional interviewee. One of the non-participants opted to participate in the interviews, but not the network study. Thus, the sample increased to 32 participants. Please refer to the sampling strategy described in Study 1 for further details.

### *Data Collection*

During the time on-site, semi-structured interviews were conducted. Each participant was interviewed twice: once before the workshop and once afterwards. The interviews were scheduled for 30 minutes. Occasionally, participants asked for an extension to continue the discussion, and some interviews lasted for up to 90 minutes. The 64 interviews were transcribed and analyzed with NVivo. In addition, observations and informal conversations were captured in field notes, which supported us in verifying insights from the interviews.

### *Setup of Pre- & Post-Interviews*

The first round of interviews focused on understanding how Plexi organized for innovation; how individuals approached problem-solving; and how work units were connected. Example questions included: “How would you describe your collaboration with other departments?” and “Imagine you want to work on an idea for a novel process or product. Could you describe your approach?” In the second round, the interviews aimed at eliciting workshop participants’ reflections on the methods they had used—in particular, which tools and approaches they perceived as similar to, or different from, their everyday practices. Another central theme was to shed light on the soft factors of the workshop, such as its atmosphere. We asked participants to recount how the atmosphere had built up, and to describe how a feeling of safety had been created. In contrast, non-participants were probed on word-of-mouth experiences—namely, whether participants had shared their experience with them (e.g., “Have you heard about the workshop and its results?”). Another theme for non-participants was to revisit past change programs. We asked which ones they remembered, and how top managers or other change agents had designed these programs to make them last (e.g., “Which individuals or functions provide continuity to change programs?”, “How can Plexi prevent the Design Thinking introduction from remaining a one-off?”).

### *Analytical Approach*

Following the guidelines of naturalist inquiry, we applied an inductive, grounded-theory-based approach to analyze the transcripts and field notes (Gehman et al. 2018, Glaser 2007). We compared our insights and preliminary findings during the data collection and in the subsequent analysis phase (Miles and Huberman 1994, Strauss and Corbin 1997). We adjusted interview guidelines after the first trials and discussed observations from the Design Thinking workshop. In addition, the distribution of devices led to many insights from brief discussions with participants while working on-site. We also held meetings with members of Plexi's top management team to define the problem statement for the workshop, or to discuss potential ways to teach Design Thinking to a broader range of employees at Plexi. The positive feedback from the first workshop led to two follow-up workshops, which were conducted in the year after. Plexi also introduced a customized toolkit containing Design Thinking tools that are easy to mimic for employees who had not experienced the method. The ongoing interaction between the workshop facilitator, study participants, and executive members at the firm supported us in deriving our findings.

We used NVivo to organize the 64 interview transcripts and field notes. The analysis program allowed us to group and cross-reference codes that emerged from the initial rounds of identifying themes. The field researcher was the primary coder, and discussed the coding scheme and modifications with one of the coauthors. To establish trustworthiness, we engaged department members in research meetings to challenge our initial propositions, which led us to refine our findings. We followed Gioia's interpretative approach and merged informant-centric themes to first-order categories, before connecting first-order concepts with second-order themes and deriving our overarching dimensions (see Figure 5) (e.g., Gioia et al. 2013, Corley and Gioia 2004, Geman et al. 2018).

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Insert Figure 5 about here  
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## FINDINGS

We structure the presentation of our findings along the lines of the Schein/Lewin (1996) model. We discuss the perception of *discomfort*, followed by the *unfreezing* of current behavior, the process of *cognitive restructuring*, and finally the *refreezing* of change. Figure 6 displays the Schein/Lewin model adapted with our findings from grounded theory work. Insights from the network analysis are not discussed separately, but are instead integrated in the *refreezing* part of the model.

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Insert Figure 6 about here  
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### I. Discomfort on the C-Level as Trigger for Change

Plexi is a large, family-owned corporation that relies on longstanding relationships with its clients. The firm's owners were described as forward thinkers who drove innovation by matching needs from customers with Plexi's technological capabilities. The executive member who oversaw R&D activities wanted employees at Plexi to adopt the owners' progressive mindset. When he came across an article about Design Thinking in a German management magazine, he envisioned it as a toolbox to fuel creativity and come up with Plexi's next product innovation. The Design Thinking workshop was not intended as a one-off, but to potentially be rolled out organization-wide. To integrate different perspectives, the facilitator asked if they could draw workshop participants from diverse units—not just R&D engineers. The benefits of working with distant units is reflected in this quote from a participant:

Of course, you notice when you're a team, how you gradually merge and think along the same lines and how you adapt to each other... or, well, how you went through the same experiences recently, or over the last few years. And, of course, it's very important, if others join from different disciplines, from entirely different areas. They're completely free, and provide this very distinct [beneficial] input.

Schein (1996) stressed that disconfirmation or frustration with the status quo are the driving forces that initiate change. In our case, the disequilibrium on the executive level translated into a change initiative in the form of a Design Thinking intervention.

## **II. Unfreezing in a Safe Zone**

Psychological safety emerged as a central construct in the unfreezing of current behavior. When informants were probed on their most memorable aspect of the workshop, they frequently highlighted the atmosphere. However, safety is not a subject or element that can simply be added to a teaching design; it must be built up through what Lewin called an “emotional stir up” (Lewin 1947a, p. 229). Design Thinking provides just such a stir-up, resulting in both positive emotions (which we grouped under “composure”) and negative emotions (which we grouped under “anxiety”) (see Figure 6). These opposing dimensions surfaced through the matching of Design Thinking’s elements with reactions (through participant observation) and reflections from participants (interviews). Different phases of the Design Thinking process translate into different emotional responses. Therefore, we linked the four Design Thinking phases (1. Discover, 2. Define, 3. Develop, 4. Deliver<sup>1</sup>) to the perception of either anxiety or composure (see the “double diamond” structure in Figure 6). The Discover phase entails taking on different perspectives to explore the problem space, while Develop involves deliberate

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<sup>1</sup> Elsbach and Stigliani (2018) offer a detailed description of “designerly tools”, which they base on Seidl and Fixson’s initial categories (2013). We limit our explanation to the four main steps, plus exemplary exercises and tools.

ideation to generate solutions through a divergent thinking style (Carlgren et al. 2016). To shift into this mode, a distinct form of anxiety must be present to steer individuals away from trained problem-solving. Table 1 presents representative data for the concepts that emerged as inducing anxiety and, contrarily, composure. The state of composure is reached in the Define and Deliver phases. Through convergent thinking, prior findings are systematically narrowed down until team members reach a consensus.

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Insert Table 1 about here  
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### *Anxiety*

Time pressure, inhibition, and task ambiguity emerged as central constructs for participants to be motivated to change and enter the “green field.” Time pressure was imposed through Design Thinking’s rigid structure. Each of the four phases is split into several pre-defined steps and tasks, each one carefully timed and monitored by the facilitator. The process also foresees conducting these exercises in a rapid sequence. Participants described working through the process as a hectic, exhausting experience—yet they also perceived the resulting stress as positive. Participants were only updated on their current phase and the steps that lay ahead a few times per day. This lack of any agenda, coupled with unfamiliarity with design tools, resulted in task ambiguity: “In between, I doubted whether we were on the right track with our task.”

In addition to working towards a seemingly undefined goal, the element of exposure induces anxiety. Design Thinking is organized along team lines. To share and discuss their findings, teams gather and present their initial, often unpolished ideas in front of others. As tasks are so rigidly defined and time-limited, participants feel interrupted and unprepared when

asked to share their thoughts. Every incident of exposure, however, leads them to experience that the atmosphere is safe, and that the promise the facilitator made at the beginning about the judgment-free zone actually holds true. Even as safety is taken away, participants realize that is actually present all the time:

The first exercise with the wallet was a shock. You had to abruptly craft something, completely clueless. [...] I did random things following experience-based knowledge. Safety was taken away. You're channeled along a path of "just doing"—thrown in at the deep end and told, "Now swim!" And everyone around you is watching.

### *Composure*

The state of composure, in contrast, is reached through another set of structural elements of Design Thinking. The construct of detachment relates to the environment in which design work usually takes place. Spaces with the air of a craft workshop help individuals let go of organizational life and routinized ways of interaction (Fixson et al. 2015). In addition, the facilitator stresses the absence of traditional student-teacher roles, and this absence of hierarchical structures was duly noted: "Working together with your colleagues and on the same [hierarchical] level is very impressive, and will have a lasting positive impression on me." Surprisingly, teamwork itself was frequently highlighted. The absence of cross-unit collaboration in everyday life sharpened participants' appreciation of interdisciplinary work during the workshop: "Looking at [problems] from a different perspective. Not only to rely on my opinion, but to gather a second or third opinion... or that people from a different unit take a look at it." Not only does the output benefit from diverse backgrounds, but design tools also help participants to exploit different perspectives.

Empathy work is a central element of the Design Thinking process. Many of the tools involved (i.e. crafting personas, or conducting user interviews) are unfamiliar to participants, but bring home to them that Design Thinking can provide a holistic view of a problem. User

interviews are a good example of a way to experience a different point of view through interaction (interviewing a potential user), as opposed to imagining what a user might envision. “That was so open-hearted; so exciting—that people say it out loud while you can craft a picture around it. I was able to imagine their point of view very well.” Further, materialization emerged as a central construct. Participants highlighted the simplicity, intensity, and structuredness with which an ill-defined problem was converted into a tangible solution over a few days.

The workshop concluded with three product innovations and one solution for a new service offering. The four teams developed a plan for potential implementation and further development of their ideas.

### **III. Cognitive Restructuring: Processing Change**

The interviews in the post-phase not only revealed reflections on the workshop, but also contrasted the workshop environment, team dynamics, and procedures with everyday practices. Our data revealed that some participants compared both environments and elaborated on their (dis-)similarities. Others, however, viewed the workshop as an encapsulated experience that was too incongruent to be transferred into practice. Accordingly, the orientations of *incongruence* and *decoupling* emerged (see Table 2).

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Insert Table 2 about here  
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#### *Incongruence*

Cognitive broadening, or extending the boundaries of a known concept, is one of the steps that individuals engage in when restructuring input. However, if instead of broadening, participants *narrowed* their interpretation of the method, incongruence surfaced. Some participants falsely



interpreted the success of the workshop as a lucky strike that was due to the selection of participants, and doubted whether its success could be replicated. However, if Design Thinking was instead interpreted as a broader concept that could be applied across many contexts, it was current organizational structures that appeared to be hindering individuals from engaging in change. Product innovations from the workshop were judged as incongruent with the firm's strategic orientation: "That is why [this product innovation won't be pursued]. I believe it is self-protection." Another example is institutionalized practices, which participants felt could not be unfrozen (at least, not with a single intervention). Some participants verbalized their observations, but halted the integration at that point, and did not follow up on a potential transfer of insights:

When you realize that it's not the right product—in our everyday mindset, that takes months, or weeks. We waste time, manpower, money—and in the end it would have been the same result anyway: "OK, that didn't work!" [In the workshop, however,] we invested a bit of time, a bit of manpower, we thought quickly, [and we found out] that it wasn't what we need. That impressed me. That you actually don't need much time to realize what is important and what is not.

### *Decoupling*

Some participants were able to decouple Design Thinking from its context—to view it not just as a creativity technique or toolbox, but as a problem-solving method for a variety of settings. "Because it wasn't just about the product, but the thinking process, which is transferable. And that was something I only realized after [the workshop]. [The Design Thinking method] doesn't only target R&D employees." Interpretations of Design Thinking as a broader concept also surfaced when participants explained psychological safety and its buildup as an underlying mechanism. Safety was frequently described as a playful and collaborative atmosphere without power distance between team members. "I was under the impression that everyone was motivated. It was a little bit like a vacation with work. I felt a bit like a student, as in, 'Let's see

what's up next.' Time doesn't matter—but on the other hand, time pressure was there.” This example shows another link. Task ambiguity is verbalized as “Let’s see what’s up next,” and accounts for an anxiety-inducing construct. The participant further depicts the interplay of anxiety and composure as “Time doesn't matter” juxtaposed with “Time pressure was there.”

The same ambivalence is evident in the following example. The participant establishes the link between tools, behavioral responses to these tools, and the buildup of safety. As the ability to decouple led to the overwriting of current practices, we present the entire quote as an example of the refreezing of change too.

I try to embed more time pressure into certain activities, as I perceived it as positive [during the workshop], despite the fact that I am more the type who needs time. I usually step back, take my time and think about it, and share my opinion a few minutes later instead of right away. I learned [at the workshop] that time limitations are beneficial and more goal-oriented, rather than leaving things open. That’s something I try to integrate into meetings: When I recognize that we are about to lose our way, to get back on track with, “We must reach a conclusion within five minutes.” I’ve had positive experiences with it already. [...] In my [Plexi Project, which I lead] I said: “[...] five minutes [...], otherwise we will just keep moving aimlessly without progress.” And this helps, I think, to improve the atmosphere—as puzzling as that might sound. I believe that, as a by-product, people open up, because they dare to jabber and don’t overthink whether it’s right or wrong. In fact, you don’t have much time for rethinking and to craft what you are about to say. And in turn, ideas float way more when you sit together and have an hour to discuss. In this sense, a change in the atmosphere [during this meeting] took place, especially due to the time aspect.

#### **IV. Refreezing Behavioral Change**

##### *Replacement*

As the example above shows, cognitive broadening led participants to decouple design thinking from its context, and resulted in the replacement of old behavior. As we interviewed participants in the weeks immediately after the workshop, some also elaborated on the underlying mechanism and outlined their intent to integrate new practices as and when they saw fit. Behavioral change in the post-phase also surfaced in terms of cross-unit collaboration. Two

participants reflected on the benefits of input from outside their own unit. Sociometric data showed an extension of their network, which we use as a marker for interacting with colleagues to whom participants had not reached out during the pre-phase.

Figure 7 visualizes this finding by contrasting the proximity of participants and non-participants in the pre- and post-phase. Each box represents a connection between one of the 31 study participants and another colleague. Colors denote the frequency of exchange, from light green (infrequent exchange) to dark blue (frequent exchange). We apply a cutoff level of 30%, which means that the pairs were in close proximity for at least 30% of the time. In our case, this indicated that they shared an office, or worked in the same open office space. The graphic only represents the analysis of the post-phase; additional social ties in form of interactions with “new” colleagues, or intensifying existing ties, are highlighted to display changes relative to the pre-phase. (Please refer to the Appendix for additional findings from the network analysis and an overview of the steps taken to explore Plexi’s network structure).

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Insert Figure 7 about here  
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The proximity matrix shows that two participants extended and intensified existing ties with colleagues outside their own work unit. Besides self-reports and sociometric evidence, we rely on observations from colleagues who worked in close collaboration with the candidate participants to strengthen our findings. These colleagues described a change in behavior in terms of cross-unit interaction in the post-phase:

The day before yesterday, we sat together and discussed projects [that were already initiated before the workshop], and he kept saying, “Let’s ask this person or this person—he might be able to help, or he might be able to help.” Also, regarding a fact he was uncertain of, he picked up the phone and said he might briefly call someone who might know about it.

### *Relapse*

Relapse, or falling back into old behavior, is a common phenomenon when undergoing episodic change (Weick and Quinn 1999). Accordingly, *anchoring* and *lethargy* emerged as constructs from our participants' reports (see Table 3). *Anchoring* describes a state in which the integration of change was not pursued. Participants saved the experience as an insightful event, but did not elaborate on their learnings:

[Back at Plexi], it's exactly this tunnel vision [that is problematic]. The unleashing of thoughts, letting ideas flow wherever they lead [during the workshop]. It was also visible throughout the Herbstlaub exercise [an ideation technique in which ideas are captured on sticky notes or "leaves" and collected on the floor]—the ideas just floated onto the floor. [...] Whether it makes sense for Plexi or not doesn't matter. Just throw it. Throw your ideas down. And I believe that it is a difference: truly opening up, to give free rein to your ideas. To escape the Plexi scaffold.

### *Anchoring*

Anchoring arose if participants felt that ongoing consulting support or more workshops would be necessary to internalize their findings. However, if they saw organizational structures or current practices as being set in stone, *lethargy* surfaced. Participants seemed to lean into the status quo and externalize the responsibility for imparting change to other members of the organization:

How we saw it during the workshop, that's how I envision it at Plexi: the salesperson works closely with the developer or product manager or with industrial engineering. Just to give an example. [...] [Colleagues] complain that units are drifting further and further apart, everyone seems concerned about their own topics, and overarching [goals] don't seem to matter. That falls back to leadership. That's my personal opinion. [...] It sounds blunt, but new people would have to be brought in. Changing the key players, or the ones in authority—but I'm not sure if that would be sustainable over the long run.

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Insert Table 3 about here  
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## DISCUSSION

In this study, we link the unfolding of a Design Thinking intervention to the Schein/Lewin theory of change to identify the underlying mechanisms of Design Thinking and trace its impact on behavioral change. Using this conceptualization of change extends research on Design Thinking, which has so far been viewed as a toolbox for radical advances. Instead, we find that its structural elements help to create psychological safety through the careful cultivation of learning anxiety. We find that Design Thinking operationalizes both these constructs, which were highlighted by Schein (1996) as central elements of unfreezing behavior.

The experience of an emotional stir-up affected how individuals reflected on their experience. Participants who could grasp the underlying mechanisms of Design Thinking went on to integrate novel behavior immediately after the intervention, through a process known as cognitive broadening. They integrated design tools into their daily routines or extended their collaboration across work units. Our network analysis also revealed that some participants began to meet and interact with additional contacts at the firm during the post-phase. In contrast, participants who failed to uncover the concepts behind Design Thinking did not elaborate on how the integration of change might look. Instead, they saved the experience as a memorable event, but continued to rely on common procedure. These different modes of translating learning into practice provide evidence for the impact of a single Design Thinking intervention—and, further, for the presence of psychological safety as an antecedent to unfreezing behavior.

### **Theoretical Implications**

Our contributions to theory are threefold. We contribute to the literatures on episodic change and the interpersonal aspects of design thinking, and also shed light on the impact of emotions on change by building on Schein/Lewin's fundamental work (1947a, 1947b, 1996).

First, we extend prior studies of episodic change by focusing on behavioral change as a measure of the process through which change unfolds. Change itself is a dynamic, interrelated, and complex process, and measuring the response to it is difficult (Pettigrew 1990). The change process itself has received considerable attention, with scholars (e.g., Armenakis and Bedeian, 1999: 295) dividing their attention between the *subject* of change (e.g., Feldman 2000, Clark et al. 2010), its *process and modalities* (e.g., Van de Ven and Pool 1995, Poole et al. 1989, Gioia et al. 1994), and *contextual factors* (e.g., Bercovitz and Feldman 2008, Taylor and Helfat 2009). In terms of the aftermath of the process, making the effects of organizational change tangible remains a challenge (Oreg et al. 2018, Feldman 2000). Traditional performance criteria at the organizational level—such as firm survival, market share, or profitability—are difficult to link to change efforts. This is especially true for episodic change, which occurs in a sharply punctuated manner and, moreover, is often initiated when organizations have already begun to change, but subsequently fallen into a state of “quasi-equilibrium” (Weick and Quinn 1999, p. 365).

Some efforts have been made to identify emotional aspects on the individual level in order to gain a better understanding of the impediments to change. Employee-organization relations such as loyalty and commitment (e.g., Hill et al. 2012), the hiding of negative emotions (Vuori, Vuori and Huy, 2018) or emotional states such as cynicism (DeCelles et al. 2013, Reichers et al. 1997) or skepticism (Andersson 1996), have emerged as constructs that explain individuals’ tendencies to support or resist change programs. However, we cannot infer whether these conditions translate into behavioral change. Our findings suggest that behavioral change constitutes a meaningful measure for the impact of episodic change. Our insights from self-reports of behavioral change matched with network-level effects. In addition, we went on to verify our findings with reports from the close colleagues of change recipients, whose observations helped to shed light on changes from a unique angle. As “insiders” to the firm,

they knew of organizational norms and practices, so their point of view might help identify what types of change they observed in their colleagues were more or less congruent with current organizational procedures—and, therefore, easier or harder to accomplish.

