

Novelty and coherence in group creative processes

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A research of triadic creative processes was conducted based on the assumption that novelty and coherence are basic dimensions of group creativity, variations of which can explain differences in creative achievement. In a workshop, 153 students were divided in triads and created 51 chain-stories. Following the standards of Consensual Assessment Technique (CAT), eight independent judges assessed creativity, novelty and coherence in the integral stories. The most representative stories for low, middle and high creativity, were selected and subjected to further analysis. The results show that development of group creativity is conditioned by high level of novelty, and by balanced ratio of novelty and coherence that enable integration of unique ideas in group processes. Symmetrical contribution of members was not confirmed as one of the conditions, suggesting that group creativity is an emerging phenomenon, relying on relations rather than individual contributions of participants.

Keywords: group creativity, process, stories, novelty, coherence, symmetrical contribution

Even though the phenomenon of creativity is defined and assessed from many different points of view, contemporary definitions tend to outline mainly the features of the product of the creative processes. Apart from novelty and uniqueness i.e. level of originality, the important criterion of a product is its functionality. Authors define it differently, stressing: usefulness, applicability, adaptiveness, appropriateness, adequacy, value or quality (Amabile, 1996; Feist, 1999; Gruber & Wallace, 1999; Martindale, 1999; Plucker & Beghetto, 2004; Sternberg, Grigorenko, & Singer, 2004; etc). Although different terms are being used, they are all related to the product's usability in a particular context, and its potential to fit into contextual constraints. Concerning group creativity, the usability of the product in a broader context depends on mutual exchanges and interconnection of group members during creative processes (Sawyer, 2003). Therefore, the usability of a group product first and foremost depends on the resonance within the group, and on the level of coherence of joint outcome even before it is introduced to a broader context. Members of the group should build on the ideas of others (Osborn, 1957). Coherence precedes usability: if a

group product is to be qualified as creative, it has to bring novel ideas which will be unified into a coherent whole. However, before considering novelty and coherence as features of a group product, they could be considered precursors of group creativity, i.e. dimensions that enable development of joint creation. Novelty can be defined as an expression of a new idea in a response to a heuristic task, not presented before in the referential group, while coherence is a degree of logical consistency, based on interdependence of group members. Coherence expresses the individual members' willingness to connect and continue elaborating on a new idea or an emerging group construct. This research is based on the assumption that novelty and coherence are equally important as precursors of group creativity, and their variations can explain differences in creative achievement.

It seems that scientific community prematurely agrees that group creativity is somehow inferior compared to individual performances. After Osborn's bold statement that a group can be twice as productive as each participant individually (Osborn, 1957), many researchers felt provoked to prove the opposite (Diehl & Stroebe, 1987; Mullen, Johnson, & Salas, 1991; Steiner, 1972; etc). Less productivity of interactive groups compared to nominal ones was labeled as "process loss" (Shepperd, 1993; Steiner, 1972), and it was explained by different causes: evaluation apprehension, coordination loss and motivation loss (Camacho & Paulus, 1995; Diehl & Stroebe, 1987), group competition (Diehl & Stroebe, 1991), and cognitive interference (Pinsonneault & Barki, 1999; Straus, 1996). Special attention has been given to the "free riding", a social loafing phenomenon, which can be detrimental for group performance (Karau & Williams, 1993). Social loafing appears when responsibility is diffused among group members, or when members are convinced that their contributions are not necessary for the group success (Harkins & Petty, 1982; Karau & Williams, 1993). Researchers of creative cognition have confirmed the effects of negative priming and implicit taking of others' ideas that block the emergence of new ones (Smith, 2003). In addition, the effects of premature consensus and group thinking have been confirmed, all leading to noncreative solutions (Janis, 1982). A group was analyzed mainly in a negative context, assuming it brings more difficulties than benefits (Nijstad, Diehl, & Stroebe, 2003).

