

A DYNAMIC PERSPECTIVE ON GROUP CREATIVITY

TOMAS BACKSTRÖM

MÄLARDALENS HÖGSKOLA, SWEDEN

TOMAS.BACKSTROM@MDH.SE

ABSTRACT

The dynamics of the group is of central importance for group creativity. At least according to processes theories, where creativity is a complex interaction between the individual and her situation, and where the individual and the others in the group are interdependent of each other. But this is seldom studied since most research on group creativity uses componential theories, where the other members of the group are seen as an external environment to the individual, a set of stimulations that facilitate or constrain the creative act of the individual. The aim of this conceptual paper is to describe and argue for a group process model (GroPro), a dynamic perspective of group creativity.

INTRODUCTION

Owing to the synergetic potential of diverse knowledge, collaborating individuals can often find better solutions for complex situations (Rubenson and Runco, 1995). Consequently, the team has become the basic organisational unit of development and innovation work (Burke et al., 2006, Huang, 2009, Kozlowski and Bell, 2003, Kratzer et al., 2004, Rubenson and Runco, 1995, Tang, 1998). Still, the creativity of the individual, not the group, is often in focus, both among managers (Bissola and Imperatori, 2011) and academics (Paulus and Nijstad, 2003, West and Wallace, 1991), which leads in consequence to an additive understanding of collaborative creativity. But both theories (Nijstad and Paulus, 2003, Rubenson and Runco, 1995, Woodman et al., 1993) and empirical research (Bissola and Imperatori, 2011, Saad et al., 2015) point at group

creativity as being more than the sum of the group members' creativity.

The need for theorizing and theory driven studies is one of the focal themes for future research suggested in a state-of-the-science review of innovation and creativity (Anderson et al., 2014). The authors are “struck by the relative lack of theoretical advances across the creativity and innovation literatures in the past decades” and continues “the most valuable avenues we consider will be to proffer ... models and theoretical propositions to explain cross-level and multilevel innovation” (op. cit. p. 1318). The aim of this article is an answer to this call. We will formulate the Group Process (GroPro) model, which integrates the phenomena behind group creativity, according to a system perspective. A first simplified description to practitioners can be as follows: The GroPro model consists of nine aspects (see figure 2). Three are tasks given to the manager/leader/facilitator: *Staff*, *Enable*, and *Affect*. And six are outposts for members of the group to reach. Three to strengthen the individual member: *Autonomy*, *Divergence*, and *Exploration*. And three to strengthen the group: *Integration*, *Convergence*, and *Exploitation*. Concepts from empirical research on group creativity are used to describe each task in more detail. The article contains examples of how the GroPro-model can be used in research and development work.

CONTRIBUTION TO THEORY

Creativity is generally conceptualised as the production of ideas that are novel as well as useful (Anderson et al., 2014). The focus may be on the creative output, the creative process (e.g. Stein, 1953) or the creative capacity (e.g. Torrance, 1971). Definitions of creativity have a social dimension, since the degree of novelty and usefulness is something others have to judge (Csikszentmihalyi, 1996). The creativity of the individual is often in focus, but empirical research shows that group creativity is more than the sum of the different individuals' creativity; for example in an experiment comparing creativity in groups composed of individualistic Canadian and collectivistic Taiwanese participants respectively, it is shown that the Canadians scored higher in individual creativity, but the Taiwanese higher in group creativity (Saad et al., 2015). And in an

experiment including over a thousand individuals, the groups with relatively uncreative members more often produced creative results (54%), than the groups with creative members (42%) (Bissola and Imperatori, 2011). It thus seems as though the emergence of unique collaborative creativity crystallises first at the social level (Jiang and Zhang, 2014, Sonnenburg, 2004).

It is possible to distinguish at least two perspectives of group creativity (see for example Anderson et al., 2014, Glăveanu, 2010). Firstly, the componential theories, where the environment has an impact on creativity by affecting components that contribute to creativity (see for example the KEYS instrument (Amabile et al., 1996)). Here the other members of the group are seen as an external environment to the individual, a set of stimulations that facilitate or constrain the creative act. Three major components contributing to small group creativity according to this perspective are expertise, creative-thinking skill and intrinsic motivation (Anderson et al., 2014).

Secondly, the process theories, where creativity is a result of a collective process. They focus for example on interactions (Woodman et al., 1993), sense making (Drazin et al., 1999) or procedures (Hargadon and Bechky, 2006). Here creativity is a complex interaction between the individual and her situation, and there is interdependence between the individual and the others in the group. According to this perspective the creativity of the group is a consequence of for example individual creative behaviour, interaction between group members, group characteristics, group processes and contextual influences (Anderson et al., 2014). This paper uses a process perspective. The goal is to formulate a model that integrates the phenomena behind group creativity. It has to include influences on the group from the context, characteristics of the group's members, and the interactions between group members including consequential emergence.