Second, our findings further contribute to an emerging theme in Design Thinking that aims to shed light on design tools and their ability to develop organizational culture (e.g., Elsbach and Stigliani 2018, Fixson and Rao 2014). Design Thinking has been introduced to many organizations in a variety of industries during the past decade (e.g., Leavy 2010). However, surprisingly little is known about the adoption of the method and its effect on culture (e.g., Liedtka 2018, Carlgren 2013, Liedtka and Lockwood 2010, Seidel and Fixson 2013). Our findings underline the centrality of psychological safety, and explain how design tools can establish a safe atmosphere. Some participants began to integrate this mechanism at Plexi, and to actively shape the atmosphere in their teams. Psychological safety, therefore, does not function merely as a means to change, but can also form its actual content. Also, since Design Thinking helps to loosen up current standards of judgment and evaluation, future research might benefit from ethnographic methods that explore its adoption as a continuous change program, to trace the gradual modification of organizational culture.

Third, we shed light on the emotional aspects of change. Schein (1992, 1996) discussed the importance of managing learning anxiety and the art of facilitation. We found that Design Thinking defines a method that provides the tools to balance anxiety, and entails a distinct type of facilitation that supports such balancing. Schein (1996) hinted at the importance of positive emotions—not just anxiety—as a necessary precondition for abandoning old behaviors. However, the interplay of positive and negative emotions has not specifically been discussed. In our study, the positive dimension (namely, composure) surfaced alongside the state of anxiety. We deem the interplay between composure and anxiety to be what Schein termed the careful managing of learning anxiety. This interplay is then linked to the buildup of safety as a

necessary condition for unfreezing behavior. Our findings further emphasize the importance of facilitation to contribute to both emotional states. The manner of facilitation steers participants towards the unknown and encourages them to experiment; yet, it also imparts a sense of invisible support, which participants can rely on throughout the process. The mechanism behind the unfreezing step in Schein/Lewin's model is what determines design thinking's success and subsequent impact. Our findings support this line of argumentation, as we were able to trace behavioral changes after a single episode.

More generally, our findings respond to the call in management research to reconnect the discussion about change with that on emotions. For example, Vuori and Huy (2016) have looked at how negative emotions were related to Nokia's inability to respond to challenges in its core market. Hodgkinson and Healey (2011) have discussed the importance of addressing the balance between "hot" and "cold" rationality, as much of the mainstream management literature on organizational cognition has focused on the latter. Håkansson et al. (2008) and Brusoni et al. (2019) analyzed at the very micro level the importance of positive and negative emotions as antecedents to exploration-exploitation choices. In our paper, we contribute to this emerging discussion by looking at how a specific innovation method may balance negative and positive emotions, hence enabling change, through psychological safety.

### **Managerial Implications**

Innovation is generally organized on team lines, and management scholars have linked the presence of psychological safety in teams to superior performance and learning (Edmondson and Lei 2014). Beyond academia, practitioners have also begun to use the term "psychological safety," and to view the construct as a central element of efficient teamwork (most notably, see Google's recent large-scale study, described by Duhigg, 2016). The buildup of safety can be effective even if participants do not already know or trust each other (Edmondson 2003, Kramer



1999). Design Thinking, therefore, is a suitable method for being rolled out organization-wide, regardless of context, hierarchical position or background of employees. It provides the tools to introduce safety as an interpersonal construct and to improve teams' innovative output.

The transfer of learning into practice is a challenge for managers who lead change programs. Based on our findings, we deem Design Thinking a useful method to achieve the immediate integration of tools and mechanisms, even after a single intervention. Scholars and practitioners alike should aim to identify existing training formats that offer “built-in” psychological safety to extend managers' repertoire of methods that are highly effective in practice. Reversing this approach, managers who run change programs could enrich their existing formats with design tools, and Design Thinking's approach to facilitation could be introduced to employees who set up and lead internal training formats.

Episodic change, as in the introduction of Design Thinking at Plexi, is an effective lever for organizations' top management teams to kick off change programs. This is especially true for firms like Plexi, who have been pioneers in their technological niche for decades. At such a stage of a firm's development, the threat of sudden technological disruption—through, for example, 3D printing or smart materials—can seem distant and nebulous. But these stable periods are an ideal time to experiment with novel innovation methods such as Design Thinking. In this context, single episodes represent an efficient way to introduce a new method. Following this first episode, managers can decide whether to develop the episode into a continuous change program, and whether the method will actually help the organization to prepare for abrupt technological change.

Finally, we stress the limitations of our study. Besides the general limitations of a single-site case study, we regard the network study as a beneficial add-on to enrich our findings, but not as a stand-alone measure to assess the impact of change. We measured the interactions among colleagues over five weeks, split into the pre- and post-phases. This time span might be

too short to verify our findings. After the return from the workshop, interaction might be more intense due to non-participants being curious about the experience and approaching workshop participants and vice versa. The content of the exchange constitutes another limitation: Sociometric data show us how often individuals meet, but the content of their interaction remains unknown. We cannot distinguish whether individuals activated their instrumental or expressive networks (Fang et al. 2015), or determine whether they met to talk about project work or Design Thinking or were simply being social.

## CONCLUSION

Our research suggests that the value of Design Thinking goes far beyond its reputation as a toolbox for radical advances. Even a single episode of Design Thinking is capable of igniting behavioral change and overwriting institutionalized practices. To do so, the process leverages the induction of both positive and negative emotions. The interplay of these, in combination with psychological safety, induces participants to venture into the unknown—yet always with a sense of safety. If participants engaged in cognitive broadening to reflect on the underlying mechanism, and were able to decouple the technical and soft aspects of Design Thinking, immediate transfer into practice followed. Regardless of whether organizations use Design Thinking to catalyze innovation, tackle “wicked” problems, or embed design as a cultural element, the method will prompt reflections on team dynamics and current organizational norms above and beyond its versatility as a tool.

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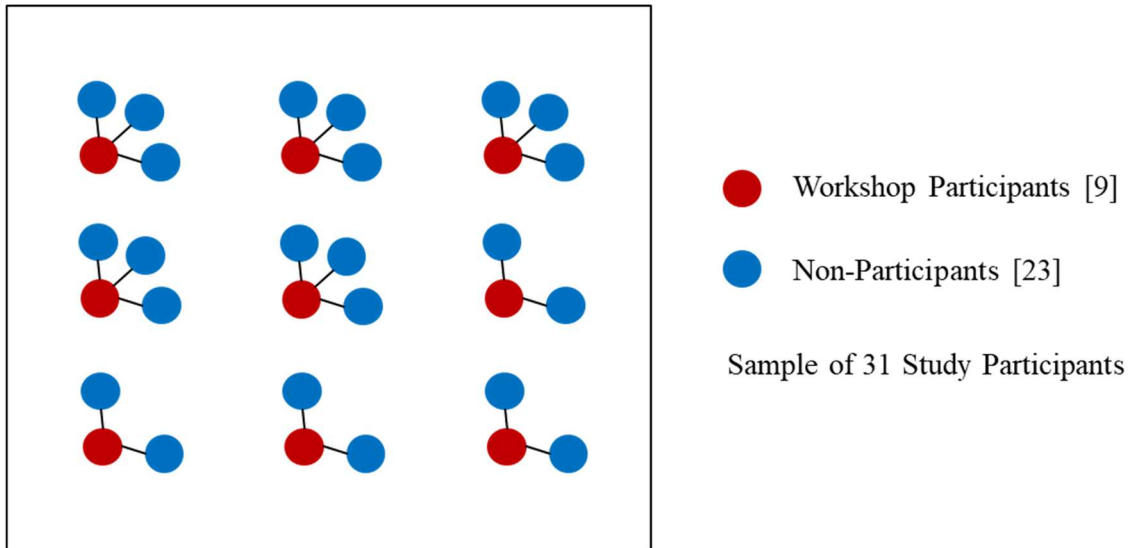
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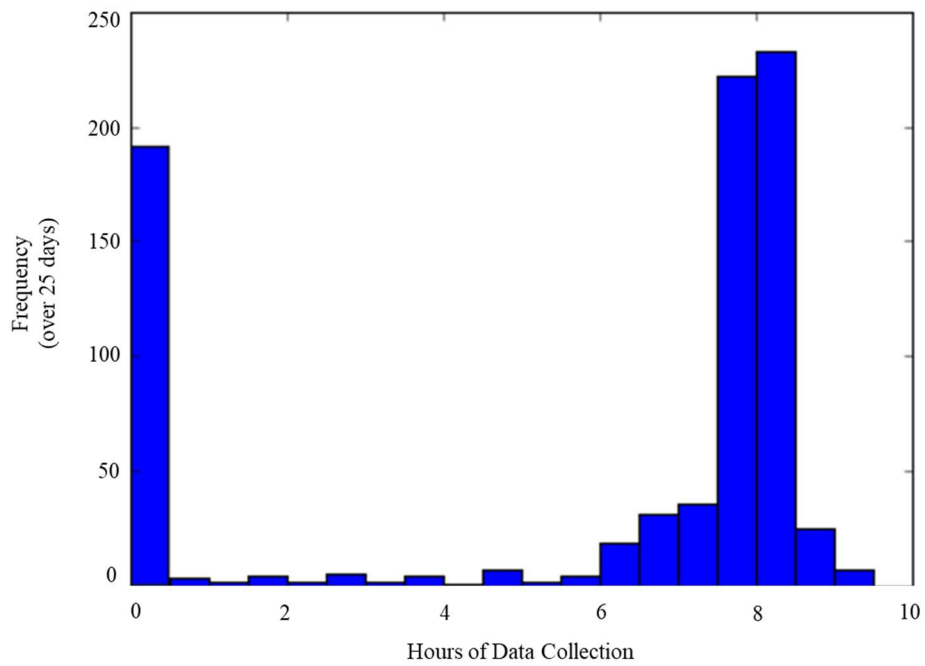
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## FIGURES AND TABLES

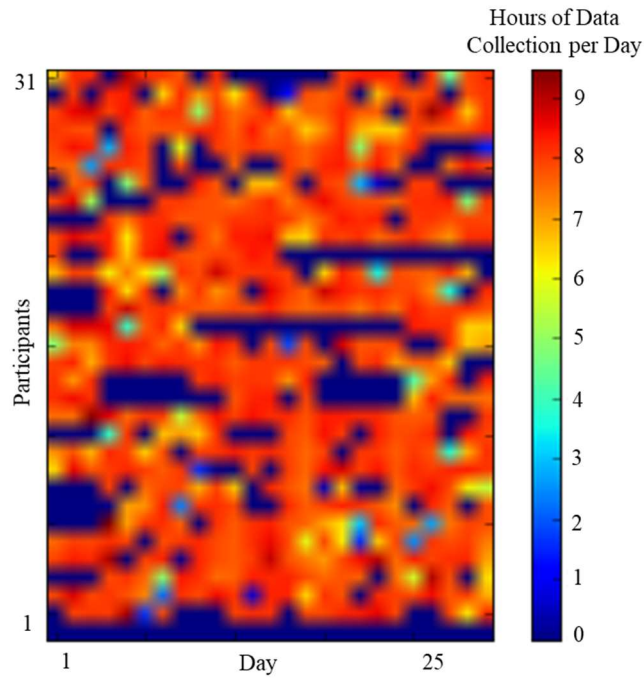
**FIGURE 1:**  
**Sample for Network Study**



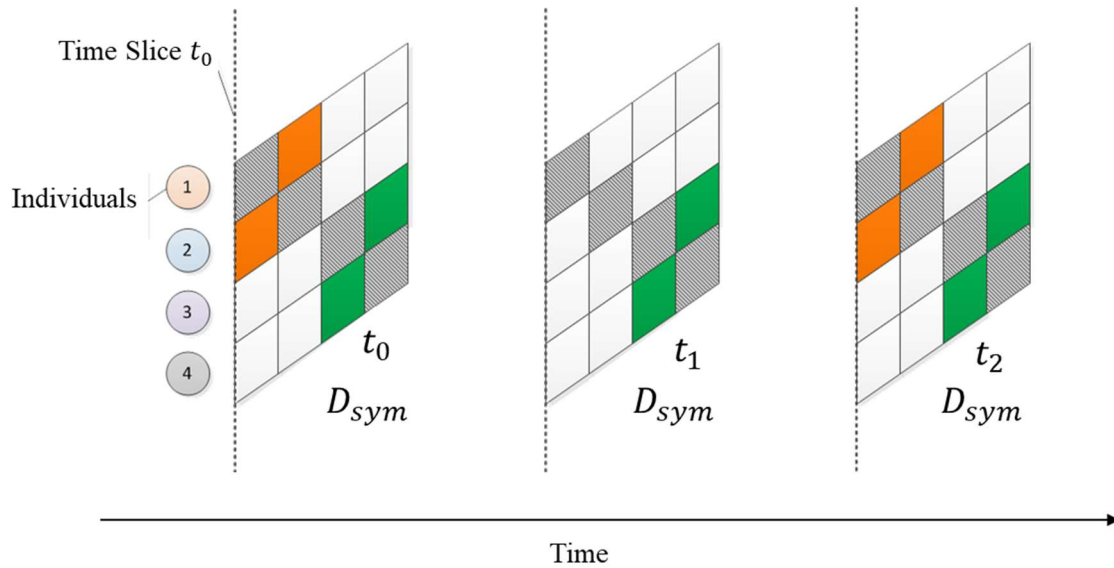
**FIGURE 2:**  
**Overview Data Collection**



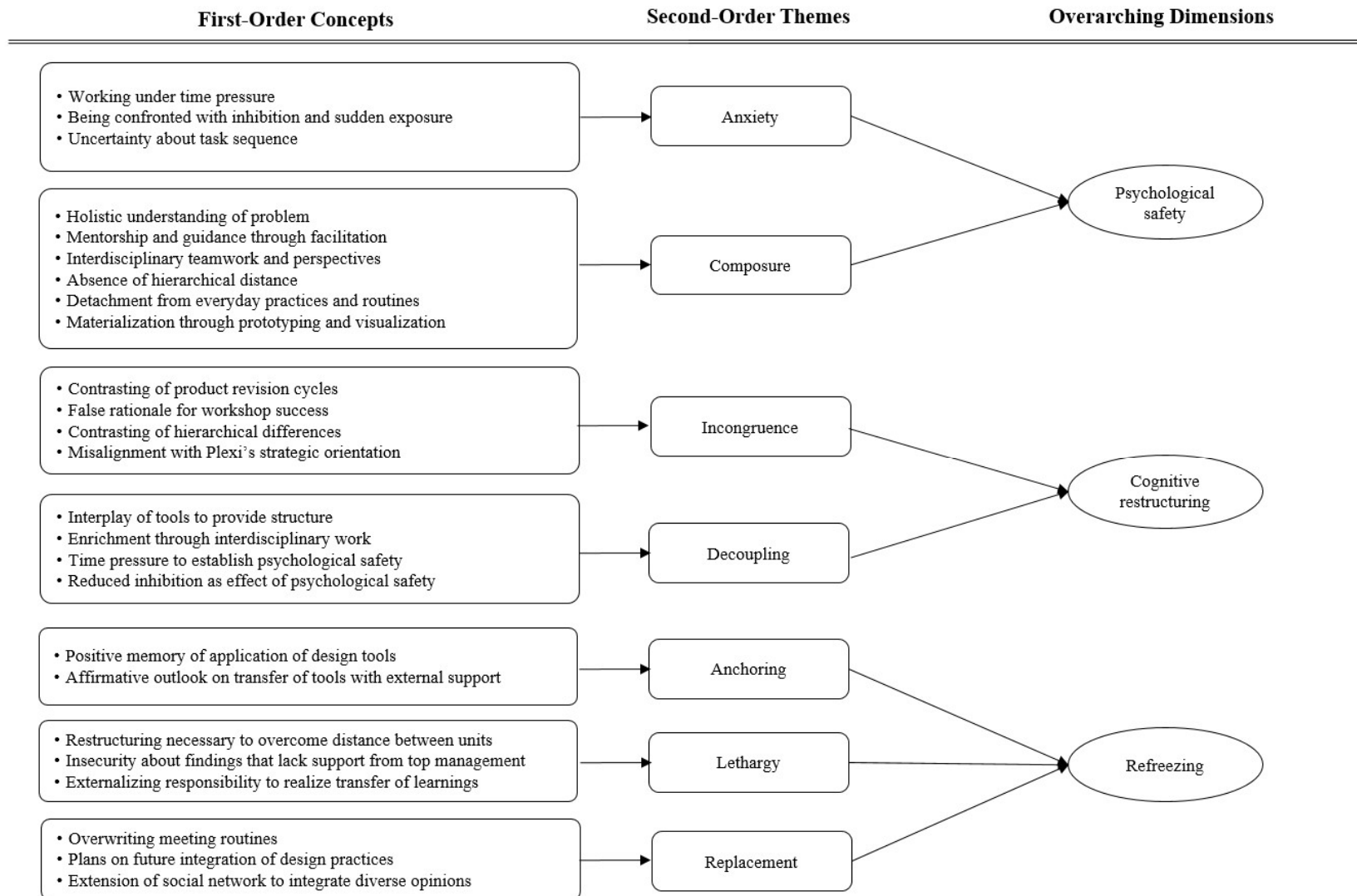
**FIGURE 3:  
Data Collection per Participant**



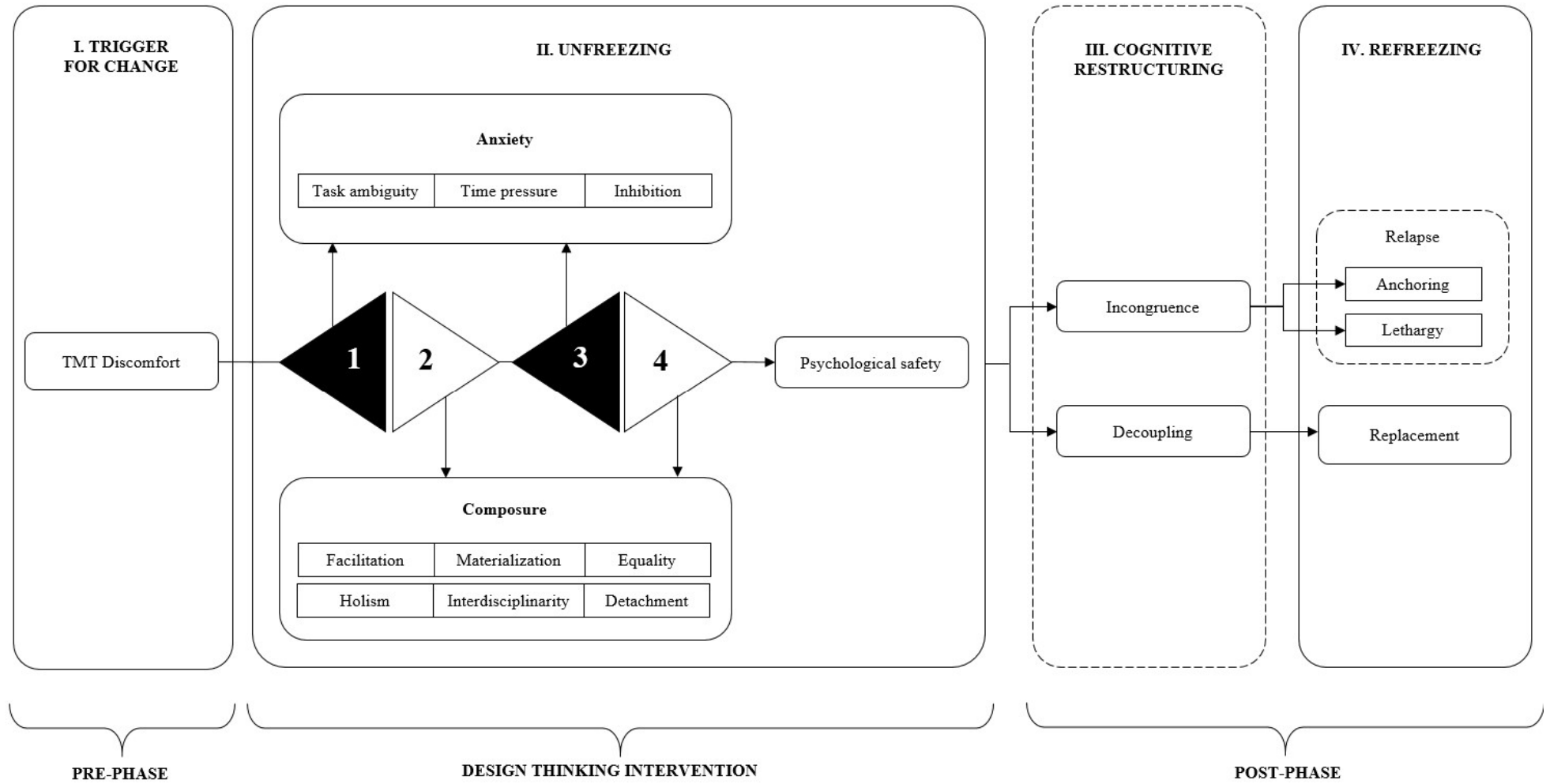
**FIGURE 4:  
Rationale for Proximity Calculation**