On the other hand, advocates of team work are keen to defend the concept of creative synergy, based on the assumption that the group result always brings more than the sum of results of each individual group member (Agrell & Gustafson, 1996; Bennis & Biderman, 1997; Kayser, 1994; Paulus, 2000; Puccio, 1999; West, 2002; Woodman, Sawyer, & Griffin, 1993). Although there is a growing body of evidence confirming the holistic assumptions, a question remains open: can we understand and explain specific conditions for emergence of group creativity in a multifactorial situation such that would be recognizable in a public sphere? The question could be of great importance considering the

necessity of collaborative work, essential not only for performing artists, but also for scientists and creators of public policies.

Conditions of group creativity

Previous research has shown that heterogeneous structure of the group, with its consequential diversity, can be relevant for the development of its creative potential (Kurtzberg, 2005; Taggar, 2002). Diversity has a strong positive impact on group performance because it stimulates elaboration of task-relevant information (Van Knippenberg, De Dreu, & Homan, 2004). When a group has a heterogeneous structure, its members with their varied skills, knowledge and expertise can share a wide scope of information and contribute to the emergence of more creative outcomes (Curseu, Schruijer, & Boros, 2007; Dahlin, Weingart, & Hinds, 2005; Harrison & Klein, 2007; Kurtzberg, 2005). Cognitive diversity brings juxtaposition of personal, sometimes conflicting perspectives, and deeper exploration of problems (Milliken, Bartel, & Kurtzberg, 2003). Ideas that are semantically homogeneous do not have potential to activate less accessible information from long-term memory of other members, and consequently the group ability to form new ideas decreases (Nijstad et al., 2003).

However, it is not sufficient for a group to have a heterogeneous structure, as diversity needs to be expressed in order to become relevant for creativity. Appearance of dissent is one of the preconditions for development of new collaborative ideas. The participants in the processes need to be relieved of conformity pressure and stimulated to think about different positions, which will result in a higher level of originality (Nemeth & Nemeth-Brown, 2003). Without authentic dissent followed by willingness and courage to express it, no cognitive stimulation is to be expected, therefore making an achievement of a real leap in the group creative processes impossible (Nemeth & Nemeth-Brown, 2003). Here we can fathom why coherence is important for group creativity: the more heterogeneous a group is, the stronger coherence is required in order to enable expression of diversity and cognitive stimulation of members.

According to the cognitive model of idea generation, stimulation in group creative processes occurs when a new perspective offered by one group member triggers new ideas in others (Nijstad, et al., 2003). In that situation, one member's idea leads to search of long-term memory and activation of previously acquired knowledge of the other members. This is then used to generate new ideas. Besides cognitive stimulation, group members can also experience certain cognitive interferences, when exchange of ideas interferes with the process of ideation at the individual level. If an interactive group is supposed to achieve a higher level of creativity in comparison to a nominal one, a cognitive stimulation must be stronger than interference. Simultaneously, coherence needs to be congruent with the level of expressed diversity as a guarantee that novel ideas will be integrated and elaborated properly. Members of a creative group can encourage further development of an idea if their suggestions dictate new

creative challenges to others, thus enabling cognitive stimulation throughout the process, while at the same time carefully listening to the ideas of others and looking for a way to connect with them. Finding the balance between generative process and linking to the ideas of others is a complex task that indicate novelty and coherence as two basic dimensions of group creativity.

Novel ideas generated during the processes, can be used only if they gained logical consistency and link with the ideas of others, forming a high level of coherence in that way. This assumption was tested previously with 44 students randomly organized in dyads. They were involved in a specially designed heuristic task with chain stories, and results showed that degrees of novelty and coherence well explain differences between products of creative and noncreative groups (Ristić, Mandić, & Škorc, 2012). Similar results have been reported by the research of jazz improvisation (Sawyer, 2003). Development of an idea is conditioned by high degree of novelty coming from all participating sides, and by balanced degrees of novelty and coherence. In addition, the results suggested that active and symmetrical contribution of members to novelty and coherence might be an optimal situation for a development of a group creation, as it is predicted from the research of social loafing and “free riding” phenomenon (Harkins & Petty, 1982; Karau & Williams, 1993). Symmetrical contribution implies reciprocity and equal participation of all members of the joint mission, with balanced responsibilities within the group. In order to develop creative potential of a group, members should take active roles in all parts of the process, so as to contribute to both novelty and coherence, because reduced participation might affect the quality of the product. Of course, one should be cautious because a dyadic structure is not a group, so it might have a specific dynamic during the creative processes. It is therefore important to test the findings within the group structure, with at least three participants involved (triads).

