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Alone but together: flow experience and its impact on creative output in LEGO® SERIOUS PLAY®

Lukas Zenk
Department of Knowledge and Communication Management, Danube University Krems, Krems, Austria
Dirk J. Primus
Department of Management, College of Business, Bryant University, Smithfield, Rhode Island, USA, and
Stephan Sonnenburg
Department of Marketing, ICN Business School, CEREFIGE, University of Lorraine, Nancy, France

Abstract

Purpose – Do LEGO® SERIOUS PLAY® (LSP) workshops result in improved experience of flow components as well as higher levels of creative output than traditional meetings (MEET)? This research studies the extent to which LSP, as a specialized material-mediated and process-oriented cocreative workshop setting, differs from MEET, a traditional workshop setting. Hypotheses for differences in individual flow components (autotelic behavior, happiness, balance), group flow components (equal participation, continuous communication) and creative output were developed and tested in a quasi-experimental comparison between LSP and MEET.

Design/methodology/approach – The study was conducted with 39 practitioners in six teams from various industries. In total, 164 observations were collected during two workshops using the Experience Sampling Method. The creative output was assessed by peer evaluations of all participants, followed by structural analysis and quantitative group comparisons.

Findings – The results show that two components of individual flow experience (autotelic behavior, happiness) were significantly higher in LSP, and one of the components of group flow experience (continuous communication) was, as expected, significantly lower. Regarding creative output, the LSP teams outperformed the MEET teams. The study suggests that a process-oriented setting that includes time for individuals to independently explore their ideas using a different kind of material in the presence of other participants has a significant influence on the team result.

Practical implications – LSP can improve the components of participants' flow experience to have an impact on the creative output of teams. In cocreative settings like LSP, teams benefit from a combination of alone time and high-quality collaborative activities using boundary objects and a clear process to share their ideas.

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Originality/value – This is the first quasi-experimental study with management practitioners as participants to compare LSP with a traditional and widespread workshop approach in the context of flow experience and creative output.

Keywords Individual flow, Group flow, Creative output, LEGO®SERIOUS PLAY®, Experience sampling method, Quasi-experimental comparison

Paper type Research paper

Introduction

In a period of increasingly unimaginative strategy meetings in the mid-1990s, the LEGO company began to develop the LEGO® SERIOUS PLAY® (LSP) method to support more collaborative and innovative settings. In contrast to traditional meetings, this method places an emphasis on a specific material (Zenk *et al.*, 2021), LEGO bricks, and follows a predefined process to facilitate workshops for improved participation, collaboration and higher creative output (Kristiansen and Rasmussen, 2014; Wengel *et al.*, 2019). Over the last decade, LSP has been utilized as a cocreative workshop method in various organizations worldwide, including Apple, IKEA and IBM, to support creative output in organizational change, idea development and innovation. However, LSP is considered a niche application, and its full potential to stimulate creative output has yet to be explored (Roos and Victor, 2018; Tien *et al.*, 2019). Today, traditional-style meetings without a clear process structure and/or usage of additional artifacts remain the norm. Although high levels of creative output and innovation are of the utmost importance, many organizations implement cocreative activities as traditional meetings in which the participants discuss new ideas without a structured and stimulating process (Puccio *et al.*, 2020). As an example, Roos *et al.* (2004) observed traditional board meetings for the cocreation of new strategies as a gathering of people continuously communicating with rather suppressed emotions and using basic work materials such as documents and flipcharts. The authors concluded that cocreative processes in such settings are significantly constrained by the media, that is, the materials used to facilitate the meeting, which, in turn, affect the mode, that is, the human experience during the interaction. Roos *et al.* (2004) assumed that alleviating the constraints of such meetings might lead to a positive change in the participants' experience and their creative output.

Among a number of other cocreative settings (see e.g. Moirano *et al.*, 2020; Steiner, 2011), LSP stands out as a particularly interesting approach as it uses a specific material (LEGO bricks) and a precisely described process. Using the bricks to generate and convey ideas following a structured turn-taking process supports collaborative learning and innovating (Jensen *et al.*, 2018). Furthermore, recent empirical studies on LSP (Primus and Sonnenburg, 2018; Zenk *et al.*, 2018) and practitioner literature for LSP workshops (Kristiansen and Rasmussen, 2014) provide evidence for simultaneous improvements in participant experience, collaboration and creative output. Nevertheless, LSP as an example of a specialized material-mediated and process-oriented cocreative workshop setting is still an underresearched topic requiring additional empirical studies to better understand the main underlying mechanisms that benefit cocreative activities and output. All positive effects of LSP on participants' experience and their collaboration reported in this literature relate directly to the concept of flow, which Csíkszentmihályi (2009) vividly described in his seminal work "Flow: The Psychology of Optimal Experience." Briefly, flow is an experience of total engagement in an activity (Sonnenburg and Primus, 2020) and can have an impact on creative output (Cseh, 2016; Maqbool *et al.*, 2019). Although flow and its components are often mentioned in practitioner and scientific LSP literature (Beltrami, 2017; Dann, 2018; McCusker and Swan, 2018; Wengel *et al.*, 2019), very few studies have been conducted to empirically compare the impact of LSP on participants' experiences with traditional meetings. For example, two key expectations have not been examined empirically: (1) that LSP reduces the

likelihood of participants being bored or anxious because the process, starting with skill building, helps maintain a balance between skill and challenge; and (2) that using LSP changes the collaboration, in particular the participation, from a few participants dominating the meeting to everyone participating more equitably, a component of group flow (Primus and Sonnenburg, 2018; Sawyer, 2007).

Given these findings and put broadly, the *main goal* of this study is to investigate the extent to which traditional meeting settings (herein referred to as MEET) and material-mediated and process-oriented workshop settings (referred to as LSP) differ with regard to the experience of individual and group flow and their impact on creative output. LSP is an example of a specialized workshop in which a specific medium (LEGO bricks) is used and a predefined process is set (Kristiansen and Rasmussen, 2014). MEET corresponds to a traditional business setting (Roos *et al.*, 2004) where people mainly talk to each other without using a specific material or following a predefined process. It is, of course, possible to adopt certain aspects of LSP for MEET. However, this is not the aim of this study. Instead, it is the comparison of two distinctly different business scenarios of cocreative settings (see also Table 1). The focus on a business setting is also of general relevance to the study of flow as "flow research has largely confined itself to the individual levels, dyads, or groups outside of the business world" (Van den Hout *et al.*, 2018, p. 415). Studying different business scenarios allows us to further investigate relevant factors that foster team flow and are associated with higher performance in organizations (Pfeifer and Engeser, 2021).

The paper is organized as follows: First, the theoretical background of the different settings and the potential effect of LSP on the experience of individual flow and group flow as well as its impact on creative output are summarized and hypotheses are developed. Second, the research design is introduced, followed by the study's findings. Finally, we discuss the findings and conclude with contributions, implications, limitations and outlook.

