

# Team Creativity Between Local Disruption and Global Integration



Axel Menning, Benedikt Ewald, Claudia Nicolai and Ulrich Weinberg

**Abstract** What differentiates an average conversation from a creative conversation? In this book chapter, we answer this question by looking at coherence styles of design conversations. With the help of the Coherence Style Framework (CSF), we are able to illustrate what divergent and convergent thinking on the conversational level looks like. Highly creative teamwork is represented as an alternation between local disruption (local low coherence) and global integration (global high coherence). This has implications for the current practices of idea generation of design thinking and innovation teams.

## 1 Introduction

Teams are at the core of innovation and Design Thinking (Gilson et al. 2015; Valkenburg 2000). This is due to their ability to consider and synthesize multiple perspectives very effectively and efficiently, which is especially important for complex problem solving in an agile product development environment.

But the equation is not simply more people = more diversity, more knowledge, and more work power.

Just working in a group of people does not necessarily result in a more creative outcome than individual work. In fact, the opposite can also happen. Small group research, especially in lab setups for the idea generation and brainstorming phase, found various effects stemming from social interaction that negatively influence

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A. Menning (✉) · B. Ewald · C. Nicolai · U. Weinberg  
Hasso Plattner Institute for Digital Engineering, Campus Griebnitzsee,  
14482 Potsdam, Germany  
e-mail: [axel.menning@hpi.de](mailto:axel.menning@hpi.de)

B. Ewald  
e-mail: [benedikt.ewald@hpi.de](mailto:benedikt.ewald@hpi.de)

C. Nicolai  
e-mail: [claudia.nicolai@hpi.de](mailto:claudia.nicolai@hpi.de)

U. Weinberg  
e-mail: [uli.weinberg@hpi.de](mailto:uli.weinberg@hpi.de)

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creativity. Among these effects are *idea fixation* (Jansson and Smith 1991; Purcell and Gero 1996), *social loafing* (Latane et al. 1979), *evaluation apprehension* (Diehl and Stroebe 1987) and *groupthink* (Janis 1972).

The creative potential of a team only reliably surpasses the creative potential of the individual if the team interaction is consciously shaped towards it. The first step is to encourage and consider multiple perspectives. Similar to those iconic Design Thinking pictures with whiteboards heavily loaded with sticky notes, the team's mental space looks alike—very colorful, very crowded. Creating and tending to such a pluralistic batch of new ideas requires collaborative divergent thinking, as established by Guilford in his 1950 paper.

Divergent thinking consists broadly of the development of many *novel* ideas (in response to same stimulus/problem statement) and is, paradigmatically speaking, the first aspect of an outcome to be classified as “creative”.<sup>1</sup> The most common divergent thinking exercise is any form of brainstorming. It is safe to say that brainstorming studies, i.e. studies of divergent thinking, have been among the most common studies in the field of creativity during the last 50 years. This has several, mostly pragmatic, reasons. Brainstorming studies e.g. do not need a lot of resources, especially as lab experiments are rather easy to set up and to evaluate and have a well-established framework for further analysis readily available. This framework is based on the most popular creativity test, the Torrance Test of Creative Thinking by E. Paul Torrance (TTCT 1966). The TTCT captures four important dimensions of creative thinking:

- fluency (the total amount of ideas produced)
- flexibility (the number of categories these ideas can be clustered in)
- elaboration (the level of detail of the ideas)
- originality (how often they came up in relation to all responses).

But divergent thinking as a standalone activity is not exactly creative. Even the TTCT does not fully capture Torrance's own definition of creativity,<sup>2</sup> as it misses out on the convergent part of creativity in both problem and solution space—nailing down the problem in the first place (“identifying the difficulty”), making the initial idea testable, testing it, and also communicating it (see Chase 1985, for further discussion).

However, sole divergent thinking leads to what has been called “pseudocreativity” (Cattell and Butcher 1968: 271) or “quasicreativity” (Cropley 1999: 89)—that is, mere novelty without any effectiveness. To achieve idea effectiveness, ideas need to be further elaborated, formulated (to achieve closure and to be communicated), evaluated and eventually validated (Cropley 2006). This is where the thinking mode of convergent thinking comes in.

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<sup>1</sup>According to the “standard definition of creativity” by Runco and Jaeger (2012), creative ideas are characterized by their novelty and their usefulness.

<sup>2</sup>Torrance (1966, p. 6) defined creativity as “a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results.”

Convergent thinking is the ability to evaluate a set of given ideas and to identify or deduce the best option (Guildford 1950; Finke et al. 1992). It relies heavily on knowledge and the ability to compare and synthesize it.<sup>3</sup> The endpoint of convergent thinking roughly corresponds to the second criterion for creative ideas, which is *useful* (Amabile 1983), *appropriate* (Sternberg and Lubart 1999: 3) or *valuable* (Boden 2009: 24). Creativity therefore is an interplay of divergent and convergent thinking (Finke et al. 1992). Many and different perspectives are first created through a certain flexibility of thought. Second, they are synthesized through association to get to a novel and useful concept. But how does a team get there through interaction? What are the guiding principles that distinguish an average conversation from a highly creative conversation?