Following the previous insights, we assume that:

- (H1) Novelty and coherence can be good predictors of creativity within group process
- (H2) Both dimensions should be highly represented and mutually balanced, so that the group process can progress and achieve high level of creativity
 - a) More creative triads will show higher degrees of novelty and coherence, compared to less creative triads
 - b) Degrees of novelty and coherence will be better balanced in the products of highly creative triads compared to less creative ones
- (H3) Creative triads will show the active and symmetrical contribution of members to the dimensions of novelty and coherence, compared to the less creative triads.

The objectives of the research are to examine: a) whether there are linear relations between creativity, and novelty and coherence, sufficiently strong to confirm predictive potential of novelty and coherence for the creativity of

groups; b) whether there are differences between group products that vary in the level of creativity, with regard to presence of novelty and coherence; c) whether there is a specific relation between novelty and coherence in products with higher level of creativity, and d) whether a symmetrical contribution of members involved in the group creative processes, with regard to degrees of novelty and coherence, is one of the conditions for a development of group creativity.

Method

The research was conducted in two phases. At first, the participants were divided into triads and asked to create stories by following a specific procedure. Then the produced stories were subjected to assessment and further analysis of experts.

Sample

153 graduate and postgraduate students of the University of Arts in Belgrade participated in the research, ages from 21 to 35, both male (36%) and female (64%), with balanced educational background, primarily in arts and/or humanities, and from mixed artistic disciplines. Special care was taken that graduate playwrights were not put in the same group, in order to provide a heterogeneous structure and to limit influence of previously acquired knowledge. Each triad produced one story, so a total number of produced stories was 51.

Story making procedure

The stories were produced according to a specially designed procedure for group work. The procedure was tested in a previous research, that has proven to be an efficient way for assessments of group product and individual contributions within triads (Škorc & Ognjenović, 2009). After the students had been divided into triads, an exercise was performed in order to “warm” them up for the joint work. Visual abstract stimuli were used in the exercise that was to be completed individually by each member of the triad.

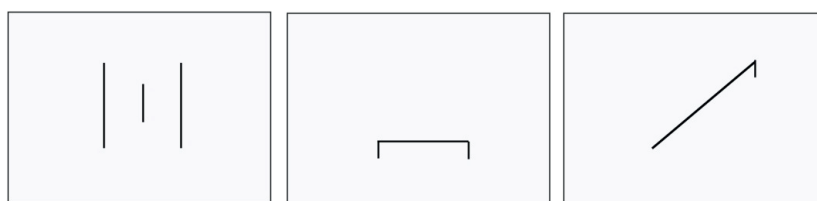


Figure 1. Examples of abstract stimuli that were used in the exercise “Continue the lines and make your own drawing.”

Each student was instructed to make a little drawing (10x20 cm). After three minutes, they were asked to exchange the drawings within the triad, to think of a suitable title for the drawing of the fellow member, and to write it on the top of it. The exercise was performed without use of words and it lasted approximately eight minutes.

Subsequently, each triad was given a blank sheet of paper (A4) and colored pencils, with the instruction to use the drawings as a starting point for their joint stories. The participants were asked not to consult verbally on what the story should be like, but to write

it on the principle of “chain”: alternately, each member of the triad was supposed to write one sentence of the story, with preview of all the previously written ones, then pass the paper to the next member, and continue this way until the end of the story. The total duration of writing was limited to 22 minutes. Number of sentences was not limited.

The story making procedure was carried out in a workshop format, as a kind of a playful exercise, so the writing was performed with high degree of spontaneity. The principle of “chain” story was used to ensure equal participation of each triad member in creating a joint story, and to enable subsequent analysis of the individual contribution of members. The aim of the initial exercise was not only to “warm up”, but also to avoid a thematic induction and produce the basis for the story that comes directly from the participants.