Theoretical background

Creative output and creativity techniques in organizations

Creativity entails a vast area of research and practice in which many different definitions are used (Acar *et al.*, 2017; Corazza, 2015; Runco and Jaeger, 2012; Ilha Villanova and Pina e Cunha, 2020), but most are linked to four fundamental aspects of creativity: people, product, process and press (Rhodes, 1961). For the purpose of this paper, which relates the experience of

Table 1. Condensed comparison of settings

Factor	MEET	LSP	Impact variable
Components of individual flow			
Autotelic behavior	suppressed by social norms	actively supported	WISH
Expression of positive emotions, especially happiness	suppressed by social norms	actively reinforced	HAPPY
Challenges and skills	not actively managed	actively managed and balanced	BALANCE
Components of group flow			
Process	un-structured, not actively managed	structured, actively supported	GEQUAL
Communication	continuous discussions without alone time	actively guided by core process including alone time	GCOMM
Outcome			
Creative output	low	high	CREATIVITY

individual and group flow to creative output, we follow the standard definition by Amabile (1996) as "the quality of products or responses judged to be creative by appropriate observers" (p. 33). The creative quality is at least bipartite and includes novelty and relevance or comparable synonyms (Runco, 2017). Correspondingly, creative output by teams in a managerial or business context is most commonly assessed by the novelty and relevance of their work (Aggarwal and Woodley, 2019). Novelty refers to how clearly original or unusual the output is in a given context, while relevance relates to usefulness and feasibility of the work (Dean *et al.*, 2006; Bissola *et al.*, 2014; Pollok *et al.*, 2021). Although both aspects are required to produce high levels of creative team output, they are associated with different and sometimes opposing modes of thinking – divergent and convergent. Research on team creativity agrees that the success of accommodating distinctly different thinking modes and maximizing the team's creative potential is determined by the interaction of individual talent and habits, team and social processes (Bissola *et al.*, 2014; Paulus and Kenworthy, 2020; Sawyer, 2014). In this study, we focus on teams and their social processes as determinants of creative output.

Fostering team creativity in organizations is essential to constantly innovate in dynamic markets. As Uddin *et al.* (2019) pointedly described, "the globalization of markets, shorter product-service life cycles and the technological revolution left business organizations with two mutually exclusive options, namely, innovate or die" (p. 877). In this context, Meinel and Voigt (2017) highlighted the positive influence of creativity techniques for collaborative idea generation and creative output. According to a recent study (Wöhler and Reinhardt, 2021), a vast number of creativity techniques exists, but only a few are popular in business practice, especially brainstorming (Diehl and Stroebe, 1991) and brainwriting (Heslin, 2009). As in traditional meetings, these techniques rarely take into consideration a clear process structure and/or the use of additional artifacts that could have a positive impact on creative output (Zhou and Hoever, 2014).

Traditional meetings versus material-mediated and process-oriented workshop settings

In this study, two different cocreative settings are compared. For the first, *traditional meetings (MEET),* we apply a setting similar to the one observed by Roos *et al.* (2004): A team of people sits around a table and discusses new ideas face to face in a professional manner using basic work material such as documents (Bales, 1950). Participants consider themselves a team and communicate with each other to reach their common innovative goals (Jackson, 2010). Basic questions are raised, which are discussed without following a predefined process, and topics emerge in the process (Sawyer, 2014). There are no strict rules except for the use of etiquette, individual status and role relationships, and group dynamic processes are neither suppressed nor reinforced (Forsyth, 2019). When one person speaks, it is assumed that other team members listen, and no time is allocated for participants to independently consider their individual ideas or reflections. There might be a tendency for certain participants to have longer times to speak than others (Woolley *et al.*, 2010). We assume that, in this setting, neither the interaction style changes over time nor do participants use any specific workshop material (Dix and Gongora, 2011). In summary, the MEET scenario represents a traditional business meeting aimed to generate new ideas without the use of any specific material or predefined processes.

As a contrast, in the second setting, we apply techniques for a *material-mediated and process-oriented creative workshop*. Here, we focus on the specific settings of LSP. The bricks for LSP are used as objects for thinking and "having ideas through the process of making" (Gauntlett, 2018, p. 12), which follows the theory of constructionism (Harel and Papert, 1991). The bricks evoke various emotions, including conscious and unconscious arousal (Bettiga *et al.*, 2017). Furthermore, they enable the creation of expressive imagery of people's beliefs and values as well as providing new ways of understanding things (Argyris and Schön, 1978). However, "the value in the method does not come from the LEGO bricks, but rather from the combination of the bricks and the facilitation of the process" (Kristiansen and Rasmussen, 2014,

p. 5). This argument is consistent with that of Amabile (1996), who emphasized that cocreative processes have to be facilitated in order to foster creativity and innovation (see also Bin Saeed *et al.*, 2019). Such an intersubjective process is already enabled in the transition from individual to pair sensemaking (Bellis and Verganti, 2020). Typically in LSP, teams of 6–12 participants are guided by a specifically trained and often certified facilitator who follows the LSP core process. According to Kristiansen and Rasmussen (2014), the core process consists of a four-step iteration: "posing the question"; "construction"; "sharing"; and "reflection." These will be described in greater detail in the section titled *Quasi-experimental design and process*.

This predefined core process is conducted from the start of a workshop in which, in addition, further rules are set, for example, specific time allotments, order of communication and the avoidance of electronic media (e.g. mobile phones) that could distract from the process. LSP workshops aim to ensure that team members participate equally in order to include everyone's ideas and to collaboratively develop their creative models. Thus, LSP workshops are designed with so-called application techniques used to develop targeted, group-specific workshop processes and to include periods of alone time, for example, when constructing LEGO models (Zenk *et al.*, 2018).

From a participant's point of view, LSP and MEET differ in several aspects. In MEET, groups of people typically sit at a table on which notepads and laptops are placed. After a facilitator or meeting owner introduces an agenda item, people begin to discuss it and may write individual notes. They do not have alone time and/or artifacts for exploring their own ideas, and they may experience the meeting as rather traditional and unimaginative. In LSP, participants experience a different scenario from the beginning (Lotts, 2016; Nerantzi, 2018). Instead of having their own writing materials, they see at their tables colorful LEGO bricks that may evoke emotions and associations with their childhood experiences. Sometimes, participants interact with the bricks even before the official start of the workshop. Instead of discussing the questions presented in the MEET approach, participants in LSP begin to build their answers as metaphors and stories; they present their models; and gradually, they develop them further, creating shared models and reflecting on their insights. The amount of time participants work individually and collectively, as well as what they create on their own and in teams, is actively managed. Specific time periods are allocated in which participants can, literally, build their own ideas and share them afterward with their team. These different scenarios may have a positive influence on the experience of individual and group flow and on the collaboration for the creative output.

The effect of LSP on the experience of individual and group flow

According to Roos and Victor (1999, 2018), LSP is designed to change the conditions that enable a different human experience: an exploratory, imaginative and playful but serious way to cocreate new ideas. One essential aspect of this human experience is called serious play. It is seen as a playful mode in which cognitive, emotional and social aspects are integrated to improve the achievement of serious tasks, especially if the development and imagination of something new are of relevance (Sutton-Smith, 2001). According to Statler *et al.* (2011), serious play is directly connected to the concept of flow, in which people become immersed in their activities.