**FIGURE 5:  
Data Structure**



**FIGURE 6:  
A Processual View of Design Thinking and Behavioral Change**



**TABLE 1:**  
**Psychological Safety through Anxiety and Composure**

Overarching Dimension	Second-Order Themes	First-Order Concepts and Representative Data
<i>Psychological Safety</i>	Anxiety	<p><b>Time pressure</b> The biggest surprise for me was [...] that I was busy from the first minute [of the workshop] right up until the last. We didn't even sit down for a single minute, and never had to wait or anything like that [...] we were continuously under time pressure. But despite what I just said, I perceived it as positive stress.</p> <p>[Reflecting on the first exercise of the workshop, in which an idea for a wallet is quickly transformed into a prototype:] On Wednesday, we assembled a wallet within two hours—chop chop! That was a big surprise. That was actually very thrilling. Somehow limiting. We only worked for two hours, transformed [the idea] fast, and tailored it rapidly towards our theme [...] The thoughts were immediately captured on a sheet of paper, and the prototyping followed straight afterwards. That was an exciting moment for me.</p> <p><b>Inhibition</b> [Reflecting on the first exercise of the workshop, in which an idea for a wallet is quickly transformed into a prototype:] The first exercise with the wallet was a shock. You had to abruptly craft something, completely clueless. [...] I did random things following experience-based knowledge. Safety was taken away. You're channeled along a path of "just doing"—thrown in at the deep end and told, "Now swim!" And everyone around you is watching.</p> <p><b>Task ambiguity</b> You don't have much time [for each task]. Don't aim for perfection—just do something. What really sticks [from this experience] is: If you can't make it, fake it. That figure of speech. It was displayed on the screen [during the facilitator's introduction]. Also, when you're talking about how to present an idea [to your teammates], you just explain it to the others as if it functions, even though you're actually not sure whether it would work. I enjoyed that.</p> <p>[Reflecting on the first exercise of the workshop and other prototyping activities during it:] Prototyping, if I could, I would have ducked out, because [...] I would have wanted to see an inventory list: "Do we have this [tool or material]? Or something else [instead]?" You had to randomly use something, like a cable tie [...].</p> <p>In between, I doubted whether we were on the right track with our task. [...] I had trouble imagining how we would form teams. [After the first rounds of collecting internal and external opinions and right before reframing the problem,] I was thinking, "How are we getting it back together? How do we link it back to how we started?" and yes, I was a bit like: "Now you've got me curious!"</p>

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*Psychological  
Safety*

Composure

### **Holism**

It's the right combination of methods, which is based on one philosophy, which is orientation to needs. How do I discover needs? How do I get to solutions fast? How do I efficiently evaluate this solution and start a new loop [iteration]?

To take more time to think about what the problem is, how it came into being and might have come into being, i.e. a deeper understanding of the problem before I start to search for a solution.

[Reflecting on interviewing random passers-by about their experiences:] The interviews were funny, because people are so blunt. [...] It's fascinating how quickly you discover something new. Also, how people verbalize it, how they [describe how they] do it exactly [...]. That was so open-hearted; so exciting—that people say it out loud while you can craft a picture around it. I was able to imagine their point of view very well.

### **Facilitation**

[...] It was a very open atmosphere. Not the traditional teacher/student [roles], and [...] just the [kind of] atmosphere to unleash creativity [...].

We couldn't have done it any other way. As in following the method with rigidity, otherwise it would get out of hand. Everyone has something to say.

[Working] according to the theme of "Just do it." [...] They will guide us. I'm confident that my navigation—my GPS—will lead me to the goal.

### **Interdisciplinarity**

Of course, you notice when you're a team, how you gradually merge and think along the same lines and how you adapt to each other... or, well, how you went through the same experiences recently, or over the last few years. And, of course, it's very important, if others join from different disciplines, from entirely different areas. They're completely free, and provide this very distinct [beneficial] input.

[...] Looking at [problems] from a different perspective. Not only to rely on my own opinion, but to gather a second or third opinion... or that people from a different unit take a look at it.

### **Equality**

That's what the workshop neatly brought out: Don't think about what the other side wants to hear. What's right or wrong. Just write down what you like and that's why it works! This is also why it works under time pressure.

---

**Detachment**

[...] Everyone was on board. No one disrupted. No one rebelled. No one interrupted the workshop. No one said. “That’s kindergarten [...]” I was under the impression that everyone was motivated. It was a little bit like vacation with work. I felt a bit like a student, as

Composure  
(*continued*)

in, “Let’s see what’s up next.” Time doesn’t matter—but on the other hand, time pressure was there. [...] Working in such a casual environment with a thousand options to sit and stand. The surroundings feel like you’re in a craft workshop. Behaving like something creative will come out of this, while actually feeling confident that we’ll make it happen.

**Materialization**

It was all pretty good [...], from the initial note-taking to the final product. The process... it was amazing. How little time we needed, and the intensity. That it’s possible to achieve so much with such simple resources.

---



**TABLE 2:**  
**Cognitive Restructuring to Process Change**

Overarching Dimension	Second-Order Themes	First-Order Concepts and Representative Data
<i>Cognitive Restructuring</i>	Incongruence	<p><b>Contrasting of product revision cycles</b> When you realize that it's not the right product—in our everyday mindset, that takes months, or weeks. We waste time, manpower, money—and in the end it would have been the same result anyway: “OK, that didn't work!” [In the workshop, however,] we invested a bit of time, a bit of manpower, we thought quickly, [and we found out] that it wasn't what we need. That impressed me. That you actually don't need much time to realize what is important and what is not.</p>
		<p><b>False rationale for workshop success</b> Participants were very agile and faster in comparison to our Plexi environment. [This] could stem from their individual character, but also from the workshop and its atmosphere, but I'm not sure if some colleagues [non-participants] could be as agile in such an environment [refers to workshop]. [...] <u>The openness depends on the vibe and the people.</u> The atmosphere contributes a lot, but the people must fit, too. I'm skeptical whether you would get the same or comparable results if you randomly mixed and matched people.</p>
		<p><b>Contrasting of hierarchical differences</b> [At Plexi] and depending on the rank, I have to and want to dominate more, and vice versa: If a higher-up is present, they take over. It is not that democratic. [...] At the workshop, it was more open. A little bit playground-like.</p>
		<p><b>Misalignment with Plexi's strategic orientation</b> [Referring to finished solution from another team:] Not everyone advocates [this solution]. It's so advanced from a technological perspective that we have to admit, it's a niche that we're not targeting with our products at the moment. [...] There are a few evolutionary steps that need to be overcome. That is why [it won't be pursued]. <u>I believe it is self-protection.</u></p>
	Decoupling	<p><b>Interplay of tools to provide structure</b> The way feedback rounds were structured, that was very interesting: that one person took on [the role] of a fan, another the admirer or the stakeholder. That everything was kept neat and short. [...] Receiving competent feedback within five or six minutes and seeing [colleagues] nodding or shaking their heads [either agreeing or disagreeing with comments]. [Referring to the Plexi environment:] In [the process of] giving feedback, you're already mounting counter-arguments, and that's what takes so long. You get to a result faster if you take feedback with a “Thank you and goodbye!” and then check if you can develop something from it. Then there will be reasons why you do or don't use it, but that's then open for discussion. These interminable, rambling discussions were completely absent—and that was, of course, extremely impressive. Receiving [feedback] short and sweet. [...]. The way feedback discussions were set up was good.</p>

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**Enrichment through interdisciplinary work**

The presentation of our ideas and constructions will stay with me for longer. The prototype that we built and the playfulness around it. Those three minutes. [Participants present their prototype along with a specific use case, as a sketch or brief roleplay.] That's something I will take away, too, and want to use more often. Letting my counterparts evaluate on a rolling basis... Receiving feedback... What is their opinion? I really liked that. [Also,] that you are doing it more often, not just once during our gate meetings [monthly R&D and management roundtables]. So far, I've found it hard to really extract feedback from that. We meet and discuss in a relatively large group, and throughout the discussion you usually don't receive targeted feedback. It gets talked to death, and in the end no one knows what [the discussion] was actually about, or what people were trying to say. I'm not sure if this is part of the [Design Thinking] method, but to proceed like that: Only a few have [feedback] cards, and only a few give very precise positive or negative feedback, I really enjoyed that. To present [at Plexi] in shorter cycles and to always receive feedback from a different person, not the same again and again. Input from a different opinion on the new version or the revised version [of the model or prototype]. This is how you [capture] and integrate many nuances.

Decoupling  
(continued)

**Time pressure to establish psychological safety**

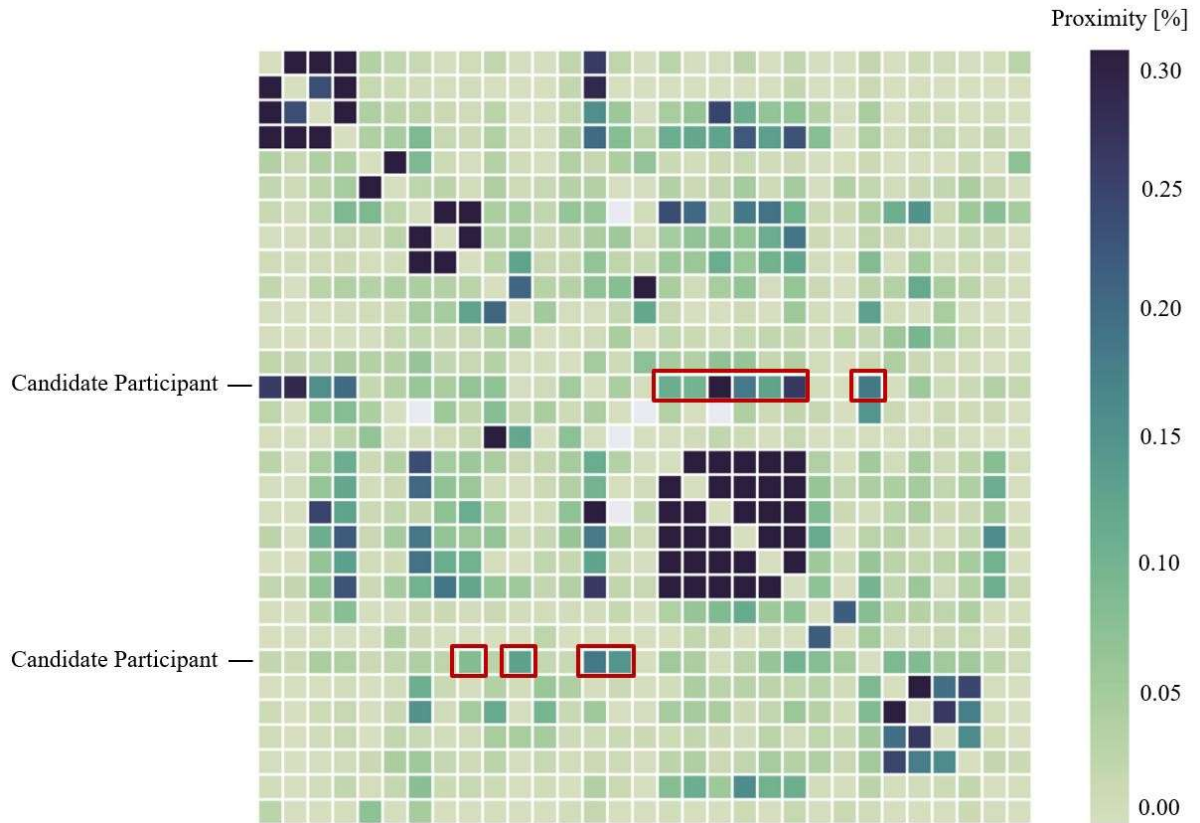
That's something I try to integrate into meetings: When I recognize that we are about to lose our way, to get back on track with, "We must reach a conclusion within five minutes." I've had positive experiences with it already. [...] In my [Plexi Project, which I lead] I said: "[...] five minutes [...], otherwise we will just keep going round in circles." And this helps, I think, to improve the atmosphere—as puzzling as that might sound. I believe that, as a by-product, people open up, because they dare to jabber and don't overthink whether it's right or wrong. In fact, you don't have much time for rethinking and to craft what you are about to say. And in turn, ideas float way more when you sit together and have an hour to discuss. In this sense, a change in the atmosphere [during this meeting] took place, especially due to the time aspect.

**Reduced inhibition as effect of psychological safety**

That's what the workshop neatly brought out: Don't think about what the other side wants to hear. What's right or wrong. Just write down what you like and that's why it works! This is also why it works under time pressure.

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**FIGURE 7:**  
**Proximity Matrix—Post-Phase**



**TABLE 3:  
Modes of Refreezing Change**

Overarching Dimension	Second-Order Themes	First-Order Concepts and Representative Data
	Anchoring (Relapse)	<p><b>Positive memory of application of design tools</b> [Back at Plexi], it’s exactly this tunnel vision [that is problematic]. The unleashing of thoughts, letting ideas flow wherever they lead [during the workshop]. It was also visible throughout the Herbstlaub exercise [an ideation technique in which ideas are captured on sticky notes or “leaves” and collected on the floor]—the ideas just floated onto the floor. [...] Whether it makes sense for Plexi or not doesn’t matter. Just throw it. Throw your ideas down. And I believe that it is a difference: truly opening up, to give free rein to your ideas. To escape the Plexi scaffold.</p> <p><b>Affirmative outlook on transfer of tools with external support</b> [...] For me it would be interesting to see examples from other companies on how they solved smaller tasks with Design Thinking. Most likely, they didn’t conduct a two-day workshop—that’s not possible—but how did they translate it? We need to find a way now. Do I pick individual problems and put together a team [...]? [...] I would want to get more experience myself and see best cases or best practices from other companies.</p>
<i>Refreezing</i>	Lethargy (Relapse)	<p><b>Restructuring necessary to overcome distance between work units</b> How we saw it during the workshop, that’s how I envision it at Plexi: the salesperson works closely with the developer or product manager or with industrial engineering. Just to give an example. [...] [Colleagues] complain that units are drifting further and further apart, everyone seems concerned about their own topics, and overarching [goals] don’t seem to matter. That falls back to leadership. That’s my personal opinion. [...] It sounds blunt, but new people would have to be brought in. Changing the key players, or the ones in authority—but I’m not sure if that would be sustainable over the long run.</p> <p><b>Insecurity about findings that lack support from top management</b> I believe the success of Plexi is based on R&amp;D activities in close collaboration with clients, or operationalizing ideas from clients. That said, I think it might be hard to sell the idea that, as of today, we will develop our own ideas, completely detached from clients. I believe [the owner] would struggle with it.</p> <p><b>Externalizing responsibility to realize transfer of learnings</b> It is not possible for non-participants to understand what we did. I asked [our senior manager] if we should present it [to non-participants]. I said that I’m skeptical at the moment whether they would get it. [They would be wondering:] What kindergarten exercises did [workshop participants] do? It was [a] good [experience], but I guess an intermediary step is inevitable [...].</p>

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Replacement

### **Overwriting meeting routines**

[The atmosphere] was positive and open. [Even now] this positivity still resonates with me... Thinking about the workshop and particularly the atmosphere. That's what truly makes a difference. The method is great, of course, and very exciting, but working together with your colleagues and on the same [hierarchical] level is very impressive, and will have a lasting positive impression on me. I try to embed more time pressure into certain activities, as I perceived it as positive [during the workshop], despite the fact that I am more the type who needs time. I usually step back, take my time and think about it, and share my opinion a few minutes later instead of right away. I learned [at the workshop] that time limitations are beneficial and more goal-oriented, rather than leaving things open. That's something I try to integrate into meetings: When I recognize that we are about to lose our way, to get back on track with, "We must reach a conclusion within five minutes." I've had positive experiences with it already. [...] In my [Plexi Project, which I lead] I said: "[...] five minutes [...], otherwise we will just keep going round in circles." And this helps, I think, to improve the atmosphere—as puzzling as that might sound. I believe that, as a by-product, people open up, because they dare to jabber and don't overthink whether it's right or wrong. In fact, you don't have much time for rethinking and to craft what you are about to say. And in turn, ideas float way more when you sit together and have an hour to discuss. In this sense, a change in the atmosphere [during this meeting] took place, especially due to the time aspect.

### **Plans on future integration of design practices**

The workshop was an opportunity for me to do something different, to learn something new, and a nice distraction that makes a change from my daily routines. I didn't believe that [Design Thinking] could do that, and basically realized that I can transfer it. It was a bit of a surprise. I had imagined something different. Or at least what you can take away from it. Because it wasn't just about the product, but the thinking process, which is transferable. And that was something I only realized after [the workshop]. [The design-thinking method] doesn't only target R&D employees.

### ***Extension of social network to integrate diverse opinions (results from sociometric data)***

*Although interdisciplinary work was highlighted as uncommon due to the "silo" mindset regarding Plexi's organizational structure, two participants extended their network across unit boundaries in the post-phase. Both participants emphasized the positive impact from interdisciplinary input (as did their close contacts at the firm), which we argue reflects in our findings from the network analysis.*

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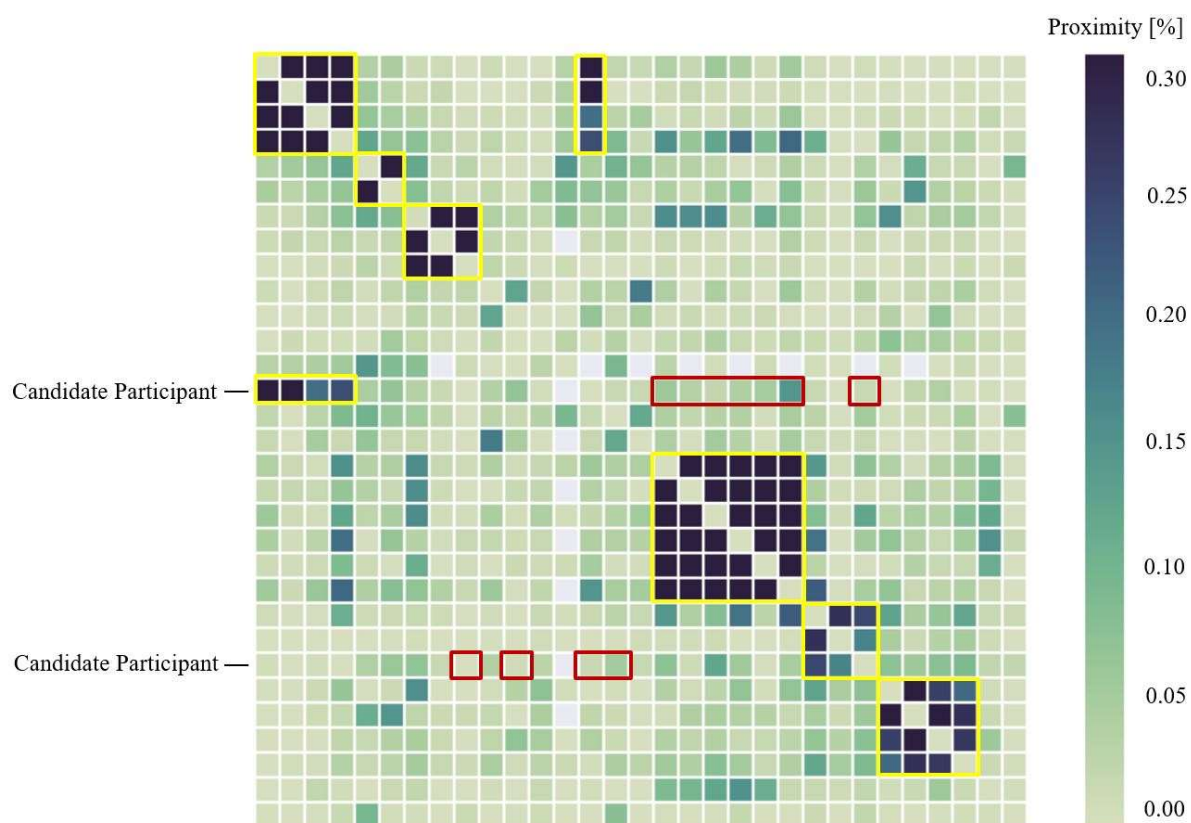
## APPENDIX

Below, we present additional findings from the network analysis to elaborate on the steps taken to derive our results. First, we complete the proximity analysis, which we use in the findings section. In Appendix A1 and A2, we show the proximity between all participants in the pre- and post-phase. The network extensions of the two candidate participants are highlighted, as well as the co-location of certain participants. We used co-location as a control to verify whether the devices accurately captured close proximity among participants. For instance, if participants share offices or work closely in a shared office space, the proximity between those pairs was naturally higher. For this effect to surface, we deployed a cutoff of 30% in time. 30% means that a pair of participants spent a minimum of 30% of their time in close proximity to each other. We infer that a cutoff of 30% well captures the physical co-location of pairs, as we were able to match sociometric evidence with participants' office location at the firm. While sharing offices surfaced at a cutoff of around 30% (blue connections), interaction with colleagues who were not co-located became visible at lower rates—namely, between 5% and 25% (connections in light green up to medium blue). Comparing the pre- and post-phases in terms of new or intensified connections resulted in our finding that two participants “added” colleagues outside their unit to their networks after the workshop took place. The other participants showed no visible changes in their activity to meet other colleagues in person. In some cases, interaction with colleagues swapped between the pre- and post-phases: Connections that were visible in the pre-phase did not appear in the post-phase, and vice versa.