Emergence, the most important feature of the group creativity system (Jiang and Zhang, 2014), is a concept from complex systems theory. It deals with the link between the individual and the group (Sawyer, 2005) and understands it as a circular causality (Haken, 1996). Organising structures at the collective level emerges through interactions between individuals and, at the same time, these collective structures influences the interactions between the individuals. The emergent collective structures thus self-organize the group.

We define group creativity as the extent to which group members suggest and promote novel ideas which are recognised and used by the group. Creative output is commonly measured by the numbers of ideas and the uniqueness of the final result (estimated by experts, using for example the Consensual Assessment Technique (CAT) (Amabile, 1982)). Above that, we suggests three measures that has to do with the flow of ideas. It is possible to distinguish treads of ideas, ideas that attract the attention of other group members and

become group ideas, ideas shared within the group (Köping Olsson and Florin, 2011). Group ideas are starting with a novel idea, an idea which is not build on ideas mentioned earlier in the interaction. The new measures are: number of group ideas, the number of members engaged in them, and the level of promotion and use of them (Backström and Söderberg, 2016).

TWO CENTRAL THEORIES USED

Two theories are central for the formulation of the GroPro-model: A theory for the study of group dynamics described in (Cronin et al., 2011) and a theory about emergence described in (Hazy and Backström, 2013).

GROUP DYNAMICS – STAFFING, ENABLING AND EMERGENCE

McGrath, Arrow, and Berdahl (2000) criticise the study of groups for using mostly chain-like unidirectional cause-effect relationships. They describe dynamics as consisting of *local dynamics* of group members engaged in the tasks of the group, *global dynamics* of group-level variables (for example norm structures, group identity, and leadership) which emerge from and shape the local dynamics, and *contextual dynamics* which refer to the interaction between global dynamics and the embedding context of the group. Thus, to study dynamics one must consider multilevel influence relationships (Cronin et al., 2011). There are scarce contributions of multilevel approaches to organizational creativity (Bissola and Imperatori, 2011). Not only componential, but even process theories of group creativity "neglect to examine the link between individual creative capability and the level of collective creativity" (Bissola and Imperatori, 2011, p. 79). Using this strict definition of dynamics, group dynamics is rarely studied also in the study of groups generally (Cronin et al., 2011, Kozlowski and Bell, 2003, McGrath and Argote, 2001, McGrath et al., 2000). We need to "better distinguish the individual and the collective level and the emergence of team coordination" (Kozlowski and Bell, 2003, p. 366).

Cronin, et al. (2011) suggest a model for the study of group dynamics which includes three dynamic profiles of phenomena: contextual, cumulative and emergent see Figure 1. The contextual constructs apply to group properties that are imposed on the group by external forces. The cumulative ones are based on stable individual properties, which come about when the group members are assigned. And the emergent constructs are group level phenomena that emerge over time in the interaction between group members. In the GroPro model we rename the cumulative to *Staff* and the context to *Enable*. Both active management, such as staff and enable, and self-regulatory processes, such as emerging, are required for group creativity (Bledow et al., 2009). The staffing and enabling are setting the stage for the most dynamic part of the model; the emergent (Cronin et al., 2011).

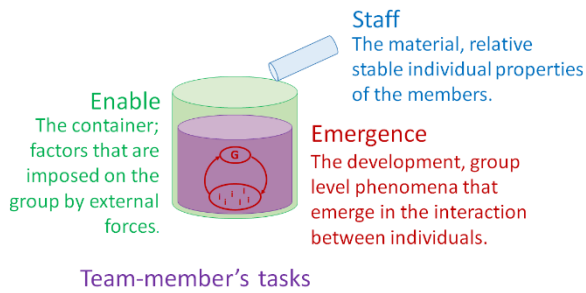


Figure 1: A model of group dynamics. Enable is like a container, when the staff is poured into container a reaction starts; the emergence, which changes the staff on both individual (i) and group (G) level.

Emergence is a process driven by group members working together, but management may also take part as an external person trying to affect the emergence.