The concept of flow was introduced in psychology in 1975 (Csíkszentmihályi, 2000), culminating in the classic work on flow by Csíkszentmihályi (2000, 2009). He described flow as a blissful state of intensified consciousness that occurs during an optimal experience and overtime. This definition has hardly changed (Peifer and Engeser, 2021). In a state of flow, people experience total engagement in an activity and feel simultaneously efficient, motivated and happy (Moneta and Csíkszentmihályi, 1996). Being in a flow state represents a duality of performing and feeling at a peak level (Sonnenburg and Primus, 2020), whereby the reward is directly connected with the activity itself. From the beginning, flow and creativity

have been closely intertwined as exemplified in a study by Nakamura and Csíkszentmihályi (2014) in which they analyzed several cases of highly creative individuals. Flow is a significant driving force of creativity and creative output (Cseh, 2016; Harmat *et al.*, 2016). In a study about flow in work and leisure, Csíkszentmihályi and LeFevre (1989) found that creativity was self-perceived at higher levels in flow than in nonflow states and that above-average levels of creativity were reported during work flow. Csíkszentmihályi (2009) found flow in sports activities, games, rituals, professional activities and artistic creations. Although the basic principle of flow and its experience seem to be the same during diverse activities, flow in creative settings involves the search for discovery and novelty (Cseh, 2016).

From a theoretical perspective, it is generally agreed that flow experience consists of specific components (Nakamura and Csíkszentmihályi, 2014; Sawyer, 2012). In this study, we focus on the impact of LSP on flow at the level of these components (first-order construct instead of second-order construct) to precisely connect experience to creative output, both of which develop during the cocreative process. Hence, to study the difference between LSP and MEET, we selected specific experience components of individual and group flow based on theoretical evidence and practical support (Abuhamdeh, 2021; Baumann, 2021; Csíkszentmihályi, 2014; Moneta and Csíkszentmihályi, 1996): (1) The intrinsic motivation to play in LSP compared to discussion rounds in MEET could have an impact on the component autotelic behavior (here referred to the variable WISH) that describes the engagement in the activity itself without aiming for external output; (2) compared to a typically uninspired and unsupported way of working in MEET, which leads to suppressed emotions, the playful mode in LSP may have a liberating effect on positive emotions, especially happiness (here referred to as HAPPY); (3) the challenges of tasks in LSP workshops increase gradually and have to be mastered through supportive skill-building measures compared to consistent interactions in MEET. These differences might have an impact on the balance between skills and challenges (here referred to as BALANCE).

Our focus in this study is on *cocreative* settings, for which we investigate not only the individual but also the group level of such collaborations. Hence, we included experience components of group flow that represent a collaborative phenomenon rather than an aggregation of individual flow experiences. While individual flow describes a state of consciousness, group flow describes a collaborative property of a group as an emergent phenomenon (Sawyer, 2014). When teams experience flow during a cocreative activity, their collaboration is optimal (Van den Hout and Davis, 2019). Referring to Van den Hout *et al.* (2019), the research on group flow has focused mainly on music and improvisational groups as well as sports teams, thus illustrating a positive relationship with team processes and output, but group flow has rarely been assessed as a collective, team-level phenomenon (see also Tay *et al.*, 2021).

Based on a systematic review, Pels *et al.* (2018) stated that a common, integrated theoretical framework on group flow is missing, but they suggested the following definition: "Group flow is a shared state of balance within a group as represented by (1) fluent, positive interactions within the group; (2) a high collective competence of the group; and (3) a collective state of mind of the group by means of positive relationships between group members, often resulting in optimal collective performance and creativity, and making group flow a positive collective experience" (p. 18). In line with this definition, in particular concerning fluent and positive interactions within the group, as well as the conceptualization of team flow by Van den Hout *et al.* (2018), we follow Sawyer (2007), who described equal participation and continuous communication as essential components for the group flow experience (see also Duncan and West, 2018).

The step-by-step and process-oriented workshops in LSP compared to the group dynamic behavior in MEET could, thus, have a positive effect on how team members participate equally (here referred to as GEQUAL). However, in MEET, participants experience uninterrupted communication compared to LSP, in which verbal communications between

participants are frequently interrupted to build or add to models. Following Sawyer (2007), this might have a negative effect on continuous communication (here referred to as GCOMM).

Individual and, in particular, group flow experiences reflect participants' capacities to collaborate in cocreative settings to produce creative output (Maqbool *et al.*, 2019; Primus and Sonnenburg, 2018). Although we assume that GCOMM is lower in LSP, we expect the other four components (WISH, HAPPY, BALANCE, GEQUAL) to have a stronger impact on creative output. This is supported by theoretical considerations and studies on LSP that suggest that material-mediated and process-oriented workshop settings foster creative output (Gauntlett, 2018; Harn and Hsiao, 2018). Hence, the expected higher experience of individual and group flow in LSP compared to MEET should have a positive impact on the creative output of teams (here referred to as CREATIVITY). Table 1 summarizes the expected impact of MEET and LSP on experiences of the participants and their workshop teams.

Development of hypotheses

In the following, we formulate hypotheses focusing on expected differences between LSP and traditional meetings regarding experiences of individual and group flow as well as creative output. In accordance with prior work on the LSP method, the variables on experience closely relate to the construct of individual flow (hypotheses 1a–c: autotelic behavior, happiness, balance) and group flow (hypotheses 2a and 2b: equal participation, continuous communication).

Autotelic behavior (WISH)

In general, work is associated with goal-oriented (telic) behavior aiming for an external benefit. By contrast, play, in this context children's toys such as LEGO bricks, is associated with unproductive behavior aiming for a benefit while performing the task, that is, autotelic behavior in which the purpose of an activity lies in the activity itself (αὐτός or autos meaning "self" and τέλος or telos meaning "goal"). Although play may not lead to immediate benefits, it may provide indirect benefits that emerge through the activities (Roos *et al.*, 2004), especially in business contexts. Recent studies on activity-based play-at-work techniques demonstrate positive output for individuals and organizations (Celestine and Yeo, 2021). Furthermore, play has a direct impact on cognitive, social and emotional levels of experience that, in turn, have a positive effect on the output of individuals, teams or organizations. According to Statler *et al.* (2011), Csíkszentmihályi's (2000) concept of autotelic behavior describes the intrinsic motivation to play, that is, enjoying the activity itself without aiming for external output. In qualitative studies on LSP, participants' autotelic experience is reported (Roos *et al.*, 2004; Statler *et al.*, 2011), for example: "There is no space for drifting off, the LEGO kept me completely engaged, inquisitive, and I wanted to play, create, explore, and develop our ideas further with the aid of LEGO®" (McNamara, 2018, p. 229). In contrast to LSP, MEET does not provide a setting in which a playful and exploratory mode is explicitly supported. Accordingly, the following hypothesis is tested:

H1a. Participants in LSP settings experience higher levels of autotelic behavior than participants in MEET settings.

Happiness (HAPPY)

LSP combines a "playful" mode, for example, fun, enjoyment, pleasure, with "serious" tasks, for example, innovation, strategy or product development. The mode of happy play should enable new solutions for serious tasks since creative output is most likely to emerge from a playful, free-flowing process (Kane, 2004). Besides the essential component of autotelic behavior, a happy, playful mode encourages positive emotions. Various studies have

identified the positive atmosphere of LSP workshops (Gridley, 2018; Lotts, 2016) and "lots of laughter" (Lotts, 2016, p. 24). Nerantzi (2018) further described the LSP workshop as an "affective experience" (p. 295) that resonates with happiness. Statler and Oliver (2008) summarized that "most commonly, participants exhibited the kind of affective dynamics associated with having fun, as manifested by laughter, smiling, excitement, and unbridled enthusiasm to continue" (p. 485). In contrast to LSP, MEET does not necessarily have an effect on positive emotions, especially happy play. Accordingly, the following hypothesis is tested:

H1b. Participants in LSP settings experience higher levels of happiness than participants in MEET settings.