Further, we present findings on interaction divided among each workday and participant (Figures A3–A5) and visualize the proximity among work units (Figure A6).

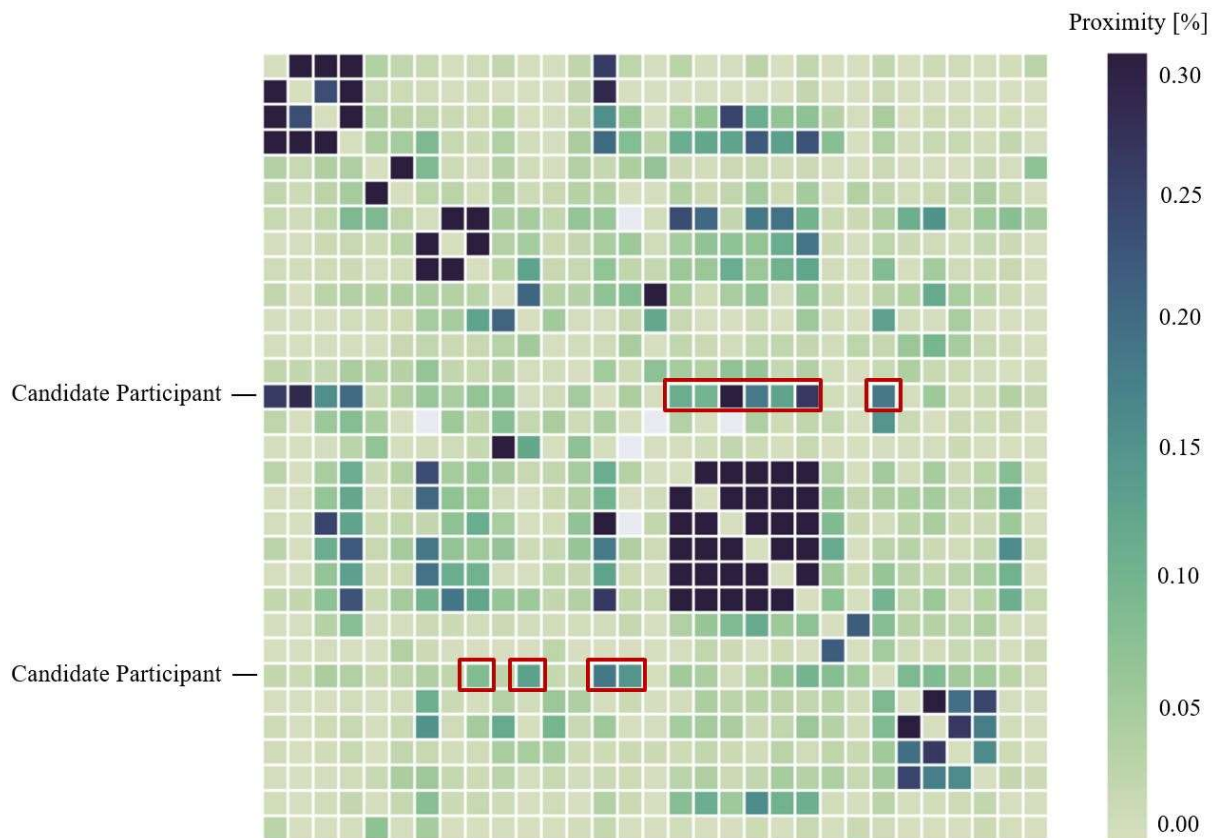
## APPENDIX A1: Proximity Matrix—Pre-Phase

Connections highlighted in red are connections between pairs, which will appear intensified in the post-phase. Connections with yellow borders are colleagues who share an office, or work in adjoining offices. For example, one of the candidate participants does not share an office with other colleagues who were carrying a device, but in the neighboring office colleagues were wearing devices, which explains why dark blue connections with this participant surfaced (minimum of 30% of the time or more in close proximity with certain colleagues).



## APPENDIX A2: Proximity Matrix—Post-Phase

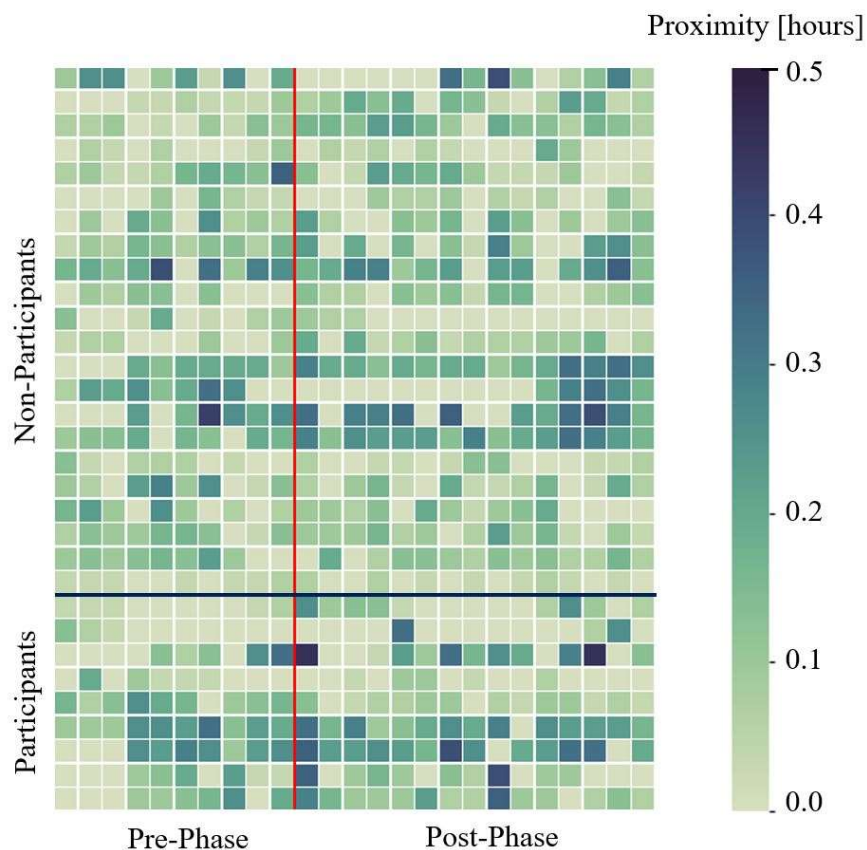
To simplify the comparison between the two phases, we show the proximity matrix of the post-phase once again. The candidate participants and their additional and/or amplified connections after the workshop are highlighted.





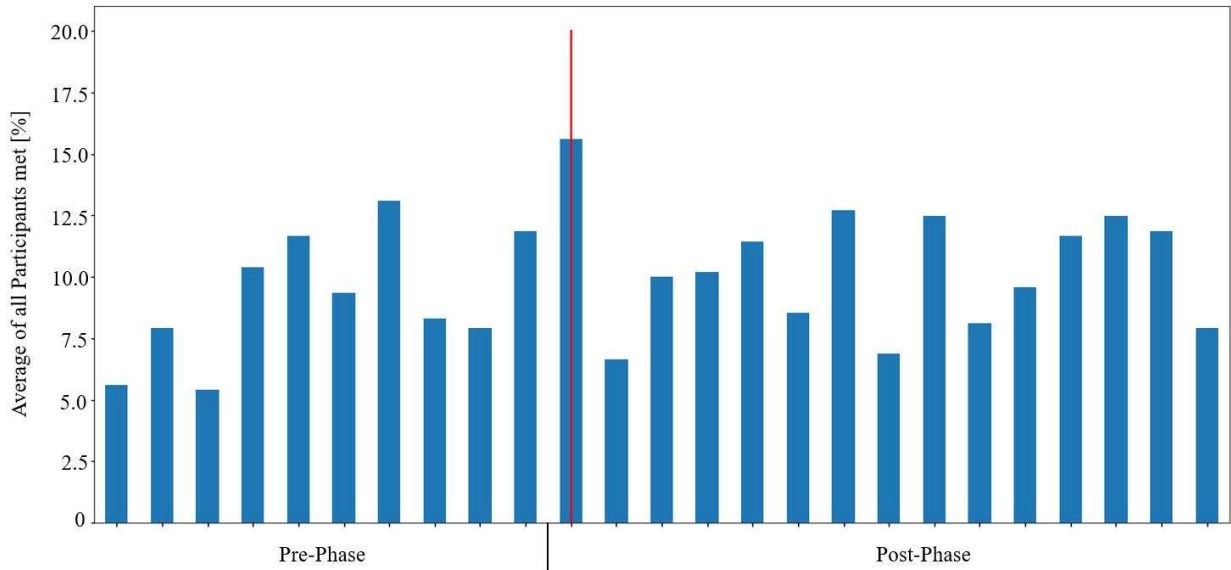
### APPENDIX A3: Exchange per Participant—Variety

To identify whether and to what extent workshop attendance has an effect on interaction in the post-phase, we analyzed the interaction per participant for every day of measurement. The cutoff of 0.5 represents proximity to half the sample for at least 30 minutes each. The sample comprises all colleagues who were wearing a device. With this measure, we aimed at visualizing the variety of colleagues with whom employees interacted. As the figure shows, the workshop did not affect interactions. Even immediately after the workshop took place, there is no visible change or peak in reaching out or more scattered among colleagues due to the recent experience, or vice versa.



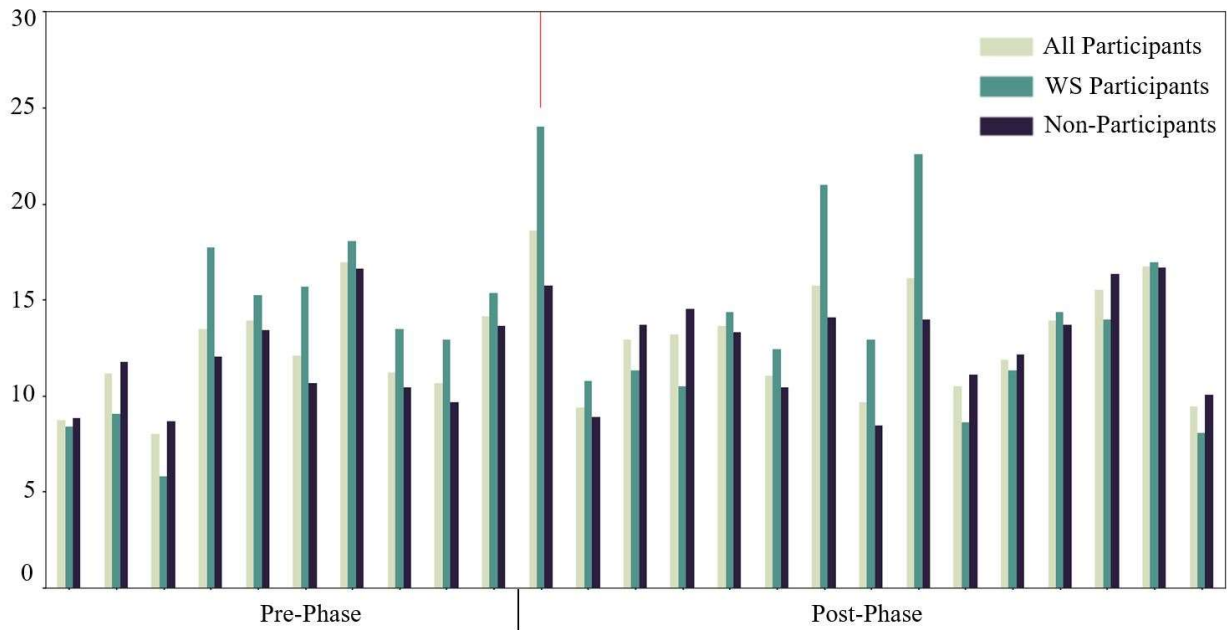
### APPENDIX A4: Interaction per Participant—Averaged I

When exploring the interaction averaged over all study participants, a mild peak surfaced immediately after the workshop. The first day after the workshop is highlighted and shows a peak, which flattens over the following days.



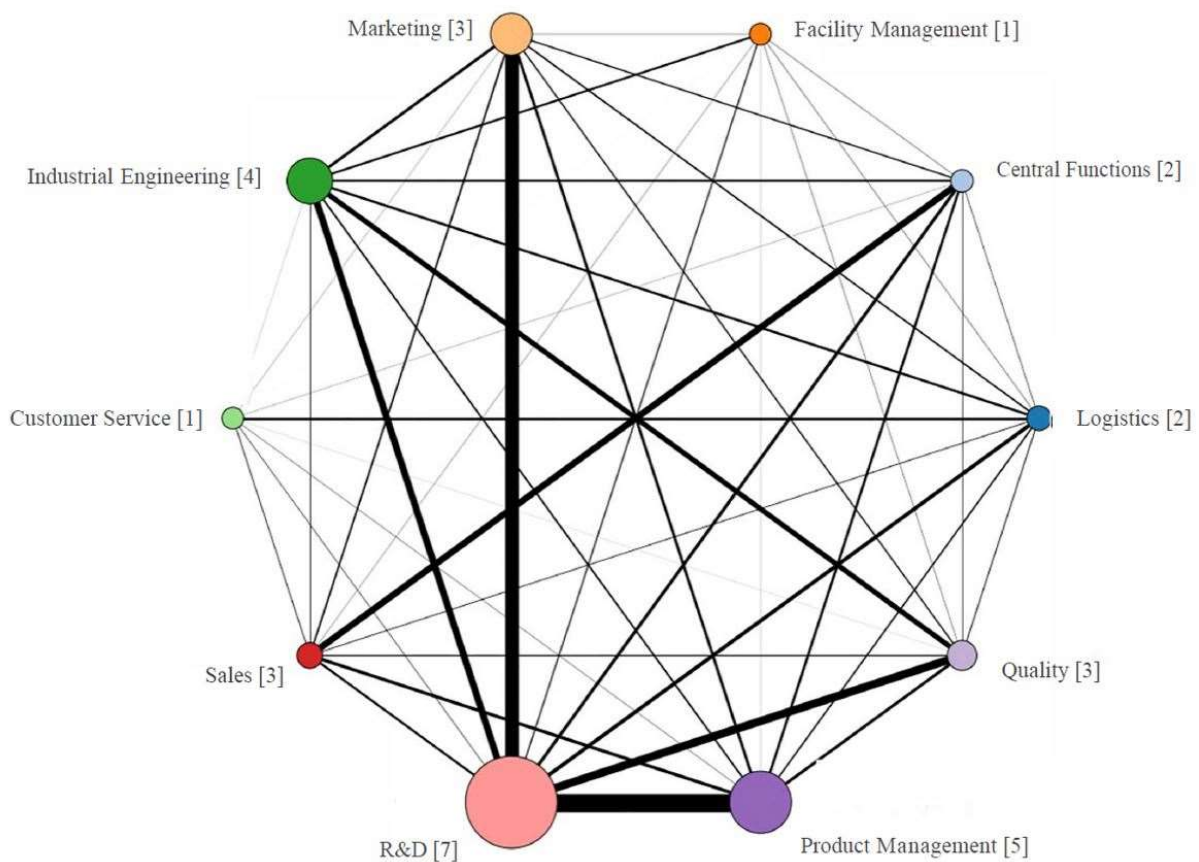
### APPENDIX A5: Interaction per Participant—Averaged II

The figure below again shows the average interaction, but distinguishes between workshop participants and non-participants. The increase for workshop participants in the post-phase underlines our finding that candidate participants extended their network.



## APPENDIX A6: Proximity across Work Units

The proximity analysis shows each unit and its links to other units. The size of the node is determined by the number of participants (shown in brackets). The width of the link line represents the frequency of exchange. A thinner line represents less frequent interaction of unit members; a thicker line denotes more frequent interaction. From the interviews and observations from the field researcher, a clear separation among work units was present. Employees describe the interaction among units as mostly limited to a shared work context. This functional interaction could be confirmed by the visualization below. For example, Marketing works in close relationship with R&D. While the Marketing unit would traditionally be expected to have close links to Product Management, the strong relationship between Marketing and R&D was highlighted in interviews and resonates with sociometric evidence.



## PAPER 3

**STANDING AT THE TIPPING POINT:  
HOW FACILITATIVE LEADERSHIP ENGAGES SPEAKING UP**

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The data collection for this study was also analyzed following a quantitative approach. The manuscript of our co-authors and colleagues was submitted to BMJ Quality & Safety on May 31, 2019:

Krenz H., Burtscher M., Grande B., Kolbe M. (2019): Variation in team composition and its impact on nurses' voice behaviour: The role of hierarchical differences and leadership centralization.

We would like to express our gratitude to Prof. Donat Spahn for generously supporting research activities at the simulation center. We would also like to thank the staff from the simulation center and all clinicians and educators involved in the design and facilitation of the training, as well as Dr. Michael Burtscher for his conceptual insights.

**STANDING AT THE TIPPING POINT:  
HOW FACILITATIVE LEADERSHIP ENGAGES SPEAKING UP**

**Abstract:**

In this qualitative study, we explore variations in leader behavior that allow individuals to engage in “upward voice.” Under the extreme conditions of hierarchical distance in medical teams and task volatility, deciding whether to speak up is a delicate situation: remaining silent can endanger patients, but questioning superiors brings its own risks. Our sample comprises 12 acute care teams that solved cases in the simulation suite of a leading hospital. We deployed a microethnographic approach to analyze the unfolding of upward voice through vocal, emotional, and spatial cues. Facilitation emerged as the leadership style that resulted in most speaking up. Leaders must not only acknowledge input from team members, but also provide an explanation for acting (or not) on their remarks. This finding contributes to voice literatures by suggesting an interpersonal strategy for leader-member exchange in the discrete moment of speaking up. Besides verbal cues, the gesticulation of some participants revealed a physical tension when engaging in speaking up, which provides evidence for the balancing of opposing forces in such emotionally charged moments. We also add to an emerging theme in management that connects the discussion of emotions to that of behavioral change, which we ground in Schein and Lewin’s early theorizing.