EMERGENCE – A RELATION BETWEEN THE INDIVIDUAL AND THE COLLECTIVE

Leadership is, in complexity leadership theory (Lichtenstein et al., 2006), defined as an interactive event in which knowledge and behaviour changes, and thus is leadership something that all members of a group can do. This distinguish Staffing and Enabling, which is tasks for the managers outside of the group, from Emergence which is happening inside the group. Further, the two drivers for leadership in the complexity leadership theory are: the formation of a collective identity and to generate tension through individual diversity. Through which novel information can emerge. This distinction between on one hand the collective (the unity and the one wholeness), and on the other hand the individual (the plurality and the many parts) is central to the understanding of emergence.

In a creative group process an oscillation between togetherness and apartness may be preferred. One important consequence of letting group members work individually part of the time is that everyone is lured and forced into becoming more active during the collective phases, thus the risk for group think and social loafing is reduced. The increased activity in collective phases is partly because people have prepared things to present and partly because others expect everyone to present their ideas (Döös and Backström, 1997). Research on the human brain function gives an additional cause to facilitate both an individual and a collective part of the creative process. Human beings are shown to have two competing, mutually exclusive, ways for the brain to work: one associated with mechanical and one with social reasoning (Jack et al., 2013). Thus it is good for a group working on a task, where there is a need to reason about physical objects, to take breaks from working together with others and using the brain network for social reasoning, to be able to use their brain network for mechanical reasoning as well.

Human interactions can be studied and enabled from both the individual and the collective perspectives. The two perspectives can be described as two sides of the same coin, or a duality, between the individual details and plurality on one side, and the collective structure and unity on the other. Both sides are always there and need each other. It is common to try to suppress one side of the duality, to only see the individuals and ignore the group as part of the context, or vice-versa, but it is better to transcend the duality, to understand that the individual and the collective are complementary and interwoven (Lewis, 2000). The Human Interaction Dynamics (HID) model (Hazy and Backström, 2013) help us to do that.

The HID model (see table 1), developed to model emergence, divides between three levels of structures with both the individual and the collective perspectives on each level: 1. The relation level with both individual *autonomy*, and *integration* into the group and the task of the group. 2. The information flow level with both individual *divergent* information, and the *convergent* information common to all group members. 3. The action level with both individual *exploring* and experimentation, and the *exploiting* of the groups resources to meet the tasks of the group. The HID model is a normative model saying that a good dynamic balance between these aspects will lead to self-organisation, the ability to adapt and transform when needed and thus to high fitness and long term sustainability as a system.

	Individual	Collective
Relations	Autonomy	Integration
Information	Divergence	Convergence
Acting	Explore	Exploit

Table 1: The Human Interaction Dynamics (HID) model, three levels with an individual and a collective aspect o each.

The six outposts of the HID model can be used to describe emergence in all kinds of complex systems. In the GroPro model we use it to understand the emergent part of the group creativity. It is complemented with three tasks of the managers. Thus the GroPro model consists of three tasks: Staff, Enable, and Affect, and six outposts: Autonomy, Integration, Divergence, Convergence, Explore, and Exploit.

THE GROPRO MODEL

The GroPro model (see Figure 2) is a systems model showing nine aspects that are of importance for emergence in a small social system, a group. And emergence is assumed to be a way to reach group creativity. The three tasks of managers (M1-M3) form the base for the group's work. The six outposts for dynamics within the group develops while the group is working together. They can be presented as three dualities (D1-D3). All six outposts are needed most of the time, even though one or another can be more

important occasionally. It is part of the group members' leadership of themselves to observe when there is a need to focus on a certain outpost to strengthen that aspect of the dynamics. Concepts from empirical research on group creativity will now be used to describe each task and outpost in more detail.

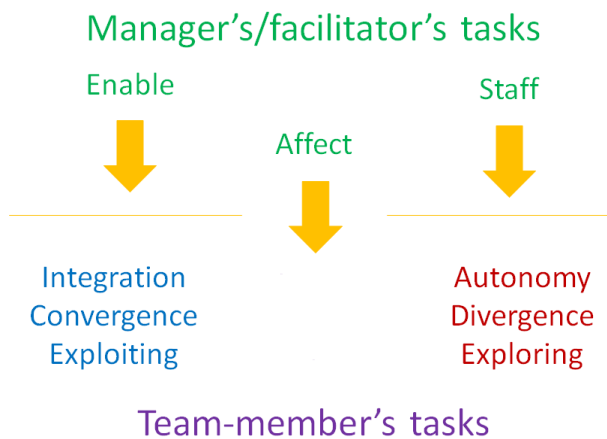


Figure 2: The GroPro-model, three tasks of the manager/facilitator and six outposts for group members to monitor and manage.