Balance (BALANCE)

According to McCusker and Swan (2018), "successful LEGO® SERIOUS PLAY® workshops create and maintain an atmosphere of 'flow'" (p. 175). In the LSP literature, flow is mainly associated with the component balance by relating participants' skills and challenges during the activity (Kristiansen and Rasmussen, 2014). At the beginning of LSP workshops, participants start with skill-building activities in which they learn to use the bricks in the context of serious play. Primus and Sonnenburg (2018) confirmed that skill-building activities had a positive effect on flow. After a skill-building sequence, the facilitators ask increasingly more challenging questions, and participants continuously cocreate more complex models. These challenges are coupled with the development of skills for building and explaining their models to create a balance between skills and challenges (Dann, 2018). Although the challenge of the questions may also increase in MEET, the method for responding to them remains the same as no additional skills are developed during MEET. Accordingly, the following hypothesis is tested:

H1c. Participants in LSP settings experience a greater balance of skills and challenges than participants in MEET settings.

Equal participation (GEQUAL)

For the team to reach its peak performance, blending egos (Sawyer, 2007) as well as generating a sense of unity (Van den Hout *et al.*, 2018) are vital. Correspondingly, LSP workshops place an emphasis on equal participation in order to include each member's perspective, knowledge and experience. Regarding the *material,* typically each person is provided with her/his own set (e.g. SERIOUS PLAY® Starter Kit), or the entire team is given a collective set (e.g. SERIOUS PLAY® Identity and Landscape Kit). Regarding the core *process*, each participant shares her/his thoughts individually and has the same amount of time to present her/his model to the members of the team (Kristiansen and Rasmussen, 2014). LSP facilitators are trained to adhere closely to the process, let everyone present her/his model in turn and include the models in the collaborative activities to jointly develop their ideas and creative output (McCusker, 2020). For both settings in this study, LSP and MEET, all facilitators should create comparable settings regarding the macro-phases (see Table A1). However, in LSP, facilitators provide material for each participant and strictly follow the predefined process in order to let every person build and share her/his ideas. In MEET, facilitators support the teams but without following a predefined process or providing additional material. Accordingly, the following hypothesis is tested:

H2a. Teams in LSP settings experience higher levels of equal participation than teams in MEET settings.

Continuous communication (GCOMM)

LSP workshops and traditional business meetings both place high importance on communication between participants, but they differ significantly in how communication between participants is guided and stimulated. In traditional business meetings, emphasis is placed on maintaining continuous verbal communication between people. According to Sawyer (2007), continuous communication moves the activity forward and a sense of joint progress is created (Van den Hout *et al.*, 2018). During continuous communication, each member builds on the ideas by the others and elaborates these ideas further, which correlates with better performance and well-being of the collective. By contrast, LSP places high importance on frequent, deliberate interruptions of verbal communication between participants during which models are constructed, then shared one by one and reflected on collectively. Therefore, at first glance, interruptions appear detrimental to team creativity. However, Kristiansen and Rasmussen (2014) point out the importance of interruptions in LSP by noting that "if you skip the construction and just talk, the effectiveness of the whole approach is lost" (p. 70). Accordingly, LSP deliberately reduces the time for continuous verbal communication, in order to improve the focus and meaningfulness of knowledge exchanges and integrations between participants (Dann, 2018). While we acknowledge that team dynamics such as production blocking may adversely affect and occasionally reduce continuous communication in less structured MEET settings, we still expect that the deliberate reduction of verbal communication will have a consistent and significant effect on the group flow experience and performance. Accordingly, the following hypothesis is tested:

H2b. Teams in LSP settings experience lower levels of continuous communication than teams in MEET settings.

Creative output (CREATIVITY)

According to constructionism, building models supports the creation of ideas and creative thinking generally (Gauntlett, 2018; Harel and Papert, 1991). In LSP, participants have time to develop new ideas by using boundary objects, building models and experiencing the mode of serious play; by contrast, participants in MEET mainly talk to members of their team (Roos and Victor, 2018). Furthermore, the use of LSP has empirically proven effects on creative output (Bulmer, 2011; Geithner and Menzel, 2016). For example, Bulmer (2011) reported that LSP provided a playful and relaxed environment for collaborating in teams and demonstrated improved performance. Other studies have identified the effects of LSP on creativity enhancement, including improving one's creativity and reducing anxiety (Brown and Vaughan, 2010; Harn and Hsiao, 2018). Studies on collective intelligence (e.g. Woolley *et al.*, 2010) show that interrupted communication provides adequate time for each team member to explore new ideas individually, which has an impact on creative output (Bernstein *et al.*, 2018). As opposed to continuous communication in MEET, alternating alone time and collaborative exchange supports teams to solve complex problems (Riedl and Woolley, 2017). In addition to the positive effects of the material and process discussed in the aforementioned hypotheses, we expect a positive effect on creative output originating from the differences in experience components of individual and group flow. For example, a greater balance experience of individual participants prevents anxiety and boredom, both of which would reduce individuals' creative performances (Csíkszentmihályi, 2000). Moreover, increased happiness and autotelic-behavior experience may lead to participants putting more effort into the activity, resulting in higher levels of creative output. Happier participants will also be more open to working with others, improving the team's interaction and performance. At the group level, the more that participants contribute equally, the more they can build on each other's ideas. In turn, when people build on each other's ideas, they can often accomplish more than individuals can on their own (Kelly, 2020). Finally, reduced communication frequency

may improve the meaningfulness of exchanges and increase the time for exploring individual ideas, again leading to higher levels of creative output (Cseh, 2016; Maqbool *et al.*, 2019). In sum, the following hypothesis is tested:

H3. Teams in LSP settings are associated with higher levels of creative output than teams in MEET settings.

Research design

The methodological approach for this study was quasi-experimental. A quasi-experimental setting is more appropriate for this study than a laboratory experiment because it increases the realism of the research setting, allows for longer exposure of participants to experimental conditions, reduces participants' awareness of participation and ultimately provides high external and ecological validity. In particular, complex interactions and tasks as they occur naturally in work settings are difficult to establish under controlled laboratory conditions lasting several hours (Podsakoff and Podsakoff, 2019). For our study, two 3-h cocreative settings were conducted with participants from various professional fields who attended an extra-occupational master program in Austria. The goal for the participants was to develop prototype ideas that could realistically be implemented in organizations. The master program language was German.

Participants and test groups

The study was conducted with 39 participants (15% male, 85% female); their mean age at the time of data collection was 26 years (SD = 3.8 years), with 4.2 years (SD = 3.5 years) of job experience on average. They worked in various professional fields, with the majority in marketing and media (23 participants) but also in financial services or the automotive industry. Most (74%) reported that they had experience with creative techniques or methods, in particular Design Thinking, but no one mentioned LSP. Participants were divided into two groups (see Table 2); for this empirical study, we distinguish *groups* (LSP, MEET) and *teams* (6–7 participants who worked together). The LSP group comprised 19 participants divided into three teams, and the MEET group comprised 20 participants divided into three teams. In each group, the three teams worked at their own tables for half a day to develop their prototype ideas. The half-day duration represents typical workshop scheduling used for cocreative settings in the business world (Hodgkinson *et al.*, 2006; Lauttamäki, 2016).