Assessment technique

In the assessment procedure a panel of independent judges participated. The panel included eight professional artists and cultural operators with experience in text analysis. The experts rated the produced stories following the principles of CAT – Consensual Assessment Technique (Amabile, 1996). More than 20 years of empirical research support the validity of this approach to measuring creativity, so CAT has been called the “gold standard” of creativity assessment (Baer & McKool, 2014). According to CAT operational definition, a product or response is considered to be creative when appropriate judges in independent assessments agree on its creativity. Appropriate judges are those informed about the particular domain in which the product was created, balanced in terms of formal training and experience. As confirmed in previous studies, a reliable measure of creativity is obtained if the panel of judges is larger than five and if there is a high degree of agreement, which can be verified by Cronbach Alpha coefficient [$\alpha \geq 0.70$] (Amabile, 1996).

In this study, the judging procedure was carried out in two rounds. All judging sessions were organized individually. At the beginning of the first session, each judge received general information on the study and the procedure. They were also asked to read the stories once without assessment, in order to get an overall impressions of the range of stories. After that they were asked to assess all stories to the dimensions of creativity, novelty and coherence. Each of the eight judges read the stories in counterbalanced order, with the instruction to rate the stories not against some absolute criteria but relative to one another.

The stories were rated on the unipolar five-point scale, from 1 indicating minimum, to 5 indicating maximum presence of a particular dimension of group creativity. The stories were presented in digital form, on a monitor, while a simple tool from the regular word processor was used to highlight the rates. The procedure was carried out without time limitation. The judges finished the first judging round over period of two hours, making one or two short pauses. The ranking list of all stories was formed after the first judging round. From the initial sample of 51 stories, three subsamples were formed for further analysis: “high”, “middle” and “low” creative stories. Each subsample consisted of 10 stories, which were the most representative for the particular level of creativity. Total number of the stories selected for further analysis was 30.

In the second judging round, eight judges were asked to assess the content of selected stories, with regard to the dimensions of novelty and coherence. This time they were asked not to assess the stories in their integrality, but to assess every single sentence in comparison to the previous one. The instruction was formulated as follows: “In every story you will see that the brackets [...] appear after each sentence. This is the place where you should rate how much you think that the sentence you have just read is coherent with the previous one. Use a scale from 1 to 3”. Although the three-point scale is less discriminative, we used it in order to obtain a clear picture, and as high as possible degree of judges’ agreement. In this way, the judges assessed the levels of novelty and coherence in individual contribution within the triads.² Again the stories were randomly ordered for each judge, and the order of assessed

2 Measures for individual contribution of each member were calculated as average of judges’ assessments, separately for the dimensions of novelty and coherence.

dimensions was counterbalanced. The second judging round was carried out in two sessions, total duration of five hours with short pauses.

Data analysis

The judges' intersubjective agreement is tested by reliability analysis, and data are processed by regression analysis and MANOVA. The regression analysis was carried out in order to test the significance of the linear relationship between creativity as criterion variable, and novelty and coherence in integral stories as its predictors.

The multivariate analysis of variance was used in order to test the significance of main effect of factor "creativity" with three levels: high, middle and low creativity expressed in the integral stories, the main effect of factor "member", also with three levels: the first, second and third member of triads, with regards to their contribution in the group process, and the main effect of factor "dimensions of group creativity" with two levels: novelty and coherence, as well as their two-way and three-way interactions. The dependent variables are assessments of novelty and coherence expressed in the stories of different levels of creativity, and also within individual contribution of the members. Data were processed with SPSS version 22.0.

Results

Reliability analysis

A sufficient level of intersubjective agreement of the judges has been confirmed in the assessments of creativity, novelty and coherence of the integral stories (Table 1), as well as in the assessments of individual member contributions to both dimensions: novelty and coherence (Table 2).