**Keywords:** Employee Voice and Silence, Leadership, Behavioral Change, Emotions, Embodiment

## INTRODUCTION

Voice, or “speaking up,” is generally defined as “any attempt [...] to change rather than to escape from an objectionable state of affairs” (Hirschman, 1970: 30). Many scholars have explored voice as a lever for change beyond individuals’ formal roles (see review by Morrison, 2014; Van Dyne & LePine, 1998; Liang, Farh C. & Farh, J., 2012), and it has also been shown to directly impact organizational effectiveness and team performance. For example, Detert et al. (2013), MacKenzie et al. (2011), Edmondson (2003), Adelman (2012), Kolbe et al. (2012), and Ng & Feldman (2012) find a positive relationship between voice and performance. Other studies have found an indirect effect, with psychological safety functioning as a mediating (e.g., Detert & Burris, 2007; Nembhard & Edmondson, 2006; Edmondson & Lei, 2014) or moderating construct for performance, as well as learning (e.g., Sanner & Bunderson, 2015; Faraj & Yan, 2009). How employees engage in voice is related to whether and how teams reach a shared goal (e.g., Leonard, Graham, & Bonacum, 2004; Blum, Raemer, Carroll, Dufresne, & Cooper, 2005). More specifically, it has been argued that “speaking up [is] a behavioral manifestation of [psychological safety]” (Edmondson, 2003: 1447).

Based on these positive linkages, we feel confident in treating voice and psychological safety as coexistent constructs, while also relying on voice as a dependent variable and marker for team performance. Leaders can establish safety within their team by encouraging members to deliberately think aloud and dare to make (critical) remarks with a view to constructive change (e.g., Nembhard & Edmondson, 2006; Bies, 2009; Goleman, Boyatzis, & McKee, 2002).

Once established, psychological safety will positively contribute to leader-member exchanges; however, it is a fragile state. It can be dispelled abruptly and enduringly through a single event (e.g., a put-down from a supervisor). How intensely and frequently individuals are exposed to such events determines the type of fear they will carry with them. Fear and futility



are among the most frequent reasons for employee silence—the opposite construct of upward voice (e.g., Milliken, Morrison & Hewlin, 2003; Dyne, Ang, & Botero, 2003; Ashford, Rothbard, Piderit, & Dutton, 1998; Detert & Treviño, 2010). Deliberate defensive fear describes the conscious choice to refrain from voice in the situation at hand; habituated fear, for example, causes individuals to remain silent systematically (Kish-Gephart, Detert, Treviño & Edmondson, 2009).

We focus on medical teams, and specifically acute care situations, to explore how leaders support their colleagues to engage in voice, regardless of the type of fear those colleagues might carry with them. Our reasoning is twofold. First, psychological safety builds up gradually. In acute care situations, it is seemingly impossible for leaders to invest in dialog to build common ground (Schein, 1995: 29). The criticality of the medical situation at hand might demand immediate task execution. Second, speaking up at the right time can help prevent errors. In our setting, for example, some avoidable medical complications among patients can be traced back to interpersonal tensions: A recent study links patients' critical postsurgical conditions to leadership behavior (Cooper et al., 2019). The authors operationalize co-workers' reports on surgeons' unprofessional behavior to predict unfavorable conditions in their patients (Cooper et al., 2019). While this prediction indicates a decrease in psychological safety, further reports from surgeons recall experiences from their times as residents, and how these incidents jeopardized safety (e.g., Swendiman, Edmondson & Mahmoud, 2019; Emerel, Kent & Chu, 2019; Schwappach & Gehring, 2014; Gardezi, Lingard, Espin, Whyte, Orser, & Baker, 2009). The emotional aftermath of such events motivates our efforts to explore how leaders can “repair” or build up safety among their team to avoid errors.

Morrison (2014) and Milliken et al. (2015), leading scholars in employee voice and silence, suggest a more precise, cognitive lens to study the emotional encounters through which silence becomes voice. Milliken and colleagues (2015) highlighted the tensions, in the form of

cognitive dissonance, that employees face when they realize that their behavior (e.g., remaining silent) is at odds with their beliefs (e.g., that they can contribute to change) (Milliken, Schipani, Bishara, & Prado, 2015; Festinger, 1954, 1962; Morrison & Milliken, 2000). Morrison (2014) takes that view a step further by bringing in Lewin's theory of change (Lewin, 1947a, 1947b), which helps us explain how individuals resolve internal, emotional conflict and release it into changed behavior. Based on Lewin's (1947a, 1947b) model, Schein (1996) highlighted the importance of facilitation to establish psychological safety (e.g., Edmondson, 1999). Schein describes facilitation as a "communication technology" (Schein, 1993:40) and a lever to establish safety (Schein & Bennis, 1965; Schein, 1993, 1995). Facilitation entails leading without controlling (Conley & Goldman, 1994: 3) and building a mutual decision-making process instead (Schein, 1978: 339).

On this basis, this paper intends to: (1) explore whether and how facilitation, as a specific leadership style, is implemented in medical teams and triggers upward voice; and (2) adopt a dynamic, processual view on vocal, emotional, and spatial aspects of leadership that lead, or not, to speaking up, relying on a very fine-grained methodological approach. We, therefore, aim to explore two main questions: (1) *How does leaders' behavior encourage their lower-status team members to speak up?* and (2) *What are the cues for the emotional stir-up of individuals if they speak up?*

To shed light on the speaking-up event and the role of different leadership styles, we deployed a microethnographic approach to depict social interactions in 12 medical teams. We analyzed the moment-to-moment verbal cues and gestures of individuals who engaged in speaking up (Gylfe et al., 2016; Congdon, Novack, & Goldin-Meadow, 2018). We inferred the social influence of leaders from the way they structured communication and addressed their team (gestures; vocal and spatial cues). Four distinct leadership styles emerged: *facilitative*, *directive*, *teaching*, and *deferent*. Our findings show that speaking up occurs more frequently

in teams in which the leader's response to speaking up comprises two elements: first, an explicit acknowledgment of the colleague's input; and second, a subsequent explanation of why the suggestion is (or is not) being followed. We interpret this result as an important contribution that supports Morrison's call to explore the characteristics of messages that are exchanged (Morrison, 2014: 190). Counterintuitively, the way leaders structured communication (e.g., verbalizing updates more frequently than orders), who they address (e.g., the team versus individuals), or how they use space to enact leadership (e.g., bedside or off-patient) did not yield more speaking up. Some participants, however, manifested their inner tensions in the form of gestures that revealed the presence of inhibiting forces. This finding relates again to Morrison's call (2014) to uncover emotional tensions that antecede voice through the lens of Lewin's (1947a, 1947b) theory of change.

Below, we position our study in the voice and leadership literatures, set out our analytical approach, and discuss the findings from our microethnographic video analysis.

## **THEORY**

This paper is based on the building blocks of voice, emotions, behavioral change, and leadership. We review and connect each of these elements in the following. Our review begins with the introduction of employee voice and employee silence as opposing states. We then connect voice and silence to the discussion on behavioral change (Morrison, 2014). While emotions and change represent an upcoming stream in management studies, this work builds on early theorizing in behavioral psychology (Pavlov, 1927; Lewin 1947a, 1947b; Kamin, 1961). To conclude, we review recent advances in leader behavior on voice.

## **Voice and Speaking Up**

Starting from Hirschman's (1970) original definition of employee voice as a means to change, the study of voice has grown into a broad and well-established field (Morrison, 2014; Premeaux & Bedeian, 2003). Initially, voice was viewed as a response to job dissatisfaction (Rusbult, Farrell, Rogers, & Mainous, 1988). Over time, the construct evolved from a purely intra-role perception (formal and task-driven) to include extra-role behavior (e.g., LePine & Van Dyne, 1998; Van Dyne & LePine, 1998; Morrison, 2014). This evolution allowed scholars to differentiate voice that seeks to improve current practices (promotive aspects) from voice that challenges the status quo (prohibitive aspects) (Dyne et al., 2003). Another distinction is between prosocial ("benefitting the organization"), acquiescent ("agreeing with the group"), or defensive voice ("shifting attention") (Dyne et al., 2003). Recent advances have focused on multilevel research—such as the investigation of shared cognitions, i.e. favorable voice climate—to understand the link between individual-level identification on voice and team-level beliefs (e.g., Morrison, Wheeler-Smith, & Kamdar, 2011). In management, the discussion on psychological factors (e.g., self-esteem or felt obligation) that antecede promotive or prohibitive voice has gained scholarly attention (e.g., Liang, Farh C. & Farh J., 2012; Morrison, 2011). Recent studies consider voice as "planned behavior" (Liang, Farh C. & Farh J., 2012: 73), which comprises "ideas, suggestions, concerns, information about problems, or opinions about work-related issues [...] with the intent to bring about improvement or change" (Morrison, 2014: 174). Within the discussion about voice, speaking up implies that individuals perceive the atmosphere as psychologically safe and are "not constrained by the possibility of others' disapproval and/or the negative personal consequences that might accrue to them as a result" (Nembhard & Edmondson, 2006: 945).

Fear of negative consequences is the most common reason for employees to remain silent (e.g., Milliken, Morrison & Hewlin, 2003). Pinder and Harlos (2001) define silence as

the withholding of a remark towards a colleague who is in the position to accommodate change. Indeed, many studies focus on silence rather than voice (e.g., Morrison & Milliken, 2000). Individual dispositions to favor silence are both plentiful and difficult to overcome (e.g., Milliken, Morrison & Hewlin, 2003; Morrison & Milliken, 2003). The inhibitors of voice (Morrison, 2014: 186) include the sense of futility (Milliken, Morrison, & Hewlin, 2003), perceived injustice (Pinder & Harlos, 2001), high self-monitoring (Premeaux & Bedeian, 2003), the perception of powerlessness (Morrison, See, & Pan, 2015) and contextual aspects such as a climate of fear or a change-resistant culture (Morrison & Milliken, 2000). Unsurprisingly, being “silenced by fear” (Kish-Gephart et al., 2009: 163) defines a common phenomenon in organizational behavior and psychology (e.g., Milliken, Morrison, & Hewlin, 2003; Milliken & Morrison, 2003; Kiewitz, Restubog, Shoss, Garcia & Tang, 2016; Detert & Edmondson, 2011; Farrell, 1983). Even in lateral communication, employees hesitate to engage in voice and more frequently display signs of reverence (e.g., Henrich & Gil-White, 2001; Fragale, Sumanth, Tiedens, & Northcraft, 2012).

These obstacles to voice are particularly salient in role-based work, such as in medical teams. Medical teams are multi-role, high-reliability teams and feature a high degree of “status asymmetry,” as Weiss et al. (2017: 66) call it. Role-based coordination is a distinct characteristic of temporary groups (Valentine & Edmondson, 2014). In contrast to team-based work, which relies on continuous member engagement, role-based work is fluid and “de-individualized” (Klein, Ziegert, Knight, & Xiao, 2006: 616, as cited by Valentine & Edmondson, 2014). In medical teams, the withholding of voice due to fears or implicit beliefs can result in immediate adverse effects for the patient (Kish-Gephart, Detert, Treviño, & Edmondson, 2009).

## **Emotions, Voice, and Change**

Switching from silence to voice means that, in a given moment, promotive forces outweigh restraining ones in an individual's mind. The reduction of negative emotions is a prerequisite to entering what Schein (1992) calls the "green room": a past situation in which the person experienced a painful event (e.g., Kamin, 1961). Daring to re-enter this unsafe zone to determine whether it has reverted to safe terrain is a long process of "deconditioning and desensitization" (Schein, 1992: 7; Barlow, 2002). Linking emotional conditioning to voice provides us with an intuitive reason why exposure to the negative consequences of speaking up leads people to systematically choose silence over voice: they want to stay out of the green room.

The connection between emotions and change has also attracted scholarly attention in other fields. For example, in organizational cognition, recent work on the micro-level depicts the influence of emotions on exploration-exploitation choices (e.g., Brusoni, Canessa, Laureiro-Martinez, & Zollo, 2019). On the team level, emotions were shown to shape the strategy making process (Liu & Maitlis, 2014). On the firm level, scholars find negative emotions to cause mergers and acquisitions to fail (Vuori, N., Vuori, T, & Huy, 2018) or to undermine the ability to innovate as response to change (Vuori and Huy, 2016).

We position our study as a first attempt to bridge the emotional aspects of behavioral change to the literatures on voice. While Morrison, in her recent review on voice, categorizes emotions, beliefs, and schemas as standalone dimensions of voice, empirical efforts towards exploring the engaging and inhibiting forces of emotion are scarce (Morrison, 2014: 186). Grant's (2013) recent work constitutes an exception. He found that individuals who fully understand how to regulate their emotions engage more frequently in voice. They are good at controlling the outward display of their emotions, and are evaluated more favorably than less skilled members. Grant reiterates the call to investigate the mechanisms through which voice is

operationalized—regardless of the level of emotion-regulation knowledge (Grant, 2013: 1718). We argue that the Schein/Lewin<sup>1</sup> model of behavioral change defines a promising framework to study the balancing of emotions that antecedes voice. We propose to probe leaders (attending physicians, informally called “attendings” and known in some regions of the world as “consultants”) as “facilitators,” and explore which strategies they deploy to elicit voice. Schein’s (1978) conceptualization of facilitation might help us explain how leaders steer the leader-member exchange following speaking up, and to further distinguish beneficial and less beneficial practices.

### **Leadership and Voice**

Upward voice plays a central role in research on leadership. We know much about the effect of leadership on voice specifically, but we also need a processual and more dynamic view. As Morrison and colleagues (2011) stress, the field needs to move beyond the study of individual-level disposition as an “unchangeable” driver of voice. Nembhard and Edmondson (2006) picked up the discussion with their construct of leader inclusiveness. Inclusive features were shown to have a positive effect on learning and the quality of work. Their operationalization of leader inclusiveness relied on a three-item scale that originates from a survey for physicians (Shortell, Rousseau, Gillies, Devers, & Simons, 1991). Clinicians were probed on (1) whether leaders value input; (2) whether they ask for input; and (3) whether they encourage team members to take the initiative (Nembhard & Edmondson, 2006: 952). Adelman (2012) found

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<sup>1</sup> We follow the reasoning of Förster, Feese, & Brusoni (2019) regarding the presentation of Schein and Lewin’s contribution to the “unfreeze–change–refreeze” model. Kurt Lewin is the originator of the social theory of change and respectively, the three-step model of change (Lewin 1947a, 1947b). Edgar Schein refined the model, which resulted in the steps of “unfreeze/discomfort–cognitive restructuring–refreeze”. We refer to this version as the “Schein/Lewin” model of change. However, we cite Schein as sole author if we discuss a specific construct that he elaborated on or added at a later stage (i.e. during the 1960s and later).

that hospital CEOs who signal their approachability and develop a culture of continuous improvement engage more (critical) upward voice. Weiss et al. (2018) further extended research on the behavioral aspects of leadership by exploring how leaders vocally address their team. The use of collective language, such as references to “we,” “us,” and “our,” as well as implicit verbal cues, such as signaling appreciation or inviting people to speak up, were positively related to voice. Farh and Chen (2018) investigated the effect of different leadership behaviors, i.e. coaching, directing, and supporting. Live observations depicted surgeons’ leadership style according to this categorization in two distinct phases of surgery. The authors operationalize supporting behavior as “behaviors that facilitate interpersonal inclusiveness” (Farh & Chen, 2018: 98). Inclusive behavior has been shown to antecede voice (Nembhard & Edmondson, 2006). Thus, we propose to explore “facilitative” characteristics by blending supporting with coaching aspects (e.g., leaders who “[provide] explanations about the procedure” (Farh & Chen, 2018: 101).

Schein (1992, 1996) stressed the importance of facilitation for the unfreezing of ingrained behavior. He described the establishment of psychological safety through facilitation as the “true artistry of change management” (Schein, 1996: 30; Schein & Bennis, 1965). Facilitation enables individuals to escape the scaffolds of institutionalized power structures and team dynamics, and to reduce anxiety. Thus, we aim to identify an aggregate dimension for leadership and to categorize leaders based on the cues that emerge while they guide their team through an entire case. Farh and Chen’s (2018) approach, in contrast, depicted to what extent (frequency and timing) leaders deploy a certain style, i.e. supporting, coaching, or directing.



## METHODS

### Research Context

We argue that medical teams comprise a favorable setting to explore the microdynamics of speaking up. The fluid character of such teams reduces voice behavior that is triggered due to affect (“emotional bonds between individuals”) and cognition-based trust (“performance-relevant cognitions such as competence, responsibility, reliability, and dependability”; see Schaubroeck, Lam, & Peng, 2011: 864 for the definition of both constructs). To give an example, clinicians might rely on routinized ways of communicating explicitly or implicitly among themselves, or turn to certain colleagues when confronted with a specific medical condition (LeBaron, Christianson, Garrett, & Ilan, 2016).

We conducted our study at a large, research-intense university hospital in central Europe. As a leading teaching institution, the hospital runs an internal simulation-based training center. The center offers a variety of formats for internal and external clients. The training for hospital staff covers medical skills (e.g., airway management or laparoscopic techniques), but also crisis management in interprofessional team settings. The simulation suite is equipped to replicate clinicians’ working environments, i.e. the operating room or a post-surgical unit. High-fidelity mannequins and embedded simulated persons (ESPs) replace patients. The mannequins present the learner with severe medical conditions, and lifelike responses to their actions. This use of mannequins allows educators to adjust the level of medical complexity, and for learners to internalize skills. Drawing on principles of experiential learning, clinicians can deliberately experiment with novel techniques without any negative consequences for the patient (Kolb, 1984). From a methodological perspective, the simulation suite enables the standardization of unexpected events in the form of controlled changes in acute care situations (Christianson, 2019). Video recording represents an unobtrusive way to gather dynamic and rich process data (LeBaron, Jarzabkowski, Pratt, & Fetzer, 2018).

We did not start out with a distinct research question or hypotheses, but analyzed data until certain questions emerged. Our general interest, however, was the processual aspects around speaking up. Videos are a suitable means to study the actions of those who speak up, and the reactions of their counterparts, from moment to moment. Nonverbal aspects, such as spatial positioning or gesticulation, can be analyzed frame by frame to shed light on the mechanisms of the unfolding. Unsurprisingly, video methods have become popular in management research for depicting such microdynamics of social interaction. LeBaron and colleagues (2018: 241) identified three methodological approaches when exploring microdynamics, namely video ethnographies (e.g., Jarzabkowski, Burke, & Spee, 2015), microethnographies (e.g., Christianson, 2019), and video ethnomethodologies (e.g., LeBaron et al., 2016). The recent growth in the use of video methods underlines the power of this tool for investigating the various modes through which individuals interact with their environment (e.g., voice, cognitive embodiment, or materiality). However, a continuing challenge in the field is how to establish cohesion among these modes (e.g., Gylfe, Franck, LeBaron, & Mantere, 2016; LeBaron et al., 2018)—for example, not to regard gestures as a standalone marker, but to deploy a holistic interpretation instead. We must synthesize findings from both visible and audible channels so that we can enhance current theorizing on speaking up.

In this study, we explore how cognitive embodiment helps us to better understand how individuals initiate and frame speaking up—and, conversely, what the reaction to voice looks like. We argue that the discussion needs to move away from the static analysis of a speak-up moment to a dynamic view of the unfolding of the speak-up event (Kozłowski & Chao, 2018; Brauner, Boos & Kolbe, 2018). Moreover, we should treat an event as a discrete occurrence, but aim to identify themes within and across scenarios. As we outlined earlier, we attempt to build on Farh and Chen's work (2018) by exploring the characteristics of leadership for each of the team leaders in our study, and to explore whether aggregate dimensions are manifested.

In contrast to this approach stands the disentanglement of specific behaviors. In the course of a leader “leading,” such behaviors can be absent, deployed just once, or deployed repeatedly. Hence, video data provide the means to derive such themes by evaluating leader-member exchange about also the discrete speak-up event—including its buildup and aftermath—multiple times, while the focus of the coder’s attention can shift between studying voice, gesture, and spatial positioning.

### **Data Collection and Sampling**

The study was embedded in the simulation center’s crisis resource management training. This type of training aims at developing behavioral and cognitive competencies such as closed-loop communication and team leadership for managing complex, uncertain clinical situations (Weaver, Dy, & Rosen, 2014; Levine, DeMaria, Schwartz & Sim, 2013; Oberfrank, Rall, Diekmann, Kolbe & Gaba, 2019).