Quasi-experimental design and process

In accordance with our research goal, our design examined the effect of two conditions (LSP and MEET) on selected individual and group experience components of flow, as well as their impact on creative output. Independent of this study, participants had already been divided into two groups during previous activities in their master program. Therefore, they were not

Category	MEET	LSP	TOTAL
Participants	19	20	39
Male	4	2	6
Female	15	18	33
Average age (in years)	26.5	25.7	26.1
Professional experience (in years)	3.9	4.5	4.2
Marketing and media	12	11	23
Creativity methods	12	17	29

Table 2. Background data of groups

randomly assigned to the two conditions of LSP or MEET. However, teams within the experimental groups were formed by random assignment at the beginning of the study in order to mitigate any threats to internal validity from imbalances in team composition. The settings were designed as in real-world business contexts to provide situations closely approximating authentic situations, thereby increasing external and ecological validity, which are important advantages of quasi-experimental designs (Podsakoff and Podsakoff, 2019). In addition, quasi-experimental designs such as those applied in this study allow for longer exposure to experimental conditions than would be possible with fully controlled laboratory or field experiments. Finally, no events or changes were observed during the execution of the two settings that would threaten internal validity because of influences on the study variables by history, maturation, testing, instrumentation, regression or mortality.

The main task for the teams was to ideate prototypes for a self-chosen aspect of the university of applied sciences (e.g. services, software, meeting spaces) that could be implemented during the following year with a high likelihood of success. LSP and MEET took place on the same day in the same room, and creating settings as similar as possible (including facilitators, table compositions and durations of workshop activities) was attempted. The teams were facilitated by three professional lecturers, including one of the authors, who work in the field of idea development and creativity training. All three are certified LSP facilitators. LSP and MEET settings were conducted according to the same general procedure, starting with a random arrangement in teams followed by the phases of warm-up, ideation and prototyping (see Table A1 in the Appendix for an overview). In the control group (MEET), the teams were asked questions that they discussed among their members. No materials or documents were made available to the teams, but the use of writing material was not prohibited. The aim was to develop a traditional meeting setting that the participants know from their professional fields. In the experimental group (LSP), the teams were given the same tasks as in the control group, but they were carried out using the LSP workshop method including the core processes: In the first step, "posing the question," the facilitator asks a challenging question. In the second step, "construction," participants have alone time to build a metaphorical model with LEGO bricks instead of verbally discussing possible answers. In the third step, "sharing," each participant briefly presents her/his model to the team and in the last step, "reflection," the participants review their models, generate new insights or stories based on the questions of other participants or the facilitator and may tell the story again from different perspectives.

Although the same macro-phases were followed, the specific micro-phases and activities carried out were different. Participants in the MEET teams, for example, started to talk about their task compared to the LSP teams, who started to build LEGO models, which resulted in more alone time. For Application Technique 1 (building individual LEGO models, see Table A1), 3–10 min were used to individually build a model. But also during the Application Techniques 2 and 3 (building shared models or create landscapes), participants had alone time to move and rebuild their models or look for additional bricks. Overall, approximately 30% of the workshop time in LSP could be attributed to alone time. Regarding the workshop material, every team was provided with the LEGO "Identity and Landscape Set 2000430" that includes more than 2,600 pieces, as well as parts of the LEGO "Connections Kit 2000431" and LEGO "Starter Set 2000414."

Surveys and method

To continuously and quantitatively assess the experience components of individual and group flow as single items during the settings, a shortened version of the ESM was used (Csíkszentmihályi and Larson, 2014; Nakamura and Csíkszentmihályi, 2014). Before and after each phase, the same survey was handed out to the participants who completed the paper-based questionnaire, in total five times (see Table A1 in the Appendix, ESM1-5).

To capture individual flow experience for the comparison of LSP and MEET, two main components previously empirically validated by Moneta and Csíkszentmihályi (1996) were measured: WISH ("Do you wish you had been doing something else?") as a component for autotelic behavior was measured on a ten-point scale with values ranging from 0 (not at all) to 9 (very much). HAPPY ("Describe your current mood") was measured on a Likert-type scale coded from 1 to 7, with "happy" as the positive pole and "sad" as the negative pole. The scale was symmetrically anchored in very (1, 7), quite (2, 6), some (3, 5) and neither (4) (Moneta, 2021). For this study, BALANCE of perceived challenges (CHALL, "Challenge of the activity") and skills (SKLL, "Your skills in the activity") are expressed in terms of radians, the standard unit of angular measure, as Pi/4 – abs (atan [SKLL/CHALL] – Pi/4). Maximum balance is at Pi/4 (0.785 radians) at a 45-degree angle when SKLL equals CHALL. BALANCE is decreasing from its maximum toward 90 degrees and 0 degrees, where it is 0 radians.

To capture group flow experience for the comparison of LSP and MEET, two main components that were developed by Sawyer (2007, 2014) were used: GEQUAL ("Did team members participate equally?") and GCOMM ("Was there continuous communication among the team?"). To be consistent with the ESM measurement for the individual flow experience, the team flow variables were captured using ten-point scales with values ranging from 0 (not at all) to 9 (very much).

After the two half-day workshops, each team developed a short video to demonstrate and explain their prototypes. In order to provide a high external and ecological validity, the creative output of the teams (CREATIVITY) in both groups was determined via a peer evaluation of all participants to simulate the target group of a market. Consistent with our conceptual definition of team creative output, referring to clearly novel or unusual work that is also relevant and feasible in a given context, we adopted the four dimensions of Dean *et al.*'s (2006) scale of creative quality (specificity, relevance, novelty, workability). These dimensions were developed based on 90 studies on creativity and idea generation and provide a method for evaluating the creativity of ideas. Accordingly, participants evaluated the creative output of all other teams but not their own in terms of SPECIFICITY ("How compact and comprehensible was the innovation presented as a video?"), RELEVANCE ("To what extent are the target group's needs addressed or their problems solved?"), NOVELTY ("To what extent is the innovation new and meaningful for the target group?") and the two subdimensions of workability, IMPLEMENTABILITY ("How realistically can the innovation actually be implemented?") and ACCEPTABILITY ("To what extent is the idea socially, legally, and politically acceptable?"). The items were presented with a five-level interval scale on the academic grading in Austria: 1 (very good), 2 (good), 3 (satisfactory), 4 (adequate), 5 (unsatisfactory). Additionally, participants rated the best three projects to assess the overall impression of team output, whereby the best project received 3 points, the second-best 2 points and the third-best 1 point.

Results

A total of 164 ESM observations from the two settings (LSP and MEET) were useable for structural analysis; 23 observations were omitted from the analysis because they were incomplete or unintelligible. The hypothesized effects of differences on individual and group flow experience were tested with multivariate analysis of variance (MANOVA). The results are shown in Table 3.

The results show that the mean scores for the individual experience components autotelic behavior (WISH), happiness (HAPPY) and balance (BALANCE) are greater for participants in LSP than in MEET. The differences for autotelic behavior and happiness are statistically significant; for balance, only a trend can be derived. The difference for the group experience component equal participation (GEQUAL) is not statistically significant. Continuous

communication (GCOMM) is significantly higher for participants in MEET compared to LSP. Therefore, hypotheses 1a, 1b and 2b can be supported. Hypotheses 1c and 2a are not supported. In order to strengthen the internal validity of our findings, we assessed the potential influence of confounding factors on differences in the experience components when the treatments were not applied. To that end, we compared both treatment groups in a posttest at the beginning of a regular master program session on the next workshop day. The results from MANOVA indicate that, without differences in treatment (LSP, MEET), no significant differences in HAPPY ($p = 0.512$), WISH ($p = 0.270$), BALANCE ($p = 0.110$), GEQUAL ($p = 0.487$) or GCOMM ($p = 0.437$) can be observed.