Table 1
Cronbach's alpha for the 1st judging round: assessments of creativity, novelty and coherence in integral stories (N=8)

Integral stories	Cronbach's alpha
Creativity	.73
Novelty	.72
Coherence	.83

Although we expected higher values of Cronbach's alpha coefficients because of the level of judges' expertise, all the values are higher than .70, and consequently can be accepted, according to the CAT standard.

Table 2
Cronbach's alpha for the 2nd judging round: assessments of novelty and coherence in individual contributions of members (N=8)

Dimensions	Cronbach's alpha		
	1 st member	2 nd member	3 rd member
Novelty	.83	.85	.73
Coherence	.88	.90	.89

After confirming the reliability, the assessments from all judges are averaged for every story and for each individual contribution within the stories.

Regression analysis

Multiple regression analysis has confirmed that novelty and coherence can predict a level of creativity in integral stories, $R^2=.76$. A significant value of F indicates a linear relationship between creativity as the criterion variable, and novelty and coherence as its predictors, $F(2,48)=80,24$; $p < .001$. The additional t tests of the regression coefficient are significant for novelty, $t=12.66$; $p < .001$, and for coherence, $t=2.26$; $p < .05$ (see Table 5. in Appendix for summary of intercorrelations, means and standard deviations for novelty, coherence and creativity in integral stories).

Analysis of variance

Multivariate analysis of variance has confirmed the main effect of factor "dimension of group creativity", $F(1,48)=4,70$; $p < .05$, as well as main effect of "creativity": the differences between "high", "middle" and "low" creative stories are statistically significant in the selected dimensions, $F(4,96)=15,80$; $p < .001$.

The degree of novelty in the highly creative stories is in the upper half of the scale, it decreases in the middle creative stories, and decreases further in low creative stories. However, the coherence shows a different tendency with the lowest degree in middle creative stories.

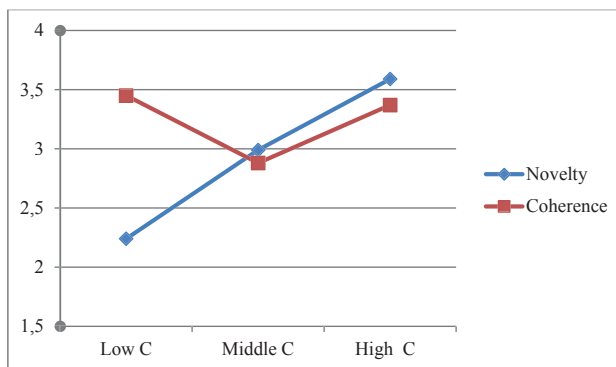


Figure 2. Assessments of novelty and coherence in the stories at different levels of creativity

Univariate tests confirmed that differences between levels of creativity are significant for novelty, $F(2,48)=54,03$; $p < .001$, but they are not significant for coherence, although the significance is close to the threshold, $F(2,48)=2,57$; $p < .10$.

Table 3
Results of univariate and power analysis for novelty and coherence in stories at different levels of creativity

	F	Hypothesis df	Error df	Partial Eta Squared	Observed power
Novelty	54.03**	2	48	.69	1.00
Coherence	2.57	2	48	.10	.49
Creativity	15.80**	4	96	.40	1.00

** The value of F is significant at the .01 level

Additional tests have confirmed that differences between all levels of creativity are statistically significant for assessments of novelty. Also, the difference between low and middle levels of creativity is statistically significant for assessments of coherence. A lower degree of coherence in the stories with a middle level of creativity is confirmed although that was not evident in the initial multivariate test (Table 4).

Table 4
Pairwise comparisons for assessments of novelty and coherence at different levels of creativity

Dependent	(I) CREAT. LEVEL	(J) CREAT. LEVEL	Mean difference (I-J)	Std. Error
Novelty	Low	Middle	-0.75**	.13
		High	-1.35**	.13
	Middle	Low	0.75**	.13
		High	-0.60**	.13
	High	Low	1.35**	.13
		Middle	0.60**	.13
Coherence	Low	Middle	0.57*	.27
		High	0.08	.27
	Middle	Low	-0.57*	.27
		High	-0.49	.27
	High	Low	-0.08	.27
		Middle	-0.49	.27

Based on estimated marginal means

** The mean difference is significant at the .01 level

* The mean difference is significant at the .05 level.