A core element of simulation-based training is the debriefing of the experiences in the simulated case. This facilitated conversation among learners and educators to explore the relationships among events, actions, thoughts, feelings, and outcomes (Sawyer, Eppich, Brett-Fleegler, Grant & Cheng, 2016; Salas et al., 2008; Rudolph, Simon, Raemer & Eppich, 2008). Scenarios are video-recorded, and the resulting footage is used in the debriefing to reflect on central or critical moments (Krogh, Bearman & Nestel, 2015). Typically, learners are engaged in the scenario itself for 5–25 minutes, and for 45–60 minutes in the subsequent debrief. Trainees were asked to give their written consent to participate in the study. Four participants chose to not participate: Three took part in training days that were subsequently excluded from our study (for our reasoning, see below), while the fourth was not heading a team and was not involved in a speak-up event. However, all participants provided oral consent to be video-recorded throughout the day. This is common practice at the training center to ensure that

snippets from the videos can be discussed immediately afterwards in the debriefing session. The conduct of this study was approved by the appropriate Ethics Committee.

The chosen training setting comprised interprofessional training for anesthesiology and intensive care staff. Every clinician participated in a full training day, which comprised four different scenarios plus the team debriefs. We use “clinician” as collective for each of the roles that participated in the training, i.e. attendings (team leads), residents (physicians in training) and nurses. Every day a different team worked through the four scenarios. In total, 12 teams participated in the training (November–December 2017). Over the course of three training days, clinicians from both the institute of anesthesiology and the institute of intensive care medicine participated in the training for the purpose of interdisciplinary training. Teams were composed of three distinct roles: The attending as team lead, residents (physicians in training), and nurses. In this context, therefore, upward voice means that a resident or nurse, as a lower-status member, “interrupts” ongoing activities to speak up toward an attending (e.g., Weiss et al., 2018).

From a design perspective, this setup helped us study whether the presence of clinicians from two disciplines impacted the unfolding of communication—in contrast to training days, in which only members from anesthesiology participated. Another factor that might affect communication was the presence of a senior attending (“guest” clinician) in five out of 12 days. While the attending was still heading the exercise, a senior attending added an additional hierarchical layer. The senior attending was briefed to stay in the background and “await” their integration by the attending. Integration means the implicit or explicit “assignment” of the senior attending as an advisor, or to mirror their own decision-making with that of the senior attending in case of doubt.

## **Scenario Design: Communication during Patient Handoffs**

During patient handoffs, responsibility for the care of a patient is transferred from one healthcare professional to another. At this crucial intersection between different areas of expertise, the probability of errors is high, and the impact of such errors can be severe. Effective communication is crucial to ensure continuity of care (e.g., Ramanujam & Rousseau, 2006), and any irregularities in transmitting information, especially in post-surgery, directly impact patients' wellbeing (e.g., Manser, Foster, Flin, & Patey, 2013). Handoffs are highly standardized (i.e. routines for effective communication are in place), but the actual handoff event is profoundly shaped by the specificities of the case and the clinicians who are involved (i.e. there is variance in routine implementation). Widely used templates to reach standardization for handoffs are the SBAR (i.e. "Situation, Background, Assessment, Recommendation") or SOAP schemes (i.e. "Subjective, Objective, Assessment, Plan") (Ilan, LeBaron, Christianson, Heyland, Day, & Cohen, 2012). To "disturb" these standardized events, our design involved a patient's condition deteriorating sharply while a handoff was actually in progress. As such an event is rare in practice, the researcher with a background in anesthesiology designed four scenarios that entailed such "disturbance" in collaboration with other educators from the training center. Below, we briefly describe all four scenarios, with a more detailed explanation of the first as the central setting of our analysis. The reason we focused on the first scenario is the varying participation across scenarios. In the first scenario, all clinicians scheduled for that day participated (see Table 1 for an overview of the sample for the first scenario). The other scenarios were laid out for a subsample to participate in, to ensure that every clinician got the chance either to actively participate or to learn from observing their colleagues while they worked through a scenario (Argyris, Putnam & Smith, 1985). All four scenarios share the feature that the attending physician heads the activities to stabilize the patient, as they would if this scenario were real. The attending is assisted by residents and

nurses. All scenarios are based on handing over information on a patient's status, which means that a few members of the team were briefed upfront, while the rest knew nothing of the patient's condition before the scenario began.

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Insert Table 1 about here  
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**Scenario 1.** The first scenario was set up as a hybrid simulation, which means that the patient is initially played by an ESP until they lose consciousness, at which point the scenario is paused until the ESP leaves the room and the mannequin is positioned. In the first scenario, a male patient is suffering from a delusional post-surgical state. He has suffered a fall a few days earlier, when he sustained multiple fractures in the upper body, and is currently located in the intensive care unit. A nurse and resident are briefed on the patient's state, then the rest of the team enter the simulation suite and the morning round procedure begins.

However, while the resident who had been briefed before the scenario is updating the team, the patient's condition worsens. He complains of pain, moves and gesticulates restlessly, and tries to interject in the conversation. He then loses consciousness and develops atrial fibrillation and cardiac decompensation. The team engages in stabilizing the patient, which means deploying cardiopulmonary resuscitation or other life-sustaining measures. If the patient regains consciousness, the simulation ends automatically at this point. If teams cannot stabilize the patient, the simulation ends on the educators' instructions.

The time until the patient lost consciousness and the mannequin was set up was 4.3 minutes on average. The shortest scenario lasted 8 minutes, the longest 25 minutes; the average time for all teams was 13.44 minutes. Table 1 shows an overview of participants and their functions.

Depending on availability, a senior attending would join the first scenario as an ESP, i.e. an embedded simulated person (“confederate”). On five days, the senior attending would participate in the first scenario and act as a recipient of the handoff. The senior attending was instructed to stay in the background, only intervening if asked for feedback from the attending who was heading the team. The attendance of a senior member allowed us to contrast the team dynamics of this setup with teams where the attending was the highest-status member. Further, we were able to use the remaining scenarios as control settings to verify whether the leadership style of the attending was consistent throughout the day, or if the presence of the senior attending affected who led the team, for example.

**Scenario 2.** Again, some clinicians are briefed upfront about the patient’s status. The patient has been transferred to the recovery ward during a busy period. The contact isolation protocol, which had to be followed, was specific to this scenario. One of the briefed team members has to leave suddenly. The patient verbalizes increasing pain; the team is forced to reevaluate their status and develop an alternative diagnosis.

**Scenario 3.** In this scenario, the receiver of post-surgical handoffs is probed on their ability to follow a structured handoff while the patient's condition worsens. The clinician who conducts the handoff has to leave the conversation abruptly. This hybrid scenario began in the hallway, while the patient was in transit to the training facilities.

**Scenario 4.** The final scenario takes place in the recovery ward. The patient has just been transferred from the operating room. After they lose consciousness, a team is called to join the simulation. The clinicians are charged with updating the arriving team in recent developments.

## **Empirical Approach**

We rely on a microethnographic approach to study how speaking up unfolds. The advantage of video-based ethnography is the ability to analyze small snippets of behavior (Christianson, 2019; Balogun, Best, & Lê, 2015). With moments of speaking up as the unit of analysis, repeatedly watching these brief sequences enabled us to disentangle “participants’ talk (who says what, when, and how) [from] their embodied behavior (the relative location, movement and orientation of people and things)” (LeBaron, 2008: 1). The clear distinction between roles in medical teams makes it simpler to identify speak-up events when they occur.

Based on prior work on voice and leadership (e.g. Farh & Chen, 2018), we argue that an inductive approach would complement these findings to identify the explicit voice strategies that emerge. Similar to the rationale behind strategy-as-practice, we aimed at deriving distinct voice mechanisms or patterns that meet the need for leadership-as-practice (Jarzabkowski, 2004). We rely on prior conceptualization in medical settings when using the constructs of “(upward) voice” and “speaking up” interchangeably (Weiss et al., 2018: 390). To examine how social interaction unfolded, our data analysis followed the steps below.

*Phase 1: Structuring voice among all participants.* The scenarios imposed time pressure and task ambiguity. Unsurprisingly, leading a team under such conditions entails that most of the coordination activities are initiated by the attending, and comprise orders or updates about the next steps (e.g., Klein et al., 2006; Tschan, Semmer, Vetterli, Gurtner, Hunziker & Marsch, 2011). Yet, initial rounds of (re-)watching the scenarios revealed differences in terms of the interplay of team members and the content of voice. We bracketed voice according to the point in time a new topic (e.g., information seeking) was initiated. The voice category remained “active” as long as the conversation dealt with that topic. As soon as a new topic was started or the ongoing conversation was interrupted, we “closed” the category/topic and coded the next communication event. We used the coding software Observer XT to distinguish between the



“sender” or initiator of voice (e.g., attending, resident, or nurse), the “recipient” (a colleague or the team as a whole), and the content of voice (e.g., placing an order) (Zimmerman, Bolhuis, Willemsen, Meyer, & Noldus, 2009). Two coders engaged simultaneously in the coding process; this approach was essential as the coders, for the most part, needed to discuss insights immediately.

Communication within this kind of medical teams is fast-paced, sometimes lasting just a few seconds. It is overshadowed by parallel conversations of other team members and is in general difficult to disentangle. Coding was also difficult as the members spoke in mixed dialects, which generated different potential interpretations of the situation at hand—both for the participants themselves and for the coders. To give one example, if an attending were to ask staff in a calm moment: “Would you like to prepare the adrenaline for an injection?” it could be interpreted as a polite way of giving an order, or an invitation to further discuss the dose for the next injection, or to elaborate on when the last dose was administered, etc. The coders would discuss these moments, taking into account variations due to the dialect they were more familiar with. Only once the coding scheme was not prone to alterations would the coders proceed individually—yet divergent coder perspectives on vague or hectic events persisted. Working in tandem also helped the coders to merge different perspectives, as the secondary coder was blind to the medical and simulation context and absent during data collection. Developing insights in tandem with dissimilar perspectives, specifically when analyzing video evidence, is a common approach in organization studies (e.g., Jarrett & Liu, 2018). As a starting point, prior categorization efforts in the context of postoperative handoffs served as a baseline for the first rounds of coding (e.g., Manser et al., 2013). Table 2 provides an overview of applicable voice categories for our setting, with examples, which emerged throughout the coding of the 12 scenarios.

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Insert Table 2 about here  
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The primary coder was present during the data collection and joined the coauthor with a medical background for a few weeks on the job to become acquainted with postsurgical handoffs under regular conditions. The second coder was blind to the medical and simulation suite context, but engaged equally in developing the coding scheme.

***Phase 2: Microanalysis of speak-up events.*** In a second step, we zoomed in on the speak-up events. We transcribed the dialogs among participants regardless of whether the speak-up was self-initiated or in response to an invitation. We integrated the conversation before and after a sender voiced an idea or concern. We analyzed different modes of communication, such as the gesticulation of the initiator, shifts in eye contact or gaze direction, or the spatial position immediately before and after the event. To do so, we followed Gylfe and colleagues' approach (2016: 136), which involves moving step by step from detailing (single frame) and sequencing (multiple frames) to patterning (contouring).

***Phase 3: Emergence of leadership styles through frame analysis and “zooming out.”*** Taking into account the insights from coding communication and the unfolding of speaking-up events allowed the leadership styles to gradually surface (LeBaron et al., 2018). As in phase 2, we applied *frame analysis* to analyze leader behavior according to different observational cues. Jarrett and Liu (2018: 370) describe the approach as identifying episodes that feature the distinct elements of “initiation, conduct, and termination.” We then integrated insights from the debriefings, studying reflections from both the team lead and the team members themselves. This process is called *zooming out* and is defined, for example, by the integration of an additional source (Jarrett & Liu, 2018). The debriefings offered insights into the participants' own interpretation of their performance, as certain key events from the scenarios are reviewed

immediately afterwards. It also allowed us to explore the organizational context (Jarret & Liu, 2018: 377). Participants would frequently refer to situations outside the training environment, and how they would go about certain activities and problems in the “real world.” The findings from our analysis are described below.

## FINDINGS

We organize the presentation of our findings in line with the steps we took in analyzing the data. First, we identified speak-up events across all teams and codified the communication between all team members. Speak-up events appeared to be rare (on average one or two per scenario), which led us to zoom in on the sequences when they did occur. Having analyzed these discrete events, we took on the attendings’ perspective, and linked how they structured communication to a general sense of the atmosphere they built, but also to the unfolding of speaking up. Once we integrated findings from these initial steps, four leadership styles emerged: *facilitative*, *directive*, *teaching*, and *deferent*. Facilitating led to the most speaking up, followed by directing and teaching. In teams with derent leaders, nobody spoke up at all. We further probed dimensions such as spatial positioning and gesticulation of attendings and the specific team members who spoke up. While the gesticulation of the attending appeared to play an essential role in the unfolding of speaking up, spatial positioning and the outward emotional state of the speak-up initiator were less significant.

### **Speak-up Events: Frequency and Type of Initiation**

Speaking up can be self-initiated or the response to an invitation. Invitations often followed a summary of the preceding steps (e.g., Attending: “OK, what’s happened so far? We did ABC [routine scheme], then [...]”) and concluded with an open question to the team (e.g., Attending: “What else could we do?”). Even though these short summaries had to fit within the fast-paced

structure, inviting the team to speak up meant a brief moment of interruption. For example, the attending would lift their head, turn their attention away from the patient or a colleague, or abruptly address the team as a whole.

Our analysis yielded five invitations to speak up, split across three teams, only one of which resulted in a speak-up event. The reasons for silence, however, remain unknown. We cannot infer whether, at that moment, nothing came to mind for the residents and nurses, or whether they did not dare to speak up. In contrast, self-initiated speak-up occurred 22 times throughout 12 teams or 12 scenarios (see Figure 1) and 16 times over the reduced sample of nine training days. Team Yin was removed from the sample as the debriefing confirmed an observation from the coding: The resident who initiated three speak-up events in this scenario expressed in the debriefing that the goal of the training is to “exploit” the safe environment and to purposefully experiment. Hence, we removed this scenario from the sample. We also excluded teams Raja and Kriya, as two attendings were present in their scenarios. The team dynamics during the scenarios and debriefings revealed the team and/or the attendings themselves voicing concerns that it was not always clear who was leading the exercise:

*Attending:* “I was not sure what to do. Because if the [other attending] is here, what do I do?”

*Attending:* “Many were questioning who was in charge. To me, it was clear it was [the other attending]. But that doesn’t mean no one else gets to say anything.”

From a coder perspective, it was not possible to focus on one attending to distinguish a certain leadership style, nor did it reflect the actual distribution of activities to assume that the lead was split equally between the two attendings. Also, the presence of two attendings from similar, yet distinct specialties (e.g., intensive care and anesthesiology), represents a rarer setup in practice. Therefore, the remaining nine scenarios served as a sample for our analysis going forward. To

account for the disparity in scenario duration, we normalized the speak-up events according to the duration of each scenario (see Figure 2).

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Insert Figures 1 & 2 about here  
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Even after time was factored in, Teams Anusara and Hatha still had the most speak-up occurrences. The way these teams were led defines a central aspect going forward. To avoid redundancies in presenting our results, we preempt the emergence of the four leadership styles and immediately match the team name with the corresponding style in the graphs below. While the attendings who led Teams Anusara and Hatha quickly emerged as *facilitative* leaders, the remaining styles of *directing*, *teaching*, and *deferent* surfaced later in the analysis.

### **Emergence of Leadership: The Attendings' Perspective**

***Voice content.*** Even though the motivation of this research is to take a more integrative view of leader-member exchanges, the way activities were structured and coordinated depended heavily on the attending in charge. In high-velocity teams, coordination benefits from structure. Clinicians rely on grids and ingrained routines when handling complexity (LeBaron et al., 2016). Unsurprisingly, the majority of voice and its initiation devolves to the team lead. Apart from invitations to speak up as immediate triggers for voice, attendings relied on *information seeking*, *updating*, and *orders* to navigate their teams. These categories all meant that a new communication event was started. While *information verification* and *elaboration* describe follow-up conversations, and build on a theme that was discussed immediately before the new communication event, *information seeking* meant engaging in a new topic. For our analysis we focused on information seeking, updating, and giving orders as these categories indicated a shift in content (for results, see Figure 3).

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Insert Figure 3 about here  
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Directive leaders give the most orders, although facilitators use almost as many orders to guide their teams. Conversely, attending Kripalu focused more on team updates than on giving orders, which ultimately did not impact upward voice.

***Voice recipient.*** Voice recipients, and the frequency with which they were addressed, differed among attendings (see Figure 4). We distinguished between whole-team interactions and communication among dyads or triads. The recipients of voice were, therefore, residents and nurses within the team. While facilitators more frequently deployed a team focus when initiating voice, attending Kripalu once more took a more egalitarian approach—yet with less effective results in terms of encouraging speaking up.

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Insert Figure 4 about here  
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***Spatial positioning.*** In addition to vocality, we analyzed the spatial positioning of attendings. We divided positions into *bedside* and *off-patient*. “Bedside” defines proximity to the patient and/or an attentive embodiment; meaning that the attending’s gesture and/or posture signaled that they could immediately step in or take over tasks from colleagues. “Off-patient,” in contrast, define sequences in which the attending maintained a distance from the patient, or stood near them while signaling a more passive attitude regarding taking over tasks. In these cases, the focus was to coordinate the team verbally rather than “bodily.” Figure 5 visualizes differences among spatial positioning.

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Insert Figure 5 about here  
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In alignment with prior steps, attentiveness towards the patient does not shed any light on leader behavior that increases speaking up or serves as a marker for facilitative leadership.

### **Microdynamics of Speaking Up: Event Analysis**

Zooming in on each of the 16 speak-up events led to the emergence of four distinct leadership styles. Besides the discrete moment of speaking up, we analyzed the frames before and after they occurred, as well as their unfolding. The attendings' gestures and the handling of these brief moments allowed us to distinguish among different notions. The identified patterns occurred not only when attendings responded to speak-up, but also when they were handling other situations or coordinating task activities. Below, we present exemplary transcripts of speak-up events for each leadership style, to highlight the importance of small but significant details in attendings' reaction to upward voice. We also show selected evidence for the emotional state of residents and nurses in their moment of speaking up.

**Leadership style: Teaching.** The teaching style comprises attendings who established an educational atmosphere throughout the scenario, and partially or implicitly handed over the lead to their residents. One attending characterized the operationalization of the training environment as staying as “passive” as the situation at hand allowed (e.g., Attending: “[In real life] I would have intervened five times as much.”). Teaching leaders immediately acknowledged input from a colleague with a reply, i.e. a specifically verbal response, or through gesture, making sure the sender felt heard. Occasionally, their exchange was preceded by an order.

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Insert Figure 6 about here  
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The attending's gesticulation (in the upper part of Figure 7) reveals how, in the moment of speaking up, the attending slightly lifts their head, focusses on the resident, and supports the acknowledgment with a brief hand gesture while saying "OK, yes, that's right." The resident, in contrast (bottom part of Figure 7), calmly follows the ongoing activity.

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Insert Figure 7 about here  
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**Leadership style: Directive.** Directive leadership implies that the attending builds a distinct notion of continuous monitoring. These attendings swiftly integrated feedback and rapidly tailored upcoming tasks to prior events. They did not explicitly acknowledge the idea or concern raised by a colleague, but responded with the operationalization of their colleagues' input by quickly placing the next order.

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Insert Figure 8 about here  
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Focusing on gesticulation revealed a brief, bodily tension in those who spoke up towards attendings who had a directive style. In the example below, the moment of speak-up entails a brief outward display of stress (the speaker rubs his head) before releasing into a relaxed state the moment after (Kendon, 1990; Navarro & Karlins, 2008; Cook & Tanenhaus, 2009).

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Insert Figure 9 about here  
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**Leadership style: Facilitative.** Facilitators do not just ensure that the speak-up content is explicitly acknowledged (congruent with the teaching type), but also explain why the colleague's remark was considered in (or excluded from) their decision-making, and hence led to the following task (i.e. an order or an update).



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Insert Figure 10 about here  
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The analysis of gesture illustrates the calm but forthright way in which facilitators acknowledge and complement their colleagues' input. The resident, in contrast, seems tense while verbalizing his idea: "Would it make sense to use amiodarone?"

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Insert Figure 11 about here  
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***Leadership style: Deferent.*** The fourth leadership style displayed deferent features—towards the senior attending, but also towards the team. In contrast to other styles, who confidently remained the lead despite the presence of a senior attending, deferent leaders seemed daunted by their own authority. The deferent aspects of their behavior were also present in the remaining scenarios, in which the senior attending ("guest" clinician) was absent. The absence of speaking up from lower-status members might stem from the perception that the lead is not able to enact change (Pinder & Harlos, 2001).