The results from the peer evaluation of each team's prototype are shown in Table 4. The total score represents the evaluated creative output as the sum of the aforementioned five dimensions (i.e. the items SPECIFICITY, RELEVANCE, NOVELTY, IMPLEMENTABILITY and ACCEPTABILITY). Recall from the section on research design that lower scores reflect evaluations that are closer to "very good" and higher scores reflect evaluations that are "unsatisfactory." The teams were ranked by their total score, and Team "Easy Study" received the best peer evaluations and team "Chill Out" the least favorable. The descriptive statistics in Table 4 reveal that the teams who used LSP as a method during their workshop (they named themselves "Easy Study"; "Park'n Study"; and "Optimierung") received the highest total scores for their prototypes, and the other three teams who employed MEET as a method received the lowest scores.

In an ensuing MANOVA, we compared the scores of the teams who used LSP with the scores of the teams who employed MEET for the five dimensions of the scale and the total scores received (see Table 5). The results confirm that the experimental group that used LSP received significantly better evaluations in the dimensions SPECIFICITY, RELEVANCE, NOVELTY and in the total score received for their prototypes. Additionally, in the ratings of the three best projects to assess the overall impression of the creative output of the teams, LSP teams received a total of 160 points and MEET teams 74 points. The results provide support for hypothesis 3.

Discussion

Theoretical contributions

This research contributes both theoretically and methodologically to the literature on cocreative settings in general and LSP specifically (Abuhamdeh, 2021; Baumann, 2021; Moirano *et al.*, 2020; Sonnenburg and Primus, 2020; Wengel *et al.*, 2019; Wöhler and Reinhardt, 2021). Cocreative settings are important elements for overall creativity and

Table 3.
Results from the analysis of hypothesized effects of differences on individual and group flow experience

Construct/variable (and hypothesis)	Method	Mean	Std. Deviation	*N*	Difference	*F*	SIG.
WISH (1a)	LSP	6.330	2.409	91	0.795	4.324	0.039*
	MEET	5.534	2.467	73			
HAPPY (1b)	LSP	5.626	0.962	91	0.380	5.540	0.020*
	MEET	5.247	1.103	73			
BALANCE (1c)	LSP	0.463	0.271	91	0.072(*t*)	2.851	0.093
	MEET	0.390	0.275	73			
GEQUAL (2a)	LSP	6.540	2.518	91	−0.120	0.102	0.749
	MEET	6.660	2.168	73			
GCOMM (2b)	LSP	6.190	2.375	91	−1.070	9.501	0.002**
	MEET	7.260	2.000	73			

Note(s): The values shown for LSP and MEET represent inverted values of WISH to capture autotelic behavior

Table 4. Descriptive results from the peer evaluation of each team's prototype

Team (condition)	Total score		Specificity		Relevance		Novelty		Implement		Accept	
	M	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD
Easy Study (LSP)	7.36	1.39	1.52	0.57	1.15	0.36	1.58	0.66	1.97	0.77	1.15	0.36
Park 'n Study (LSP)	8.09	2.45	1.24	0.50	1.45	0.67	1.73	0.76	2.06	1.00	1.61	0.83
Optimierung (LSP)	8.44	2.52	1.78	0.87	1.53	0.70	1.81	0.58	1.97	0.81	1.36	0.54
StudOrganize (MEET)	8.89	2.44	2.03	0.86	1.71	0.79	1.77	0.73	2.14	0.77	1.23	0.49
Creative Lounge (MEET)	9.09	3.22	2.00	0.92	1.74	0.75	1.88	0.73	2.18	1.03	1.29	0.58
Chill Out (MEET)	9.37	2.53	2.11	0.80	2.11	0.68	2.06	0.68	1.74	0.89	1.34	0.54
All Teams	*8.55*	*2.55*	*1.79*	*0.82*	*1.62*	*0.73*	*1.81*	*0.70*	*2.01*	*0.88*	*1.33*	*0.58*

Table 5. Multivariate analysis of variance, comparing LSP and MEET teams

Dimension	Method	Mean	Std. Deviation	*N*	Difference	*F*	SIG.
Specificity	LSP	1.52	0.700	102	−0.53**	23.618	0.000**
	MEET	2.05	0.852	104			
Relevance	LSP	1.38	0.614	102	−0.48**	24.291	0.000**
	MEET	1.86	0.756	104			
Novelty	LSP	1.71	0.669	102	−0.19*	4.192	0.042*
	MEET	1.90	0.718	104			
Implementability	LSP	2.00	0.856	102	−0.02	0.024	0.876
	MEET	2.02	0.914	104			
Acceptability	LSP	1.37	0.628	102	0.12	1.074	0.301
	MEET	1.29	0.534	104			
Total Score	LSP	7.98	2.220	102	−1.14**	10.701	0.001**
	MEET	9.12	2.728	104			

innovation processes in organizations (Bissola *et al.*, 2014; Brem, 2019; Markham and Lee, 2013). According to Van den Hout *et al.* (2018), specifically team flow should be studied more extensively and from a wider perspective, especially in the business world, to increase creative performance and output. In this study, we focused on specific experience components of both individual and group flow and investigated these in a quasi-experimental setting with management practitioners as participants to determine their impact on the creative output of teams. To our knowledge, no empirical evidence on flow in the context of LSP in comparison to traditional meetings has yet been provided. Hence, the findings of this study contribute to similar flow research in the context of cocreative workshop settings (Primus and Sonnenburg, 2018) with the focus on specific flow experience components and their association with cocreative output.

Our findings regarding the *experience components of individual flow*, autotelic behavior (WISH) and happiness (HAPPY) corroborate previous studies in this area (Roos *et al.*, 2004; Roos and Victor, 2018; Statler *et al.*, 2011). In LSP, participants had time to individually explore, develop and reveal their initial ideas by playing and building individual models. These activities fostered their autotelic behavior. They enjoyed discovering their ideas and, afterward, presenting them to their teams. In addition, the emerging playful mode positively influenced the participants' happiness, which was reinforced by the affective experience reported in previous qualitative studies (Gridley, 2018; Lotts, 2016; Nerantzi, 2018).

The balance (BALANCE) of the participants' skills and challenges, an essential element of LSP workshops, is supported by activities such as skill building. This should enable participants to work with novel workshop materials, here LEGO bricks, which are generally considered children's toys. Although we could not find a significant difference, the mean score in LSP was higher than in MEET. One reason for the low difference might be that we attempted to establish cocreative settings that are as comparable as possible. Therefore, in both settings, the same increasingly challenging questions were posed, and trained facilitators supported individual teams. We assume that the role of the facilitators, in particular, had a positive impact on the balance in the MEET teams by challenging and supporting the participants verbally, which highlights the importance of facilitators in cocreative workshop settings (Brem, 2019; Sakellariou *et al.*, 2017).