M1. STAFF

Staff refer to the members of the group; how many and who they are. Team size is showed to decrease individual creativity, probably due to social loafing, but the creativity of the group increases slightly according to a meta-analysis of 104 independent studies of team-level creativity and innovation in the workplace (Hülshager et al., 2009). Larger groups have, in general, a greater amount of skills and knowledge to use in the creative process.

Relative stable individual properties of the members, such as expertise and creative-thinking skill, are of importance for the creativity of the group, even though they are of less importance than the interaction between the members and the consequent emergence. An empirical study including almost five hundred individuals shows group creativity to be significantly correlated to both aggregated individual creativity as well as group creativity-relevant processes, but a low incidence of such processes neutralises the effect of a group high in creativity (Taggar, 2002). Example of group creativity-relevant processes are time awareness, goal orientation, task oriented leadership, and effective communication (Bissola and Imperatori, 2011).

Job-relevant diversity is a significant antecedent of team-level creativity (Hülshager et al., 2009). Two different kinds of diversity have been studied in research. Job-relevant diversity has a slight positive significance to group creativity, probably because of greater amount of skills and knowledge available in the process. Background diversity (age, gender, ethnicity etc.), on the other hand, shows a slight negative significance in the meta-study (op. cit.), maybe because

of communication problems and because it make it harder to reach consensus.

Reaching consensus is vital for the creation and implementation of new ideas. Thus, individual interpersonal competencies are probably of importance for the creativity of the group, for example abilities of: active listening, empathy, sharing knowledge, experiences and ideas, participating in generative dialogue, improvising in groups, and giving and receiving feedback (Illeris, 2004).

M2. ENABLE

Enabling refer to the context; factors that are imposed on the group by external forces. Managers have a task to give support and create structures that enables the creativity of the group (Peschl and Fundneider, 2014). Support can include expectations, approval and practical support of attempts to be creative.

An enabling and created vision has been studied by for example (Hoegl et al., 2008), stating that a clearly specified and inherently exciting project goal will foster innovation team performance and help the team to overcome barriers of will in the creative process. Further, in our research we have experienced managers who have formulated "aggressive goals"; goals which are impossible to reach without radical innovation and without interaction between different personnel categories. Such desire to change the game, formulated by managers, can be highly motivating for creative groups.

Goal interdependence is another enabling aspect. It refers to the extent to which team members' goals and rewards are related in such a way each team member can reach her goal only if other team members also reach theirs. The importance of goal interdependence for group creativity may be due to it influencing interaction between team members to be more cooperative and helpful. (Hülshager et al., 2009)

M3. AFFECT

The managerial task to affect the emergence in a group is very delicate. It is sometimes said that influence from outside will ruin the emergence. Still the manager, leader, or facilitator often have a kind of long-term, helicopter perspective that is of importance for the outcome of creative process. The best would be if the manager can take part of the group work as an ordinary member, but it is often impossible for managers to devote that amount of time to one group.

Close listening, equal participation and leave control to team are three things to remember for the manager to not disturb the emergence when she interacts with the team (Sawyer, 2008). It is important to deeply listen to what is going on in the group before you try to affect it. The manager should not dominate, but take an equal role in the interaction. And the group members must be able to feel that they are in control of their actions.

D1. AUTONOMY – INTEGRATION

The autonomy – integration duality has to do with the group members' relation to the group and the task of the group. Autonomy means that group members are able to, know how to and, are willing to think and act freely in relation to the group and task, while integration means that members submit to the group. Autonomy-Integration is a relational structure that is there all the time, as long as the group exists. Members have a relation to the group and the task, even when working outside the group.

Autonomy-Integration has partly to do with identity. In different situations you may identify more individualistic and autonomous, or more team oriented and integrated. Both have been associated with creativity: an individualistic orientation (Goncalo and Staw, 2006, Janssen and Huang, 2008), and a team orientation (Hirst et al., 2009).

When a group member is mainly in the autonomous outpost she fulfils the assumptions of the componential theory. The relation between creativity and an individual factor is often inconstant, because it is shaped by the contextual variables and because different parts of the creative process have different antecedents (Anderson et al., 2014). But self-esteem or self-efficacy, especially creative self-efficacy (Tierney and Farmer, 2002) and motivation, especially a combination between intrinsic and prosocial motivation (Grant and Berry, 2011) are shown to be connected to creativity.