Interaction of factors “creativity” (high, middle and low) and “dimensions of group creativity” (novelty and coherence) is statistically significant, $F(2,48)=11.85$; $p<.01$.

At first, multivariate test did not show significance of main effect of the factor “member”, but additional contrast tests discovered a certain difference between the first and the third member of the triads, $F(1,27)=4.44$; $p<.05$.

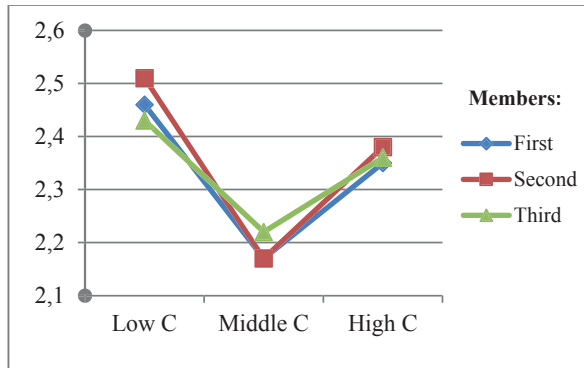


Figure 3. Assessments of individual contributions of members at dimensions of COHERENCE in the stories of low, middle and high creativity

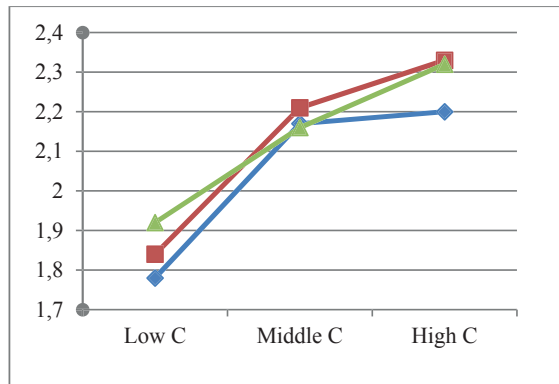


Figure 4. Assessments of individual contributions of members at dimensions of NOVELTY in the stories of low, middle and high creativity

Further analysis has not confirmed significance of two-way interactions: member-creativity, $F(8,162)=0.19$; $p>.10$, and member-dimensions, $F(2,81)=0.17$; $p>.10$, neither the significance of three-way interaction: member-creativity-dimensions, $F(4,81)=0.12$; $p>.10$.

Discussion

The results have confirmed the hypotheses to some extent. According to regression analysis, novelty and coherence are good predictors of creativity within triadic process, as it was expected in the first hypothesis. The second hypothesis – that dimensions of novelty and coherence should be highly represented in order to achieve a high level of creativity in the group process – has been partially confirmed. Highly creative stories have revealed more novelty

compared to the middle and low creative stories, while middle creative stories have revealed more novelty than the stories of low creativity. Creativity increases proportionally to the amount of novel elements, which is not surprising, whereas coherence shows a different tendency. A degree of coherence in highly creative stories is leveled and relatively high – these stories are neither more nor less coherent than the stories of other two levels. However, low creative stories have a higher degree of coherence, significantly different than the middle creative stories. The most important result is a significant interaction of “creativity” and “dimensions”, which confirms that the three groups of stories differ concerning the ratio of novelty and coherence. Highly creative stories, as well as the middle ones, have balanced degrees of novelty and coherence, with the primacy of novelty, whilst the discrepancy is evident in low creative stories: we can see the imbalance – coherence dominates over novelty. Existence of the initial idea that enables the creative processes to start is not enough if the initiator does not receive relevant responses from other group members. If collaboration is based solely on maintaining coherence without introducing novel ideas, the creativity declines. The members rely more and more on each other without discovering new elements of the story. In interplay with each other the first idea gets drained. Without cognitive stimulation, there are no conditions for the flow experience to occur: a situation where challenge is lower than skills, intrinsic motivation radically decreases and can produce boredom (Csikszentmihályi, 1990).