Regarding the *experience components of group flow*, equal participation and continuous communication, the difference for the latter was significant. In LSP, a particular emphasis is placed on the core process that includes the equal participation (GEQUAL) of all team members. Therefore, participants have the same amount of time and the same access to the material to build their models alone, and facilitators are trained to let all participants present them equally. This should result in more equitable participation in LSP in comparison to MEET settings in which speaking contributions are not necessarily equally distributed and tend to follow group dynamic patterns. However, contrary to our expectations, this component did not differ between the two groups. This strengthens our assumption about balance that all teams were supported and guided by trained facilitators to ensure better comparability for this quasi-experimental setting. One explanation for this outcome is that facilitators' presence and actions alone introduce a natural regulating effect that provides every person in a team equal opportunity to speak. This effect could have compensated for the absence of the LSP process in the MEET group. As hypothesized, the levels of continuous communication (GCOMM) differed significantly between the cocreative settings. MEET teams indicated higher scores than LSP teams because team members continuously talked to each other without constructing models. The LSP setting avoids having participants "just talk." On the contrary, LSP includes alone time in which participants generate new ideas that they share and exchange afterward. These interruptions intentionally reduce the quantity of verbal communication but increase focus, meaning and idea quality, thereby leading to higher creative output. This result challenges the importance of continuous communication in group flow research (Pels *et al.*, 2018; Sawyer, 2012, 2014).

Regarding *creative output* (CREATIVITY), LSP teams outperformed MEET teams, providing support for our last formulated hypothesis. As described in the method section, all team results were assessed by peer evaluations of all participants regarding five predefined dimensions and an overall rating as well as following a predesigned process, including individual discovery with artifacts (Celestine and Yeo, 2021). The significant difference in creative output with LSP detected in our study contributes to existing work that notes how using a different workshop material affects teams' overall creative performance (Al-Jayyousi and Durugbo, 2020; Gauntlett, 2018; McCusker, 2020). In addition, participants' exchanges of knowledge and mutual adoption of perspectives seemed to support and boost the cocreative endeavor of the teams (Hoever *et al.*, 2012). In MEET, participants continuously talked with each other, and team members had no time for their own discoveries of ideas compared to LSP. While one person speaks, all others have to listen and, therefore, cannot develop their own ideas. Similar to other studies on collaborative creativity (Kelly, 2020; Nijstad *et al.*, 2006), we see that an interplay of collaborative communication and individual discovery is crucial for higher creative output. LSP in contrast to MEET supports both of these activities, including individual phases and collaborative phases to integrate individual insights.

Practical implications for cocreative working, especially with LSP

What do the results imply for cocreative settings? LSP has a positive effect on experience components of individual flow. Material that supports a playful mode and positive human experience as well as a process that allows individual discovery and collaborative discussions enable a creative endeavor compared to MEET. During the alone time, participants have the opportunity to develop their own ideas instead of being involved in continuous verbal communication that leaves less room for their own thoughts. The additional use of their hands and the construction of physical artifacts have an important impact on individual flow experience. However, we assume that alone time in isolation is not the golden key for group performance and, hence, for overall creative output. According to Pels *et al.* (2018), the basic condition of group flow consists of a task for a psychologically and physically present group. In LSP, participants have time alone to ideate, but they ideate for a collaborative task and always in the presence of the others using the same material. Compared to MEET, where participants continuously interact verbally, those in LSP workshops have space for more individual exploration and imagination. During their time alone, they are (at least unconsciously) inspired and stimulated by observing and being observed by the others, which could be considered nonverbal interaction. Inspired by LSP, we want to emphasize the significance of including individual phases in the presence of others as well as collaborative phases, hence, *alone but together,* for other kinds of cocreative work.

In the title of his publication, Walker (2010) posed the question: "Is doing it together better than doing it alone?" Based on two studies, he answered the question by concluding that social flow was reported to be more enjoyable than solitary flow and that interdependent teams reported more joy in flow than individuals performing less interdependently. We challenge this dichotomous question and propose the inclusion of both individual and collective phases in cocreative settings. Furthermore, in contrast to Sawyer (2014), we argue that less continuous verbal communication in favor of more time alone (but still together for mutual inspiration and nonverbal interaction) has a stronger impact on overall creative output. The *shared material* in LSP (i.e. LEGO bricks) is the bonding and stimulating boundary object for *alone but together*.

In addition to shared material, a *facilitated process* provides a clear distinction as well as integration between individual discoveries and collaborative activities. Each participant is explicitly permitted to play individually and become immersed in her/his world of thoughts and, afterward, to reintegrate her/his ideas into the group process to further achieve the collaborative task (Dann, 2018). A facilitator is already essential for traditional meetings but even more so for cocreative workshop settings (Amabile, 1996), especially LSP. For most people, playing with LEGO bricks in a work context is unusual or even distracting (Zenk *et al.*, 2018). In the beginning, the facilitator is tasked with supporting participants to use children's toys for serious purposes. For that, skill-building measures are vital for becoming immersed in this medium (Primus and Sonnenburg, 2018). The clearly structured LSP process is also unfamiliar to most people and does not correspond to the usual group dynamic rules and hierarchical differences. Facilitators are confronted with emerging resistance and challenged to continue the process without demotivating participants. Finally, the metaphorical results must be retranslated into practice; otherwise, the LEGO models created are not perceived as realistic ideas for the problems addressed. However, when successfully accomplished, facilitators can provide a different cocreative setting for participants using boundary objects to develop new ideas, as demonstrated in this study.

Limitations and suggestions for future research

In this study, we randomly assigned participants to teams to compare their experiences and creative outputs in unfamiliar personal constellations, thus preventing the effects of

already-established team cultures. The aim was to focus on new teams who started to generate initial ideas and prototypes in cocreative settings. However, in organizations, teams are often established, and their historical dynamics must be considered before initiating a cocreative setting for idea development. In addition, idea development might be restricted as new creative output must build on or fit existing products and services. For future research, established teams could be investigated in field studies to ensure an even higher ecological validity.

Regarding the material, every team received the same set of LEGO bricks, mainly the Identity and Landscape Kit recommended by LEGO for groups of 10–12 workshop participants. Nevertheless, especially for skill building, identical LEGO sets such as the Starter Sets for each person rather than for each team would be preferable and might strengthen the individual flow experience. This technique could be used in future quasi-experimental LSP studies.

We placed great emphasis on developing a setting that was as transparent and replicable as possible for a quasi-experimental design. However, we are aware that research is facing a replication crisis, and replicated studies may show different effects (Maxwell *et al.*, 2015). In this respect, we have described the workshop setting and structure of the study in detail so that future research can expand or even contradict our current findings (see Table A1 in the Appendix). In agreement with Lewandowsky and Oberauer (2020), we support the endeavor to transparently publish current results and to further replicate the studies to develop a robust and efficient science. Additional laboratory studies could also further analyze specific aspects of cocreative settings, which would allow a higher internal validity.

We intentionally chose participants with different industry backgrounds for our experiment because inter- and transdisciplinary as well as cross-team collaboration are important characteristics of innovation (Scholz and Steiner, 2015). However, cocreative work often depends on the specific organizational context and industry. Engineers in the automotive industry may need a different setting than software developers in a start-up. In future studies, the differences in organizational contexts could be investigated as well as the settings and methods used until now to develop ideas and prototypes.

Lastly, the concept of *alone but together* should be investigated in more detail with regard to group flow. What level of interruptions are conducive to flow experience and creative output? Which interventions are required to promote individual exploration during intentional interruptions? How can these individual discoveries be effectively integrated back into the group process? This is also of particular interest for virtual settings, which have increased in the current pandemic. Future research could investigate whether physical and virtual settings have different impacts on experience components of individual and group flow and/or on creative output.