Cohesion, which is close to integration, is one of the most studied team characteristics, and it is significantly related to group creativity according to a meta-analysis (Hülshager et al., 2009). It refers to the commitment of group members to their group and their desire to maintain group membership. It has been suggested that strong personal attraction among group members creates a safe climate to be autonomous and challenge the structures of the collective (West and Wallace, 1991). Participative safety, the combination of participation in decision making and intragroup safety, have significant relation to creativity in several studies (Hülshager et al., 2009). A supportive cooperative work atmosphere, where group members help one another and collaborate, increases group creativity (Amabile et al., 1996, Keller et al., 1996). Further, integration to the task, a commitment to the objectives of the group is found to be associated with creativity (West and Anderson, 1996).

D2. DIVERGENCE – CONVERGENCE

The divergence and convergence duality has to do with the information flow in the group, the process of sharing information, ideas, knowledge and experience with each other in the group. Divergence stands for ambiguity, and the inflow of new information and ideas into the group interaction. Divergence is based on different group members having different information, expertise and experiences to share and a willingness to share it. It is

important to creativity, since creative output are defined as unique or original. Convergence stands for a process where divergent information is correlated in interaction between group members, so that members come to have an increasingly shared understanding, a dominant interpretation, or at least an understanding of each other's information.

A potential for divergence is formed for example by job-relevant diversity (M1. Staffing), by thinking autonomously (D1. Autonomy), by being motivated and feeling safe to share new ideas to the group (D1. Integration), and by scouting for new information (D3. Exploring). Individual brain-storming is an example of a common process to receive a lot of divergence.

A combination of divergence and convergence, the extent to which group members share information, ideas, knowledge and experience with each other, is shown to be important for group creativity. Interaction with other group members are of importance for the amount of new ideas from one member, it increases when she has access to other members' ideas (Nijstad and Stroebe, 2006). Internal communication is one of the significant antecedents in a meta-analysis (Hülshager et al., 2009). For example, team reflection was significantly correlated with their rated innovativeness in a study of one hundred teams (Tjosvold et al., 2004) and the strongest antecedent to team innovation in a study of 136 primary care teams (Somech, 2006), and groups that engage in interaction between members to integrate knowledge have an increased ability for adaptive improvements of their work (Okhuysen and Eisenhardt, 2002).

Also results of the process of convergence, like for example a common understanding of objectives and display of high commitment to these, are correlated to group creativity (Hülshager et al., 2009) and shared mental models is significantly associated with creativity in a study of 161 teams (Santos et al., 2015).

D3. EXPLORATION – EXPLOITATION

The exploring and exploiting duality has to do with the actions of the group and its members, actions that go beyond their own group. Exploring is the search for opportunities, knowledge and information to use in the creative processes, for example to explore ideas or solutions from other contexts or to experiment, test and try out different ideas. Exploiting is to use the resources of the group to create value: to present, argue for and implement solutions created in the creative process.

External communication is one way of exploring, and one of the significant antecedents of team creativity in a meta-analysis (Hülshager et al., 2009). External communication includes for example communication with persons outside of the group (Ancona and Caldwell, 1992, Keller, 2001), communication with partners (Wong et al., 2007), use of external knowledge sources (McAdam et al., 2008), and the weak ties form in the networks of communication (Granovetter, 1973,

Perry-Smith and Shalley, 2003). Experimenting is another way to explore for new information. Sawyer (2007) writes “There’s no creativity without failure ... the highest performers are those who engage in *deliberate practice* – as they are doing a task, they’re constantly thinking about how they could be doing better, and looking for lessons that they can use the next time.” (op. cit. p. 55) When it comes to exploitation task orientation, a shared concern with excellence of quality of task performance, is correlated to group creativity (Hülshager et al., 2009). The execution part in a model of team adaptation (Burke et al., 2006) gives two ideas on what can be important for exploiting: Mutual performance monitoring, were members keep track of fellow group members to ensure that everything is running as expected. And back-up behaviour, to provide other members with resources when it is apparent that she is failing to reach the goals. To collectively reflect about and even rehearse important external actions within the group can be one way to strengthen the exploiting outpost.

THE USE OF THE GROPRO-MODEL

The GroPro-model has been used as a tool in four different ways, so far. Two of them are not evaluated by research.

1. *A tool for leadership of a meeting.* As a member of a meeting you can evaluate if there is an imbalance between divergence and convergence. The divergence outpost can be strengthened by challenging others to be more autonomous, for example to use their specific expertise, and to explore, for example to try to see things from a customer perspective. The convergence outpost can be strengthened by appealing the group towards integration, remember them the importance of cooperation to be able to fulfil the common task, and the exploration of their common efforts soon to come.