***Overview of leadership styles.*** To conclude, we visualize the findings from the final step of our analysis (refer to phase 3), which led us to derive the leadership styles described above (see Table 3). We would like to highlight that the descriptions describe fine-grained notions, which allowed us to infer different styles of leadership. Much of an attending's work in our scenarios was predetermined by continuously gathering and sharing information as well as giving orders and, hence, orchestrating their teams. Yet, in the brief moments that allowed them to integrate their "own style," we were able to detect differences. We would like to highlight that these styles mean the attending exhibited a certain style, i.e. they way s/he acted in the scenarios we observed. We cannot generalize about them as leaders in every situation. Characterizing the "style" of leadership leaves open the question of whether and how people

adopt different styles. If their style is an enduring, possibly permanent character trait that does not change or can only be changed through conscious effort cannot be inferred. Being able to derive the below leadership cues, we relied on prior research on work group moods (e.g., Bartel & Saavedra, 2000; Grandey, 2008) and studies on emotional dynamics (e.g., Liu & Maitlis, 2014).

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Insert Table 3 about here  
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## DISCUSSION

Our study suggests that the way an attending responds to upward voice impacts the frequency of such events. Most notably, the leadership style that entailed *facilitative* elements revealed a simple but influential way of responding to upward voice. Facilitators actively acknowledge and integrate their colleagues' input. The facilitative attending first provides a brief response, nods or makes eye contact to confirm that the colleague was heard, and explains why the input is being considered in solving the problem at hand (or not). The speak-up events in our scenarios occurred naturally, meaning that the scenario design did not impose any explicit requirement to speak up (e.g., malfunctioning equipment); nor did ESPs trigger any voice events. We found that almost all speak-up events were self-initiated (despite sporadic invitations from higher-ups to speak up), appeared all of a sudden, and were resolved within a few seconds. The way these brief conversations (explicit and implicit acknowledgment) were handled, as well as the attendings' reinforcement throughout the scenario, allowed us to distinguish four styles of leadership. *Facilitative* behavior appeared to elicit more speaking up.

We find that *what* is said matters more than *how* it is said. This contradicts findings on using, for example, collective language (i.e. "we," "us," "our"). We mirror early findings from Lewin when arguing that, as he termed it, democratic leadership is to be favored over laissez-

faire and autocratic styles (Lewin, Lippitt, & White, 1939; Burnes & Cooke, 2013). We also find that a laissez-faire notion in leading (the teaching style) and an autocratic style (directive) yielded less upward voice than facilitation. To conclude, the balancing of emotions became visible immediately before or during the moment of speaking up. Residents and nurses showed their inner tensions through anxious gestures. If positive forces outweighed inhibiting ones, behavioral change in the form of voice occurred.

### **Theoretical Implications**

Our contributions to theory are threefold. First, we extend voice literatures by proposing a distinct interpersonal strategy for leaders to engage speaking up. Second, we provide evidence that the discrete moment of speaking up elicits both positive and negative emotions. We build on Morrison's (2014) suggestion to apply Lewin's view that emotional imbalance antecedes voice. Third, we contribute to a growing theme in management scholarship, which explores mechanisms for effective coordination in medical teams.

*Facilitation as "good etiquette."* We found that facilitation engages voice. Much research in psychology and management hints at the importance of valuing input from lower-status members in nurturing voice (e.g., Peterson, 1999, Detert et al., 2013; Tangirala & Ramanujam, 2008). The importance of displaying appreciation of colleagues' input—even as briefly as in our speak-up events—is empirically established (e.g., Saunders, Sheppard, Knight, & Roth, 1992; Dutton, Ashford, Lawrence, & Miner-Rubino, 2002; Edmondson, 2003; Detert & Burris, 2007; Hsiung, & Tsai, 2017). The characteristics of facilitation that explain this effect date back to Lewin's early theory of social change (Schein, 1996). His fundamental model was further developed by Schein, from the 1960s until the mid-1990s. By that time, the adapted Schein/Lewin model was rejuvenated in the organizational change literature (e.g., Burnes & Cooke, 2013; Burnes, 2004, 2005; Todnem, 2005). The model depicts the steps in unfreezing

behavior, the process of cognitive restructuring, and the refreezing of changed behavior. It further stresses the central role of balancing emotions to enable change. The presence of positive emotions (e.g. motivation to change) alone is not enough to trigger change; negative emotions, such as anxiety, are an antecedent force for the initial process of unfreezing routine behavior. We encourage leaders to adopt a facilitative style to engage their colleagues in dialog, and show their appreciation, in order to better manage this state of arousal. Schein (1993) stressed the negative consequences if facilitative features such as acknowledging colleagues are absent. The simplicity of our finding mirrors his reflection that “[w]hat we call tact, good manners, savoir-faire, or poise usually refers to a person’s ability to respond in such a way as to enhance everyone’s self-worth, rather than tear it down” (Schein, 1993: 41). The voice strategy that we propose was not only a distinct feature in moments of speaking up; facilitative leaders also showed “good etiquette” in other communication events throughout the whole scenario. This observation touches upon recent findings on personality traits that foster voice. For example, a disposition towards conscientiousness and agreeableness is a characteristic of ethical leadership (Walumbwa & Schaubroeck, 2009). We extend research on leader behavior by deploying microethnographics to move beyond self-reports and live observations as prominent approaches in studies on upward voice.

***Facilitation to overcome silence.*** Our findings on gesticulation and gesture in moments of speaking up provide evidence that senders experience negative emotions. These are not harmful to voice, but need to be outweighed by positive forces. Leaders are in a unique position to go beyond the mere appreciation of a comment and provide a reassuring response to their colleagues’ input. Overcoming silence is an important shift, as this variant of emotional conditioning is difficult to overcome. Many clinicians suffer from the repercussions of events where they were confronted with harmful reactions to their speaking up (e.g., Edmondson, 2003). Pinder and Harlos (2001) use the term “acquiescence” to describe a state in which

employees feel disempowered from contributing, as this quote from our debriefings confirms: “Speaking up in practice is difficult. In medicine, strong hierarchies are in place. It is what it is. You do it a couple of times, you have a couple of bad experiences, and you stop doing it.”

Moreover, silence is endemic to certain industries and their authority structures. In male-dominated settings, such as military teams, leaders’ beliefs were shown to influence the extent to which female team members engage in voice (Farh, Oh, Hollenbeck, Yu, Lee, & King, 2019). The belief that women fitted into that specific environment, and were capable of contributing, elicited more voice from women. Future research would benefit from segregating contexts that place heavier or lighter emotional burdens on certain team members. It seems there are preexisting “emotional trajectories” that make it harder (or sometimes easier) for certain individuals to overcome the tipping point towards voice. Future advances could explore these trajectories and the tactics individuals deploy to cope with them (Grant, 2013). Leaders and their tendencies in terms of facilitation play a central role in assisting in such efforts. If leaders cannot respond to concerns raised by their employees, or simply fail to, those employees might ultimately exit the organization (McClellan, Burriss & Detert, 2013: 543). Our findings add to these insights by suggesting that supportive, appreciative responses from a leader elicit voice, and might engage individuals to strengthen this behavior rather than walking away from the organization.

***Facilitation and coordination.*** In recent management studies, researchers have shed light on effective coordination in extreme conditions such as medical teams (e.g., LeBaron et al., 2016; Valentine & Edmondson, 2014). Taking into account the rise in cross-disciplinary projects, their insights seem both timely and relevant for practitioners outside medicine too. The buildup of smart cities represents an example of a cross-disciplinary project, in which architects, engineers, experts on smart grids, traffic systems, etc. come together without prior

experience and operate under the constraint that their collaboration will be temporary (e.g., Edmondson & Harvey, 2017, 2018).

Scholars have explored contextual and situational factors to explain how effective coordination comes into being (e.g., Bedwell, Ramsay, & Salas, 2012, Edmondson, 2003; Nembhard & Edmondson, 2006; Liang et al., 2012; Lingard, Garwood, & Poenaru, 2004). Specifically, temporary groups benefit from routines that cultivate cohesion between the variety of roles and personalities that work together. For example, Valentine and Edmondson (2014) followed the structural redesign of emergency pods, which helped teams to bundle roles and establish collective accountability. Their study showed how communication processes improved following the pod redesign: team members felt surer who they should address for updates, and could decide more quickly whether certain information was important for other colleagues. LeBaron and colleagues (2016) studied the enactment of ostensive (“fix”) and performative (“flexible”) parts of routines during patient handoffs. The handoffs considered in this study were managed in pairs occurred in tandems. The authors found that even if the two elements of a tandem showed a strong overlap of ostensive aspects, effective coordination still demanded that moves and sequences were adaptively fitted to the situation at hand (LeBaron et al., 2016: 529). In a similar vein, we argue that our findings show that the adaptive fitting (the reinforcement) of the leader’s response leads to more speaking up. A patient handoff is a scheduled and mostly undisturbed event that takes place at the end of a shift. Our study participants resolved an acute care situation, which meant working at high speed with an uncertain outcome. Despite the dissimilarity in settings, speaking up interrupts the ongoing activity and is followed by a brief exchange between the clinician who spoke up and the team lead—a moment in which our proposed voice strategy can be leveraged.

## **Managerial implications**

Leadership training is under-represented in the curriculum of prospective physicians. Beyond the patient-physician relationship, they need to assess multi-faceted problems while orchestrating the team. No wonder some physicians describe themselves as “accidental leaders” (Collins-Nakai, 2006: 68). Our findings might not only contribute to existing curricula in simulation training, but also offer advice for medical students that they could experiment with early on. Leaders are often unaware of their colleagues’ tendency to remain silent, and do not notice that they are “treading lightly,” as Detert and Treviño (2010) phrase it (Detert & Treviño, 2010: 264; Morrison, 2014; Detert & Burris, 2016). Our findings could be integrated into debriefing sessions to raise awareness of the prevalence of silence and the difficulties people face in overcoming it—both vocally and emotionally.

The transfer of learnings into practice is a central topic in medical simulation (e.g., Walsh, 2015). Technical skills, such as laparoscopic techniques, might be easier to be transferred into practice. Learning and transferring “soft” skills, such as experimenting with facilitative features of leadership, is more difficult. Most clinicians cannot attend multiple training days on the same subject. Achieving behavioral change such as the refinement of leadership therefore requires a format that has an impact even with a single intervention. To see how difficult it is in practice to trigger change with a single episode, we can look at prior efforts in medical training. Interestingly, Boyle and Kochinda (2004) found that even a single intervention aimed at improving communication between nurses and physicians yielded a positive effect. The pre-/post-design anticipated measuring effects immediately after the training and again in six months’ time. Nurses reported lower levels in stress, physicians an improvement in their communication and leadership skills. While these self-reported results are promising, studies that give participants the opportunity to immediately transfer their learning show mixed results. The intervention of Raemer and colleagues (2016) specifically targeted the

improvement of speaking up. Again, a single intervention was probed on its impact; however, the setting was a randomized experiment in the simulation suite. A medical scenario was manipulated to offer opportunities to speak up. Before tackling the scenario, the intervention group participated in a workshop on speaking up—however, participation did not significantly increase speaking up.

Other authors further discuss potential factors that hinder speaking up. Milliken and Lam (2009), for example, argue that silence can be rooted in a specific organizational context, even disregarding interaction effects between individual-level dispositions and a distinct social environment (e.g. a prevalent norm to remain silent). Raemer et al. (2016) suggest exploring leaders' reactions to upward voice, which our study contributes to. We posit that a reinforcing response plays a central role—not only to show appreciation in a specific situation, but also to potentially contribute towards a facilitative group voice climate, which might increase the subsequent adoption of facilitation in practice (Liang et al., 2012).

### **Limitations**

To begin with, we must acknowledge the limitation imposed by the interpretation of emotions. Research shows that among contextual aspects, the display of anxiety via gesticulation reflects an individual disposition that can also be found in situations that do not impose pressure (e.g., Félix, Arena, & Conein, 2019; Gylfe et al., 2016). Further, if a lower-status member voices an idea calmly, we cannot necessarily infer that they were dealing with opposing forces (or not) while doing so (Vuori, N., Vuori, T, & Huy, 2018).

In addition, our findings are derived from videos of medical scenarios and debriefings that took place in the simulation suite. Social desirability among other well-known constructs might influence participants to act and respond in a way they deem is expected from educators and their colleagues (e.g., Weiss et al., 2018). Given these constraints, future inquiry would



benefit from follow-up interviews with participants who engaged in speaking up. These candidate participants might not only assist in controlling for time-lagged effect changes, but also help researchers to establish a more comprehensive understanding of team dynamics “behind the scenes” (Morrison & Milliken, 2000). The debriefings showed that some clinicians thoroughly enjoyed reflecting on their own and their teams’ work—a routine that is difficult to combine with their busy schedules outside the training environment. Especially for these clinicians, a conversation with a researcher (external to their field) might be an opportunity to elaborate on training experiences, as well as incidents from practice, in a deliberate atmosphere.

To conclude, our sample is limited to the analysis of nine leaders and 16 speak-up events. In these kind of micro-level studies, depth is sacrificed for breadth and results in small samples. One way of increasing opportunities to study more speak-up events, would be to impose more opportunities to speak up through the scenario design (e.g., to include an ESP). However, “forced” moments of speaking up might impact the magnitude of negative emotions that individuals display when they feel obligated to speak up.

## CONCLUSION

Speak-up events in medical practice are rare. Our research suggests that the way leaders frame their response to speaking up represents a crucial factor in engaging individuals in the discrete moment of upward voice. The frequency with which leaders addressed the team, as opposed to individuals, or how they structured and divided tasks among the team, could not be associated with speaking up. Instead, acknowledging input and explaining why (or why not) a colleague’s remark is being integrated going forward, defines a voice-engaging characteristic of facilitative leadership. We build on Nembhard & Edmondson’s (2006: 947) finding, which underlines that it is the “*words and deeds* by a leader [...] that indicate an invitation and appreciation for others’

contributions.” We propose facilitative leadership as a strategy to overcome silence. To convert cognitive dissonance into behavioral change requires psychological safety, well-balanced learning anxiety, and facilitation (as described in Schein/Lewin’s theory of change). While the act of speaking up provides evidence of a psychologically safe state (Edmondson, 2003: 29), facilitation was shown to ease the balancing of emotions (Schein 1992, 1985: 298–299). Individuals can then overcome the tipping point and engage in voice. Our findings further show that these inner tensions were sporadically visible on the outside. We argue that the identified gestures define an indicator for the presence of inhibiting forces. Studying emotional cues that antecede behavioral change in the form of upward voice as well as leader-member exchange both benefit from microethnographics. The processual view on speaking up is what sets our study apart from recent advances on voice and emotion regulation (Grant, 2013) as well as the depiction of task-related leadership characteristics (Farh & Chen, 2018).

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## FIGURES AND TABLES

**TABLE 1:  
Team Composition**

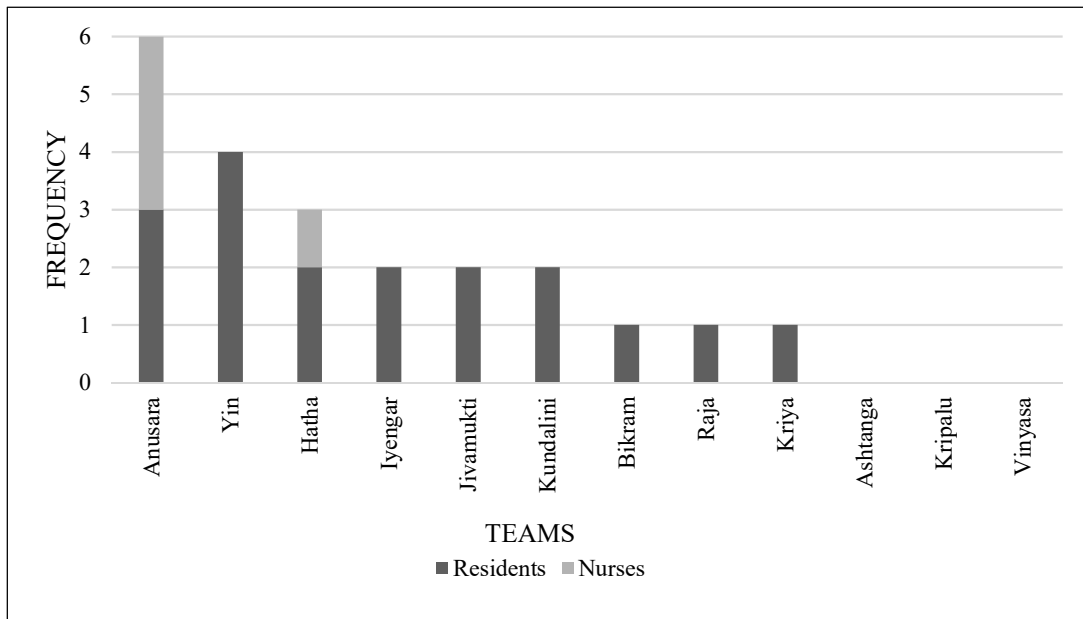
Team Name	Senior Attending	Attending Anesthesiology	Attending Intensive Care	Residents	Nurses	Team Size
Bikram	0	1	0	3	5	9
Ashtanga	0	1	0	3	5	9
Kripalu	1	1	0	3	2	7
Kundalini	0	1	0	3	3	7
Anusara	0	1	0	2	2	5
Jivamukti	0	1	0	3	3	7
Iyengar	1	1	0	3	2	7
Vinyasa	1	1	0	3	4	9
Hatha	1	1	0	3	4	9
Raja*	0	1	2	3	5	11
Kriya*	1	1	1	3	5	11
Yin*	0	1	1	3	5	10

\*removed from sample

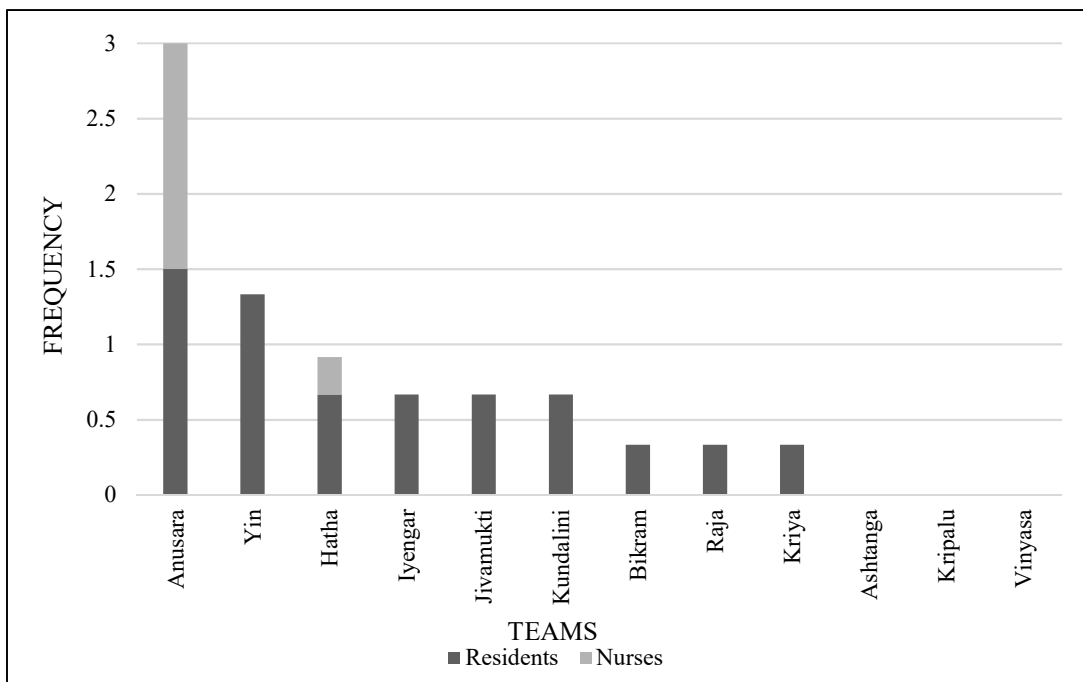
**TABLE 2:  
Categories of Verbal Communication**

Verbal Communication	Example
Speak-Up (self-initiated)	<b>Resident:</b> Umm, but shouldn't we maybe stop the morphine...
Invitation to Speak-Up	<b>Attending</b> [summarizes prior steps] [...] and we administered adrenaline. [Talks to team] So, what could be possible causes?
Updating	<b>Attending:</b> Ok, we already cardioverted
Order	<b>Attending:</b> Let's turn everything off here.
Information Verification	[ <b>Attending:</b> Heart rate is 180] <b>Resident:</b> Heart rate 180?
Information Elaboration	[ <b>Resident:</b> Troponin wasn't put on last night] <b>Attending:</b> But this morning. As a control.
Information Seeking	<b>Attending:</b> What [medication] is still running?