Conclusion

Creativity and innovation management requires the continuous development and implementation of new ideas (Ombrosi *et al.*, 2019). Cocreative work is crucial for developing new ideas and prototypes and supporting the knowledge integration of different employees for collaborative innovation. The question is how cocreative settings should be designed to be most effective. Instead of focusing on the individual *or* collaborative dimension, we followed a more holistic and multidimensional approach. Comparing the settings of LSP and MEET, we identified significant differences regarding experience components of individual and group flow and their impacts on creative output. Contrary to the obvious assumption that participants should talk continuously in cocreative settings, we

demonstrated that the interplay between alone and collaborative time – but always together – is of great importance.

An ideal-typical workshop setting should comprise a well-designed process of several phases in which participants alternately first create their ideas individually and, afterward, share them and work together to further develop their ideas. It is essential that the individual time does not lead to a sense of loneliness but enables participants to ideate in the presence of others. The collaborative time should emphasize the integration of the individual ideas to create new insights together, resulting finally in creative output. The duration of the workshop should be planned for a minimum of half a day (Hodgkinson *et al.*, 2006; Lauttamäki, 2016).

In summary, three main factors stimulate flow experience and appear essential for a cocreative setting following the concept of *alone but together:* (1) The provided *material* affects the human experience and the divergence of idea generation. Boundary objects, haptic material such as LEGO bricks, require time to get used to them but, as described in the results, seem to enable the development of more specific, relevant and novel ideas than traditional materials (Dean *et al.*, 2006). LEGO bricks as used in LSP appear to be a unique material as they support a playful experience and, literally, connect participants' individual LSP models. Hence, LEGO bricks may fulfill the aim of using boundary objects as "objects which are both plastic enough to adapt to local needs and constraints . . ., yet robust enough to maintain a common identity" (Star and Griesemer, 1989, p. 393). (2) In contrast to the general idea that creativity requires as much freedom as possible, we consider a *process* whereby phases alternating between individual and collaborative time are advantageous. The process should provide enough freedom within the structure but give participants a path to follow. These findings align with other creative methods that include such alternating processes. For example, in Design Thinking (Brown and Katz, 2019), specific stages of thinking are distinguished in which individual and group processes alternate (Ambrose and Harris, 2010). Another example is the Group Process model (Backström and Söderberg, 2016), whereby individual and collective phases are alternated. The individual phases further encourage a higher level of activation in the collaborative phases, in which the results are presented (Döös and Backström, 1997). (3) A *facilitator* supports the team and guides the members through the process of discovering ideas (Brem, 2019). Participants need clear permission to start exploring individually but must also be required to come back in time to share their insights with the team (Dann, 2018).

While meetings are common in today's organizations, the results from the present study indicate that the typical meeting does not provide the optimal setting for creative output. In contrast, cocreative settings such as LSP are promising if the strengths from individual and collaborative activities are combined using boundary objects and guided by a clear process, hence, providing a setting of *alone but together*.

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Appendix

Phase	LSP	MEET	Time
Introduction	Aim of the workshop and random arrangement in three teams		10min
	Data collection via ESM1		5min
Warm-Up	Skills Building 1) Tower (AT1) Build a tower with max. 8 bricks. The last brick must be red. 2) Tree (AT1) a) Build a tree with as many bricks as you like. b) Rebuild the tree and create a metaphor for the most important prerequisite for innovations. 3) Story (AT1) Build a model that represents the essential features of the university.	Mutual presentation 1) Introduction Please introduce yourself briefly and tell us what you expect in the workshop 2) Discussion What is the most important prerequisite for innovations? 3) Discussion What are the essential features of the university?	30min
	Data collection via ESM2		5min
Ideation	1) Needs/Problems (AT1 or discussion) In your opinion, what is a major problem or need of participants at the university? 2) Skills (AT1 or discussion) What skills or expertise can and would you like to contribute to the teamwork? 3) Ideation (AT1 or discussion) What idea(s) do you have that combines the needs as well as the skills of the team?		45min
	Data collection via ESM3		5min
	Break		15min
	Data collection via ESM4		5min
Prototyping	Selection		50min
	Position your model of ideas on the table on the axes motivation and realization (AT3).	Discuss, which ideas are motivating for you and can easily be realized.	
	Prototyping		
	Build an initial prototype of the innovation that integrates key aspects of all participants (AT2).	Which prototype of the innovation should be developed in the team? What are the main aspects?	
	Elevator Pitch		
	Prepare how to tell a story about your prototype and present it.	Prepare how to explain your prototype and present it.	
	Data collection via ESM5		5min
Outro	Next steps for the teams		5min

Note(s): ESM1-5 refer to the Experience Sampling Method and additional data collections. AT1-3 refers to Application Techniques that describe how to apply LSP processes according to Kristiansen and Rasmussen (2014): AT1: "Building Individual Models and Stories" to generate ideas based on the core process; AT2 "Building Shared Models and Stories" to co-create common models; AT3 "Creating a Landscape" to get an overview of the models by placing them close to similar ones

In the phases Warm-Up and Ideation, AT1 was used, in which the teams followed the four-step core process: (1) Posing the question, (2) Construction, (3) Sharing, and (4) Reflection. In the phase prototyping, AT3 was used to select the best ideas and AT2 to develop a shared model of an innovative prototype

Table A1. Design of the workshops and longitudinal data collections

About the authors

Lukas Zenk is an assistant professor of Innovation and Network Research and Deputy Head of Research at the Department for Knowledge and Communication Management at the Danube University Krems, Austria. He holds a PhD in Business Informatics from University of Vienna and a Master of Science on Innovation Management from Danube University Krems. In his applied research projects, he investigates how people collaboratively solve complex problems and how creative and innovative processes can be supported. He published among others in the Int. J. of Human Resource Management, Int. J. of Management and Applied Research, Creativity and Innovation Management and Sustainability Science. In practice, he works as an organizational consultant, applied improviser and certified LEGO® SERIOUS PLAY® Facilitator. Lukas Zenk is the corresponding author and can be contacted at: lukas.zenk@donau-uni.ac.at

Dirk J. Primus is an associate professor of Management at Bryant University in Smithfield, RI. His teaching and research draw from extensive experience (15 years) gained in various leadership positions in the Life Sciences Industry. He holds a PhD in Business from Bentley University. His recent published articles are featured in Technovation, the Creativity Research Journal, the International Journal of Technology Management, the Encyclopedia of Creativity and in the International Journal of Logistics Management. Dirk is an active member of the International Society of Professional Innovation Management (ISPIM), and he is certified as a LEGO® SERIOUS PLAY® and Design Thinking Facilitator.

Stephan Sonnenburg is an associate professor of Branding, Creativity and Innovation Management at ICN Business School and a member of CEREFIGE, the University of Lorraine, Nancy, France. He has 20 years of academic and corporate experience in the fields of strategic planning, marketing, advertising and creativity. He holds a PhD in Philosophy and a Master of Arts in Communication Studies from the University of the Arts Berlin. Stephan has published in Creativity and Innovation Management, the Creativity Research Journal, the Journal of Interactive Marketing, the Journal of Strategy and Management and the Encyclopedia of Creativity, among others. His research interests focus on co-creative branding, storytelling, team flow and creativity training. Stephan is the second chairman of the German Society for Creativity, and he is certified as a LEGO® SERIOUS PLAY® and Design Thinking Facilitator.