2. *A tool for design of training.* The GroPro-models has been used to design both several commissioned trainings as well as a bachelor course “Creativity in innovation processes”.

The two other uses has been within research projects.

3. *A tool for structuring a creative process.* In an experiment with students it was showed that groups with a work processes structured by help of the GroPro-model were significantly more creative than the groups that were allowed to work as they preferred (Backström and Söderberg, 2016).

4. *A tool for organisational development.* The GroPro-model has been developed during fifteen years of empirical research about organisational change processes at the level of first line managers and work groups. An early version is described in (Backström, 2004). The autonomy –integration and the divergence – convergence dualities were used as the base in an intervention to develop collective competence in work groups. Creativity was one of the aspects that increased

significantly (Backström et al., 2013). In another project a survey instrument was designed based on the GroPro-model. The instrument worked to differentiate innovative companies from others. And representatives from companies within the project meant that these results formed a better base for development of their innovation capacity, than results from a traditional instrument. (Cedergren et al., 2017)

DISCUSSION

As all models, the GroPro-model is a huge simplification of reality. It is a way to make it easier to describe, understand and affect reality. The model is intended to be complex enough for researchers studying group creativity, but also simple enough for practitioners to use in their work to enable and affect group creativity. Nine aspects with a clear structure between each other seemed to be a good compromise between these two conflicting goals. If you start to use the model you will realise that sometimes the borders between the different aspects of the model are hard to draw. It is not always easy to decide to which aspect a certain action or concept belongs. For example when an individual take a risk it may be because the managers enable it (M2. Enabling), the group has an open social climate (D1. Integration), the individual is courageous (D1. Autonomy), the action can be understood as is a part of the interaction (D2. Diversity), or the individual has important new information (D3. Exploration).

The GroPro-model is grounded on theory. It is common to instead ground models on empirical data, for example to use statistical analysis to decide which aspects to use to best describe a phenomenon, and how they are connected. A theory grounded model has to be empirically tested before it can be trusted. The GroPro model has still been tested too little. There is a need for more empirical research on the model to evaluate its usefulness.

REFERENCES

- AMABILE, T. M. 1982. The social psychology of creativity: a consensual assessment technique. *Journal of Personality and Social Psychology*.
- AMABILE, T. M., CONTI, R., COON, H., LAZENBY, J. & HERRON, M. 1996. Assessing the work environment for creativity. *Academy of Management Journal*, 1154-1184.
- ANCONA, D. G. & CALDWELL, D. F. 1992. Demography and design: Predictors of new product team performance. *Organization Science*, 321-341.
- ANDERSON, N., POTOCNIK, K. & ZHOU, J. 2014. Innovation and creativity in organizations: A state-of-the-science review, prospective commentary, and guiding framework. *Journal of Management* 40, 1297-1333.
- BACKSTRÖM, T. 2004. Collective learning: a way over the ridge to a new organizational attractor. *The Learning Organization*, 11, 466-477.