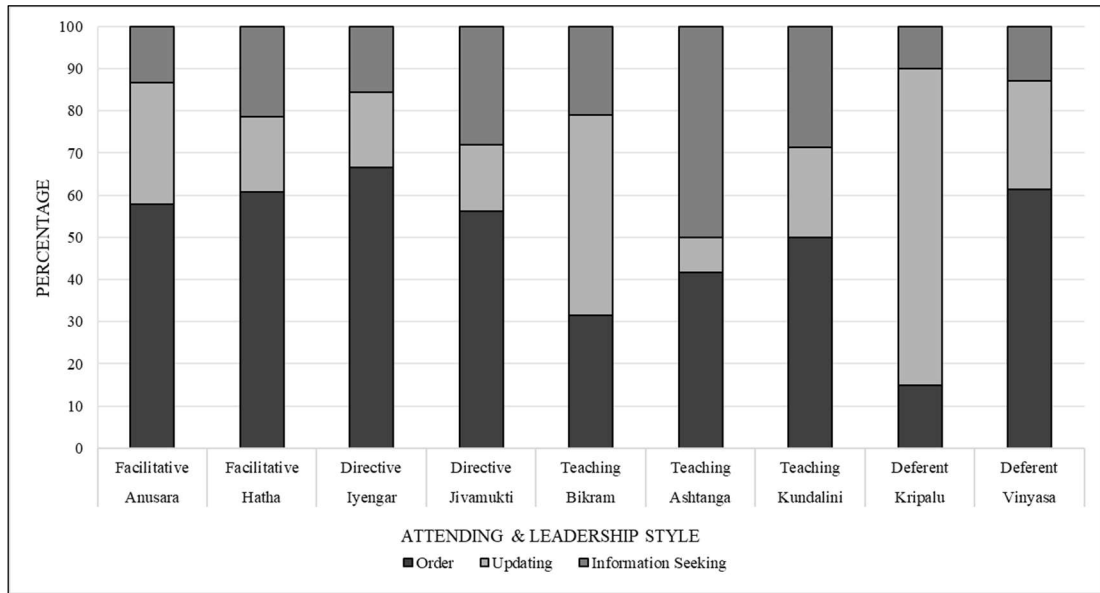
**FIGURE 1:  
Frequency of Speak-Up Events**



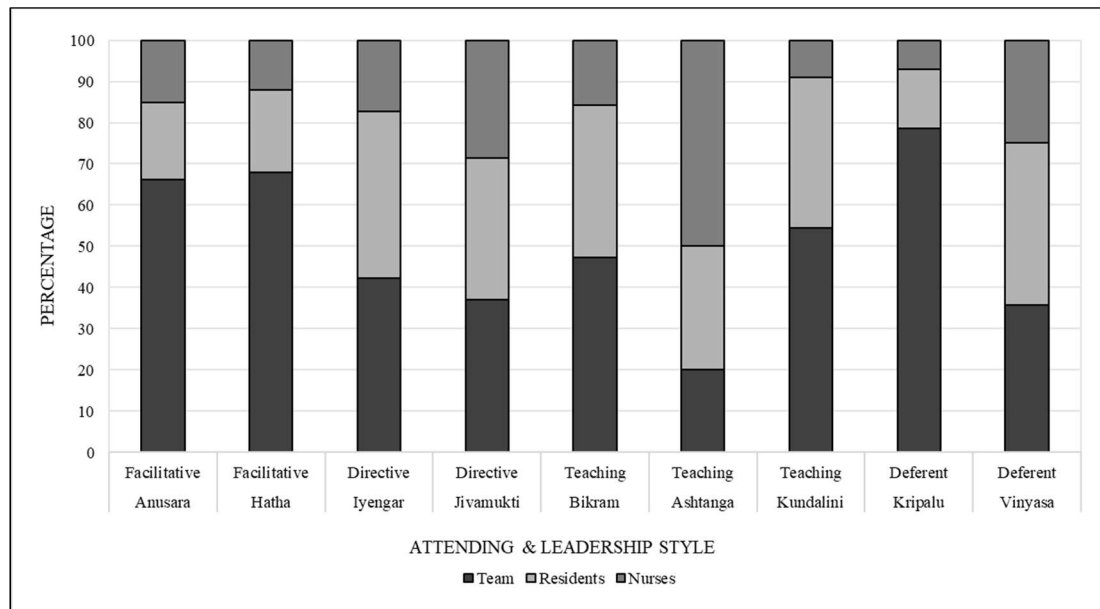
**FIGURE 2:  
Frequency of Speak-Up Events  
(Normalized by Number of Team Members)**



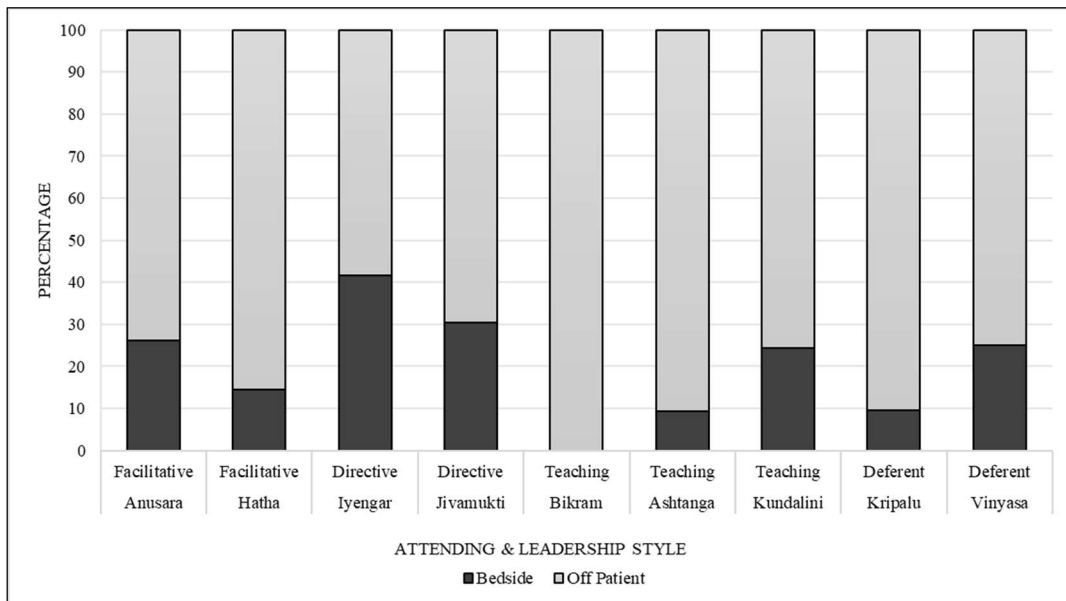
**FIGURE 3:  
Content of Voice**



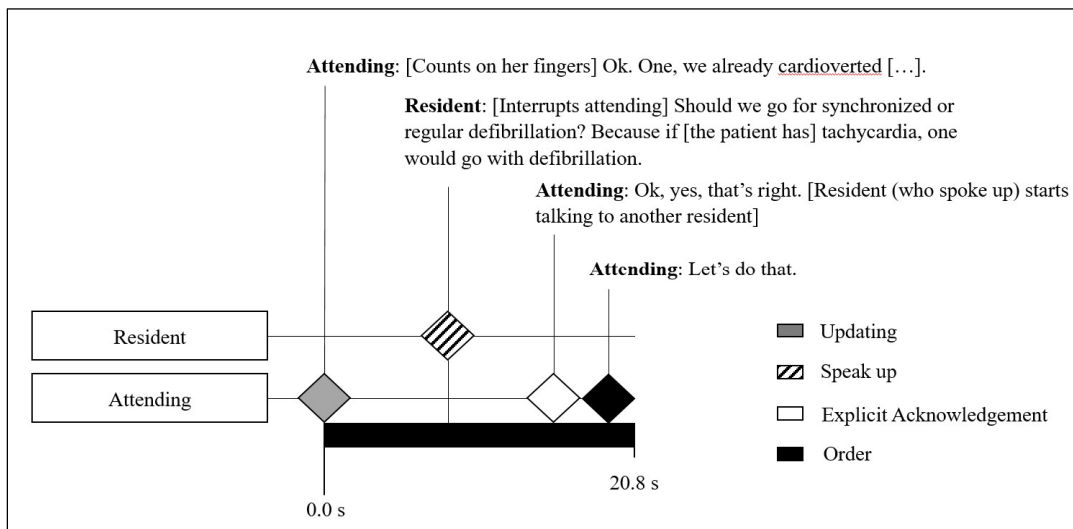
**FIGURE 4:  
Recipient of Voice**



**FIGURE 5:  
Spatial Positioning**



**FIGURE 6:  
Leadership Style Teaching—Speaking Up<sup>1</sup>**

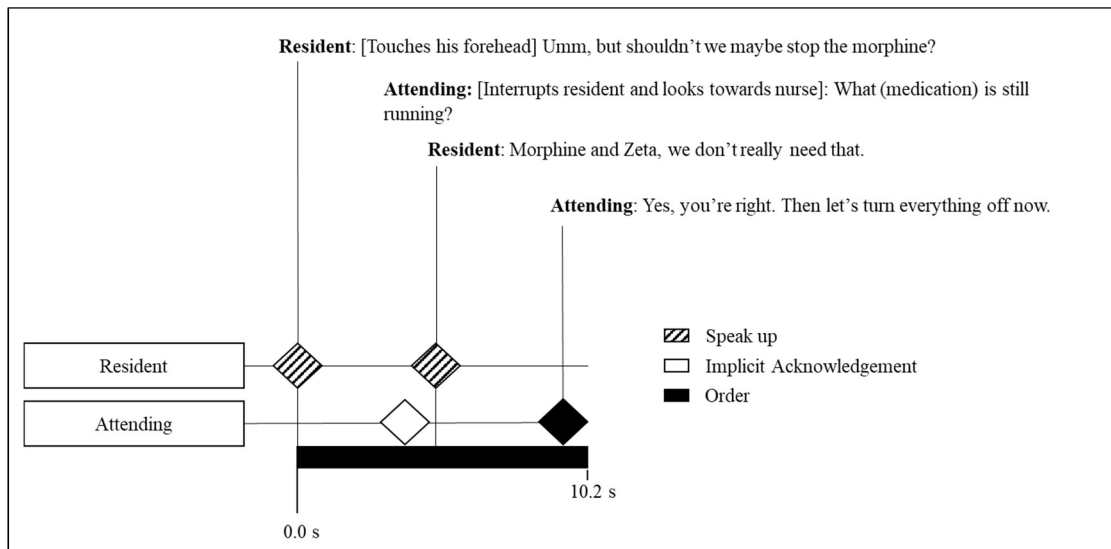


<sup>1</sup> We removed parallel conversations and comments from other team members to provide a concise representation of the chosen dialogs.

**FIGURE 7:  
Leadership Style Teaching—Gesticulation**



**FIGURE 8:  
Leadership Style Directive—Speaking Up**

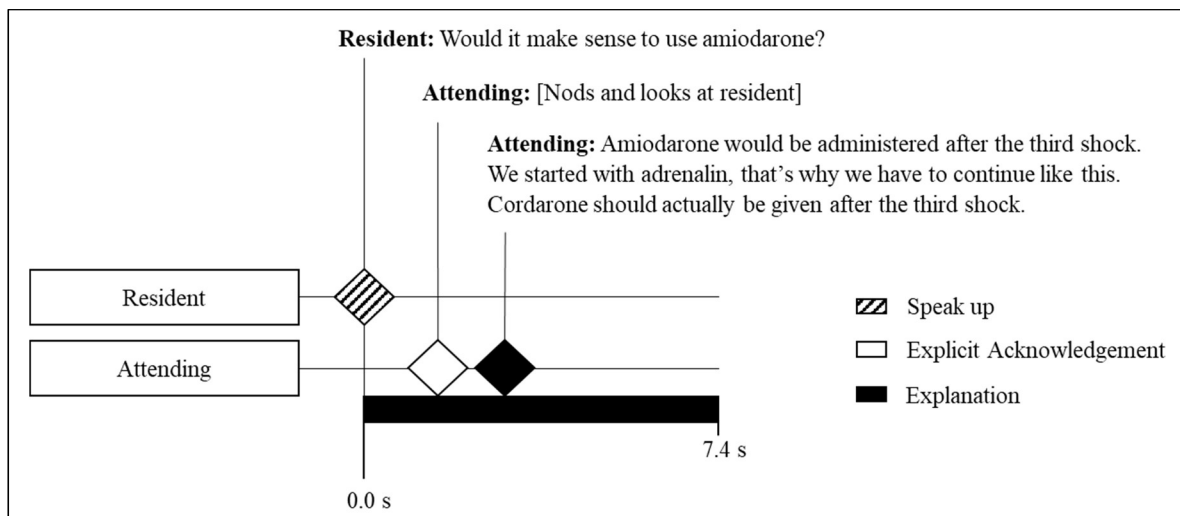




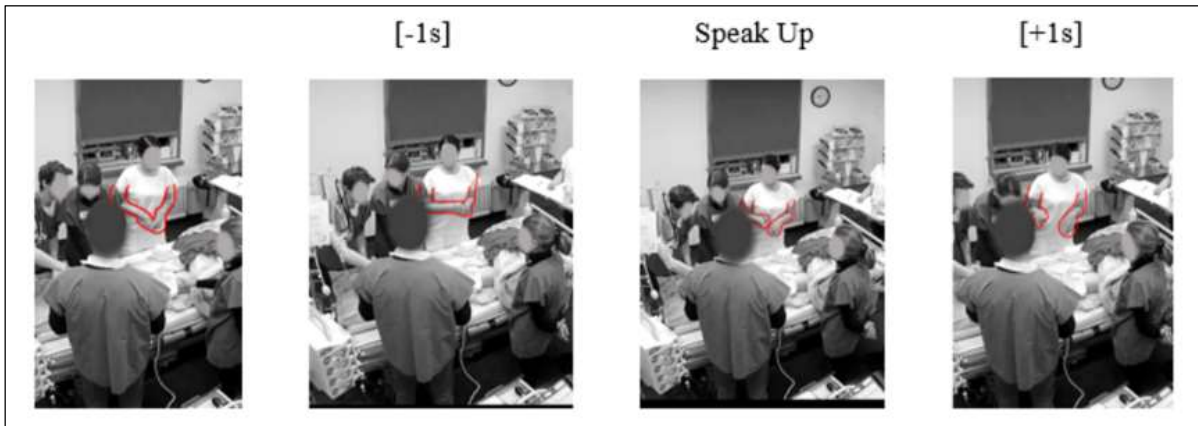
**FIGURE 9:  
Leadership Style Directive—Gesticulation**



**FIGURE 10:  
Leadership Style Facilitative—Speaking Up**



**FIGURE 11:**  
**Leadership Style Facilitative—Gesticulation**



**TABLE 3:  
Leadership Styles by Observational Cues**

Cues	Facilitative	Directive	Teaching	Deferent
<b>Leadership Style (Short Description)</b>	Facilitative and considerate features. Leads without controlling. Engages in integrating team members' input into decision-making.	Task-centered style. Confident and goal-oriented lead. Central decision-making entity. Continuously monitors and structures ongoing tasks.	Democratic, advisor-like style. Receding lead. Steps back to give residents room so that they can (partially) take over lead and experiment with an unfamiliar role.	Friendly and considerate lead. Occasionally displays uncertainty over their role and their own decision-making; especially in the presence of a senior attending.
<b>Vocal Cues</b>	Conversational, friendly tone. Even pitch and volume.	Neutral, even tone. If pressure increases (e.g., the patient's condition worsens or a colleague needs further input to execute their task), pace of speech and pitch increases.	Subtle, even tone. Hesitant and careful at times (e.g., when attempting to "interrupt" a conversation in progress).	Halting, soft-footed tone. Occasional signs of stress (e.g., shifting abruptly between topics). Either raises pitch when talking at an accelerated pace, or lowers pitch and tone ("shy"-mode).
<b>Verbal Cues</b>	Structures and derives reasoning for next steps out loud. Maintains conversational flow and engages team to also think aloud. Reinforces team members through acknowledgment (appreciation of input) and explanation for integration of such. Continuously reflects on patient's status, which combines a summary of prior steps and an outline regarding next steps. Relies on schemas (e.g., to track whether previous steps were conducted according to guideline) to structure their reasoning. Frequently formulates orders as questions. Stops talking if team members start to talk. Engages in conversation with patient (which is otherwise often taken over by nurses and residents). Smiles and also jokes in a friendly manner if the situation allows for it.	Keeps decision-making rationale rather to themselves. Continuously monitors ongoing activities of all team members (e.g., seems well aware of distributed tasks and status of task execution). Less frequently requests and integrates input from team members. Rarely provides explanations if team members provide input, as the attending immediately and tacitly integrates the input into their own reasoning. And, hence, might come back with a response only later. Assists team members in a directive manner if they seem to be confused or overcome by a task (e.g., requested an instrument that was placed in an equipment cart. As the nurse struggled to find the instrument, the attending guided the procedure to open each drawer and search the cart systematically, rather than randomly opening and searching).	Less speaking time than other team leads, as teaching attendings purposefully stay in the background. However, frequent exchanges between team members to derive decisions. Integrates in-team decision-making with comments, or actively requests current status to help "resident(s) in charge" to find a suitable solution (see Figure 6). It takes 20.8 seconds to complete the speaking-up event, as opposed to a few seconds elsewhere. The attending awaits the outcome of the decision-making of the resident and the discussions among other team members. For the sake of clarity, we removed these parallel conversations, yet they show that speak-up events can also unfold in a rather scattered way.	Gives orders with care. More frequently than other attendings, these team leads rely on feedback from and discussion with senior attending to derive next steps. Looks frequently to team members to non-verbally request their opinion or to receive "their confirmation" on the proposed steps. At times, these leaders seem to be "wanting to be overheard" by the senior attending. Monitors ongoing tasks less frequently than others.

<b>Bodily Cues</b>	Calm, restful movements. When situation allows, steps back from patient and adopts a comfortable, relaxed posture (e.g. puts hands into pockets, or crosses arms behind back and calmly observes the team). Repeated use of hand gestures (e.g., using fingers to enumerate steps the team has taken so far, almost like a continuous, steady loop).	Focused and tense throughout task. Seems always ready to step in and assist team (e.g., wears gloves). Quick and rather abrupt changes in gestures (e.g., uses “finger guns” to point out colleagues to assign tasks).	Relaxed and calm posture (e.g., leans against side table while observing their team). Uses hand gestures to underline monitoring tasks (e.g., “First we did [...], then we [...]”).	Abrupt, jerky hand gestures when explaining next steps.
<b>Spatial Cues</b>	Less frequent changes in position. Steps back slightly from team (e.g., signals presence and availability, but still visibly holds the role as team lead).	Frequently moves through the room. But also often stands next to patient (see Figure 5).	Steps back to observe team activities, but also changes position to bedside when initiating a discussion or the patient’s status worsens. Seems comfortable with “external” observer role.	Frequently moves around the room. Switches between bedside and off-patient. Senior attending, in turn, comes closer to the patient and presents himself more visibly than in other teams as an active advisor for the team’s and the attending’s decision-making.
<b>Team’s Reaction</b>	Team actively searches for and engages in tasks.	Team actively searches for and engages in tasks. Seem to have less “degree of freedom,” as the attending is quick to prestructure and communicate the next task. Less time to pivot.	Ongoing friendly debate among team members to derive next steps as collective. Playground-like exercise for residents. Residents seem to enjoy and appreciate the opportunity to experiment with leading. Teams with most frequent self-initiation of new topics, such as information seeking, updating etc. (regardless of whether the initiators are nurses or residents, and normalized over scenario duration).	Occasionally stands still (“passive”) and awaits instructions. Tension and deferent attitude of attending seems to spill over to team.