The results confirm findings from the previous research with dyads where ratio of novelty and coherence significantly varied between the creative and non-creative stories (Ristić, et al., 2012). We came to a similar outcome in the triadic stories. Novelty is not expected to increase without coherence: already, in the middle creative stories the two dimensions are balanced, coherence significantly decreases and becomes adjusted to the degree of increased novelty, which reaches the maximum degree in highly creative stories. Coherence that could find its analogy in a partnership during a joint work is needed to enable the integration of novel elements into a wholeness of form. The results are built on the insights of researchers of the cognitive approach who emphasize that cognitive stimulation must be stronger than interference if a group process is expected to move forward (Nijstad, et al., 2003). Whether novelty is seen by protagonists in the creative processes as stimulation or as interference, may well depend on the dimension of coherence, balanced to the degree of expressed novelty. We could assume that cognitive stimulation dominates the process when high degree of novelty is complied with the degree of coherence, while a different constellation can evoke interferences (if novelty jumps too high), or the occurrence of the social loafing phenomenon (if coherence dominates). Anyhow the effect of novelty should not be relativized, as well as the effect of coherence should not be overplayed. We need to keep in mind that the effect of novelty is indisputable, while more evidence is required to confirm the effect of coherence. Ratio of novelty and coherence require further research in order to be clarified.

Still, the results show that dimensions of group creativity cannot be considered as isolated entities, but above all as relational ones: the effect of their juxtaposition in a particular context is what is relevant for development

of group creation. Accordingly, a balanced ratio of novelty and coherence could be one of the conditions for the development of group creativity, together with high degrees of expressed novelty and coherence, which could be viewed as substantive underlying dimensions of a group creativity.

The noticed interaction suggests a further possibility: both dimensions might be correlated with some more general, heuristically more powerful factor we didn't cover in this research. Csíkszentmihályi (1990) highlights the flow phenomenon, while Sawyer (2006) reminds us of the importance of play. Certainly, detection of this factor should be one of the tasks in next research steps.

The third hypothesis, that symmetrical contribution of members to dimensions of novelty and coherence is relevant for group creativity, has not been confirmed. A specific method was introduced to enable all participants in the process to be equally represented, so that we could measure their individual qualitative contribution to the dimensions of novelty and coherence. Nevertheless, absence of interactions with the "member" factor indicates that the level of creativity in a group is not dependent on symmetrical contribution of individual members. This result is not consistent with the findings of the already mentioned research with dyads, where symmetrical input was observed from both members in the creative stories as opposed to rupture in that relationship in the non-creative dyadic stories (Ristić, et al., 2012). Moreover, in triadic stories, a novelty and coherence in input of one member vary in proportion to degrees of both dimensions in inputs of the others. By its dynamics, group structures are more complex than dyads and have more potential to harmonize various inputs, as well as more challenges of dissent. Although different levels of creativity in triadic stories have shown relatively balanced members' contribution, a certain and constant difference between the first and the third member has been confirmed and is statistically significant. It seems that a certain dissent, which is evident between the first and the third member, does not vary due to the creativity level, and it might be a sign of general tendency in a group process: the most distant member from the one who starts the story, has the greatest freedom in creative play and explicit intention to change the initially proposed idea. This could be a tendency specific for the group structure as opposed to dyads, where absence of a potential "bridger" can lead to discrepancy and decrease group creativity. According to Kirton, cognitive diversity can be pivotal for creativity if a group includes a person who knows how to "bridge" different creative styles and levels of experience (Kirton, 1989).