- BACKSTRÖM, T., MOSTRÖM ÅBERG, M., KÖPING OLSSON, B., WILHELMSON, L. & ÅTEG, M. 2013. Manager's task to support integrated autonomy at the workplace. Results from an intervention. *International Journal of Business and Management*, 8, 20-31.
- BACKSTRÖM, T. & SÖDERBERG, T. 2016. Self-organisation and group creativity. *Journal of Creativity and Business Innovation*, 2, 65-79.
- BISSOLA, R. & IMPERATORI, B. 2011. Organizing individual and collective creativity: Flying in the face of creativity clichés. *Creativity and Innovation Management*, 20, 77-89.
- BLEDOW, R., FRESE, M., ANDERSON, N., EREZ, M. & FARR, J. 2009. Extending and refining the dialectic perspective on innovation: There is nothing as practical as a good theory; nothing as theoretical as a good practice. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, 363-373.
- BURKE, C. S., STAGL, K. C., SALAS, E., PIERCE, L. & KENDALL, D. 2006. Understanding team adaptation: A conceptual analysis and model. *Journal of Applied Psychology*, 1189-1207.
- CEDERGREN, S., BACKSTRÖM, T., BLACKWATER, H., JOHANSSON, P. & WIKSTRÖM, A. 2017. A new survey instrument for assessing the innovation climate. *ISPIM'17*. Vienna.
- CRONIN, M. A., WEINGART, L. R. & TODOROVA, G. 2011. Dynamics in groups: Are we there yet? *The Academy of Management Annals*, 5, 571-612.
- CSIKSZENTMIHALYI, M. 1996. *Creativity*, New York, Harper Collins Publishers.
- DRAZIN, R., GLYNN, M. A. & KAZANJIAN, R. K. 1999. Multilevel theorizing about creativity in organizations: A sensemaking perspective. *Academy of Management Review*, 286-307.
- DÖÖS, M. & BACKSTRÖM, T. 1997. The Riv Method: A participative risk analysis method and its application. *New Solutions*, 7, 53-60.
- GLĂVEANU, V. P. 2010. Paradigms in the study of creativity: Introducing the perspective of cultural psychology. *New Ideas in Psychology*, 28, 79-93.
- GONCALO, J. A. & STAW, B. M. 2006. Individualism-collectivism and group creativity. *Organizational Behavior and Human Decision Process*, 96-109.
- GRANOVETTER, M. S. 1973. The strength of weak ties. *American Journal of Sociology*, 78, 1360-1380.
- GRANT, A. M. & BERRY, J. W. 2011. The necessity of others is the mother of invention: Intrinsic and prosocial motivations, perspective taking, and creativity. *Academy of Management Journal*, 73-96.
- HAKEN, H. 1996. *Principles of brain functioning. A synergetic approach to brain activity, behavior and cognition*, Berlin, Springer.
- HARGADON, A. B. & BECHKY, B. A. 2006. When collections of creatives become creative collectives: A field study of problem solving at work. *Organization Science*, 484-500.
- HAZY, J. K. & BACKSTRÖM, T. 2013. Human interaction dynamics (HID): An emerging paradigm for management research. *Emergence: Complexity & Organization*, 15, i-ix.
- HIRST, G., VAN DICK, R. & VAN KNIPPENBERG, D. 2009. A social identity perspective on leadership and employee creativity. *Journal of Organizational Behavior*, 963-982.
- HOEGL, M., GIBBERT, M. & MAZURSKY, D. 2008. Financial constraints in innovation projects: When is less more? *Research Policy*, 1382-1391.
- HUANG, C. C. 2009. Knowledge sharing and group cohesiveness on performance: An empirical study of technology R&D teams in Taiwan. *Technovation*, 786-797.
- HÜLSHEGER, U. R., ANDERSON, N. & SALGADO, J. F. 2009. Team-level predictors of innovation at work: A comprehensive meta-analysis spanning three decades of research. *Journal of Applied Psychology*, 94, 1128-1145.
- ILLERIS, K. 2004. A model for learning in working life. *The Journal of Workplace Learning*, 16, 431-441.
- JACK, A. I., DAWSON, A. J., BEGANY, K. L., LECKIE, R. L., BARRY, K. P., CICCÀ, A. H. & SNYDER, A. Z. 2013. fMRI reveals reciprocal inhibition between social and physical cognitive domains. *NeuroImage*, 385-401.
- JANSSEN, O. & HUANG, X. 2008. Us and me: Team identification and individual differentiation as complementary drivers of team members citizenships and creative behaviors. *Journal of Management*, 69-88.
- JIANG, H. & ZHANG, Q.-P. 2014. Development and validation of team creativity measures: A complex systems perspective. *Creativity and Innovation Management*, 23, 264-275.
- KELLER, R. T. 2001. Cross-functional project groups in research and new product development: Diversity, communications, job stress, and outcomes. *Academy of Management Journal*, 547-555.
- KELLER, R. T., JULIAN, S. D. & KEDIA, B. L. 1996. A multinational study of work climate, job satisfaction, and the productivity of R&D teams. *IEEE Transactions in Engineering Management*, 48-55.
- KOZLOWSKI, S. W. J. & BELL, B. S. 2003. Work groups and teams in organizations. In: BORMAN, W. C., ILGEN, D. R. & KLIMOSKI, R. J. (eds.) *Handbook of psychology: Industrial and organizational psychology*. London: Wiley.
- KRATZER, J., LEENDERS, R. T. A. J. & VAN ENGELEN, J. M. L. 2004. Stimulating the potential: Creative performance and communication in innovation teams. *Creativity and Innovation Management*, 13, 63-71.