We would like to stress once more the absence of interactions with the factor "member", that was not expected. In order to understand it, we could refer to theoretical considerations of Keith Sawyer who defines creativity as "the emergence of something novel and appropriate, from a person, a group, or a society." (Sawyer, 2006, p. 33). Sawyer explains the concept of emergent creativity, pointing out that a group develops its creative potential based on

relations rather than on individual contributions. According to that, a kind of reciprocity and mutuality among group members could be a feature of all group structures, no matter how creative they are. This is not some exclusive advantage of highly creative groups. Dissent, as well as symmetrical contribution, might be observed at all levels of creativity, starting from the processes of completely non-creative groups to top achievements of highly creative ones. It varies depending on different factors such as compatibility of personal approaches or cognitive styles, but it does not have critical impact on the level of creativity. Sawyer's considerations imply that development of a new construct in group creative processes is neither an issue of quantity nor quality of individual contributions, but the quality of members' interactions above all. The result of the group is more than the sum of individual results, remind us the theorists of creative synergy, which is based on a holistic view, and could complement the idea of emerging creativity (Paulus & Brown, 2003). The potential of a group is determined by relations among its members that enable creativity to emerge, develop and be released. If we reconsider our starting point, having in mind Sawyer's insights, the result of group processes does not belong to anyone in particular, nor can we say whose contribution is more or less valuable in terms of novelty or coherence compared to the contributions of other group members (Sawyer, 2006). Group creation is a result of juxtaposition, based on specific and newly developed bonds that we could call creative. Finally, it might be time to move on from the individualistic approach to the group issue, and explore deeper dynamics of creative processes in groups, rather than try to determine its structure or effects of individual contributions.

Further studies are needed to expand insights on development of group creativity in specific contexts. It is particularly interesting to check conditions under which degrees of novelty and coherence decrease or increase during the process of story building, from its beginning to completion. We know that creative production can be an exciting experience, and can evoke a flow state (Csíkszentmihályi, 1990), but it can also be unpleasant and frustrating. Levels of satisfaction and joy, which develop during the processes, may influence the intrinsic motivation, and consequently determine the level of creativity (Amabile, 1996). Apart from other contextual factors that could affect intrinsic motivation, competition deserves special attention in dynamic situations of group creative processes because of its potentially strong impact that may lead to group disunity.

With all reservations because of the small sample, this research offers a unique methodological approach for measuring group creativity, and relevant insights on conditions for its development. The results give us clues for further exploration of novelty and coherence and their roles in group processes, on our way to understanding and explaining the complex social and sometimes paradoxical phenomenon of group creativity.

Conclusion

In this research we explored roles of novelty and coherence as two basic dimensions of group creativity. The results confirm that levels of novelty and coherence during group processes play an important part, affecting its achievement by impacting group creative potential. Two preconditions for development of group creativity are detected: a high level of novelty in creative input during a process, and a balanced ratio of novelty and coherence that enables integration of unique ideas into a new emerging construct. The symmetrical contribution of members is not confirmed as one of the preconditions, which suggests that group creativity is an emerging phenomenon, relying on relations rather than individual contributions and abilities of its members.

This is certainly only a basis for thorough exploration of conditions of group creativity. To confirm and to extend the findings, the research should be repeated with a larger number of stories, and conclusions should be checked in the processes of wider group structures. It is necessary to examine effects of contextual factors, such as competition, that may influence development of different dimensions in the group processes.

Finally, it should be kept in mind that the dimensions of group creativity are not only about the structure of art pieces in a collective act, but primarily about universal human needs that are behind it. Otto Rank once said that creative work comes from two desires. The first is for individuation because people tend to manifest their unique nature and strive to achieve independence from others. The second is for identification, recognizable in the need for sharing the universal human experience that empowers unity (Rank, 1935/1989). Essentially, all art entails both aspects, but sublime art achieves balanced integration between the two. Explaining them in a situation of a group creative act is one of the most important tasks of new empirical quest and, despite its complexity, it is not less interesting than other important issues in studies of creativity.

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Appendix

Summary of intercorellations, means and standard deviations for assessments of novelty, coherence and creativity in integral stories.

Assessments	Novelty	Coherence	Creativity	<i>M</i>	<i>SD</i>
Novelty	–	-.16	.86**	2.94	0.67
Coherence	-.16	-	.014	3.23	0.82
Creativity	.86**	.014	-	3.14	0.66

** Correlation is significant at the 0.01 level (2-tailed)