- KÖPING OLSSON, B. & FLORIN, U. 2011. Idea exchange and shared understanding: Tools stimulating thought and conveying ideas. *Design principles & practices: An international journal*, 5, 3-17.
- LEWIS, M. W. 2000. Exploring paradox: Toward a more comprehensive guide. *Academy of Management Review*, 25, 760-776.
- LICHTENSTEIN, B. B., UHL-BIEN, M., MARION, R., SEERS, A., ORTON, J. D. & SCHREIBER, C. 2006. Complex leadership theory: An interactive perspective on leading in complex adaptive systems. *Emergence: Complexity & Organization*, 8, 2-12.
- MCADAM, R., O'HARE, T. & MOFFET, S. 2008. Collaborative knowledge sharing in composite new product development: An aerospace study. *Technovation*, 245-256.
- MCGRATH, J. E. & ARGOTE, L. 2001. Group processes in organizational contexts. In: HOGG, M. A. & TINDALE, T. S. (eds.) *Blackwell handbook of social psychology: Group processes*. Oxford: Blackwell.
- MCGRATH, J. E., ARROW, H. & BERDAHL, J. L. 2000. The study of groups: Past, present and future. *Personality and Social Psychology Review*, 95-105.
- NIJSTAD, B. A. & PAULUS, P. B. 2003. Group creativity: Common themes and future directions. In: PAULUS, P. B. & NIJSTAD, B. A. (eds.) *Group creativity: Innovation through collaboration*. New York: Oxford University Press.
- NIJSTAD, B. A. & STROEBE, W. 2006. How the group affects the mind: A cognitive model of idea generation in groups. *Personality and Social Psychology Review*, 186-214.
- OKHUYSEN, G. A. & EISENHARDT, K. M. 2002. Integrating knowledge in groups: How formal interventions enable flexibility. *Organization Science*, 370-386.
- PAULUS, P. B. & NIJSTAD, B. A. 2003. Group creativity: An introduction. In: PAULUS, P. B. & NIJSTAD, B. A. (eds.) *Group creativity: Innovation through collaboration*. New York: Oxford University Press.
- PERRY-SMITH, J. E. & SHALLEY, C. E. 2003. The social side of creativity: A static and dynamic social network perspective. *Academy of Management Review*, 89-106.
- PESCHL, M. F. & FUNDNEIDER, T. 2014. Designing and enabling spaces for collaborative knowledge creation and innovation: From managing to enabling innovation as socio-epistemological technology. *Computers in Human Behavior*, 346-359.
- RUBENSON, D. L. & RUNCO, M. A. 1995. The psychoeconomic view of creative work in groups and organizations. *Creativity and Innovation Management*, 4, 232-241.
- SAAD, G., CLEVELAND, M. & HO, L. 2015. Individualism-collectivism and the quantity versus quality dimensions of individual and group creative performance. *Journal of Business Research*, 578-586.
- SANTOS, C. M., UITDEWILLIGEN, S. & PASSOS, A. M. 2015. Why is your team more creative than mine? The influence of shared mental models on intra-group conflict, team creativity and effectiveness. *Creativity and Innovation Management*.
- SAWYER, K. 2007. *Group genius. The creative power of collaboration.*, New York, Basic Books.
- SAWYER, R. K. 2005. *Social emergence: Societies as complex systems*, Cambridge, Cambridge University Press.
- SOMECH, A. 2006. The effects of leadership style and team process on performance and innovation in functionally heterogeneous teams. *Journal of Management*, 132-157.
- SONNENBURG, S. 2004. Creativity in communication: A theoretical framework for collaborative product creation. *Creativity and Innovation Management*, 13, 254-262.
- STEIN, M. I. 1953. Creativity and culture. *Journal of Psychology*, 36, 311-322.
- TAGGAR, S. 2002. Individual creativity and group ability to utilize individual creative resources: A multilevel model. *Academy of Management Journal*, 45, 315-330.
- TANG, H. K. 1998. An integrative model of innovation in organizations. *Technovation*, 297-309.
- TIERNEY, P. & FARMER, S. M. 2002. Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal*, 1137-1148.
- TJOSVOLD, D., TANG, M. M. L. & WEST, M. 2004. Reflexivity for team innovation in China. *Group and Organization Management*, 540-559.
- TORRANCE, E. P. 1971. Are the Torrance tests of creative thinking biased against or in favor of disadvantaged groups? *Gifted Child Quarterly*, 15, 75-80.
- WEST, M. A. & ANDERSON, N. R. 1996. Innovation in top management teams. *Journal of Applied Psychology*, 680-693.
- WEST, M. A. & WALLACE, M. 1991. Innovation in health care teams. *European Journal of Social Psychology*, 303-315.
- WONG, A., TJOSVOLD, D. & SU, F. 2007. Social face for innovation in strategic alliances in China: Mediating roles of resource exchange and reflexivity. *Journal of Organizational Behavior*, 961-978.
- WOODMAN, R. W., SAWYER, J. E. & GRIFFIN, R. W. 1993. Toward a theory of organizational creativity. *Academy of Management Review*, 293-321.