Our 2018 Design Thinking Research chapter, “... and not building on that: The Relation of Low Coherence and Creativity in Design Conversations,” explores the divergent side of design conversations. It presents how new ideas are generated through local disruptions (Menning et al. 2018). Accordingly, local disruptions (in form of local low coherent statements) are the linguistic equivalent of mental focus shifts, which stimulate or represent the creation of new ideas. Characteristically, good design teams pay attention to low coherent statements. They do not produce more (rather actually fewer<sup>4</sup>) low coherent statements, but they discuss and explore those statements more deeply and treat them as the potential missing link.

The convergent side of design conversations is represented by probing low coherent statements for potential integration into the overall discourse and making remote associations. Ideally, new contributions are combined or blended with existing pieces of knowledge.

Good ideas emerge through conversations that happen predominately in the domain of divergent flexibility (local disruption) and through convergent integration these ideas pass into the overall discourse (global integration).

## 2 The Coherence Style Framework (CSF)

In the following, we introduce the Coherence Style Framework (CSF) that helps to identify and analyze how divergent and convergent thinking look like on a conversational level. Topical relations are described in terms of their grammatical and lexical relation (cohesion; Halliday and Hasan 1976) and their perceived semantic connectedness (coherence; bibliographic overview in Bublitz and Augsburg 1999). The cohesion of text and talk can be objectively assessed. But to know if a contribution is off-topic and if so, how far, depends on the individual reading and sense-making of the communicative situation. This makes coherence highly subjective and hard to

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<sup>3</sup>For a deeper, historical discussion see Copley 2006.

<sup>4</sup>Goldschmidt (2014) and Suwa and Tversky (1997) found that ill-structured conversations represent ill-structured design processes, whereas good design teams converse on longer internally coherent episodes, representing some form of deep thought modus on a certain design issue.

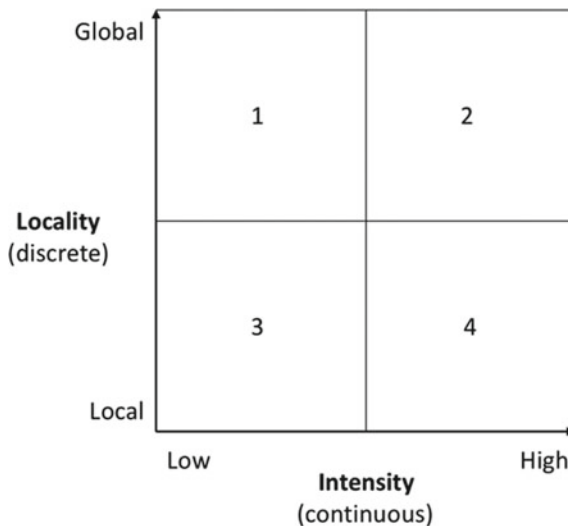
measure (cf. Menning et al. 2017). Hence, coherence is the perceived connectedness of two discourse units. The CSF represents the coherence style of a discourse element in two dimensions: intensity and locality.

*Intensity*: Coherence can be described on a continuous scale between low and high. High coherence refers to a very close topical connection and a big semantic overlap of two discourse units. Low coherence describes the perceived high semantic distance between two discourse units.

*Locality*: Coherence can be described in two discrete states: local and global. The determination of these states depends on the size and position of two discourse units. Local coherence describes the perceived relation between subsequent and rather small discourse units. For example, the close topical relation between two subsequent sentences is described by local coherence. Global coherence refers to “the ways in which the larger segments of discourse relate to one another” (Grosz et al. 1983: 44). The global coherence definition in this text is slightly different. Global here means the semantic relation of a discourse unit to one or multiple discourse units that are not in the direct neighborhood of the discourse element in question.

Based on the distinction between intensity and locality of coherence, utterances are represented in the CSF (Fig. 1).

Each quadrant represents a certain coherence characteristic. The reading of the CSF requires a retrospective view on a conversation. Thus, the CSF can only be applied as an analytical tool after a conversation has taken place. The conversation must have a clear beginning and ending (fixed corpus size). This means that for each discourse unit at a certain time coherence information to past and future discourse units exists.



**Fig. 1** The Coherence Style Framework (CSF)

Please note that the dimension of locality is discrete and the dimension of intensity is continuous. Hence the boundary between local and global is clearly defined, while the continuous scale implies that most of the coherence values are in-between extremes. This means when representing a conversation in the CSF, a threshold must be applied to determine what is “low” and “high”.

For our purpose we define speaker turns as smallest conversational units in the CSF. A speaker turn (in short: turn) is a distinct verbal contribution of a team member at a certain time. A turn begins “when a speaker begins to speak and ends when the speaker ends her or his articulation deliberately or is interrupted” (Menning et al. 2017: 2).

In the following we would like to further explain the coherence characteristics of the four different quadrants:

**Global low coherence (Quadrant 1).** If a turn shows global low coherent characteristics it means that it exhibits no or only weak links to what has been said before or what will be said. These turns have no explicit impact on the conversation. They do not conclude or integrate what has been said. Nor do they trigger future speaker turns to refer to it. Goldschmidt calls these turns “orphan moves” (2014).

**Global high coherence (Quadrant 2).** A speaker turn is globally high coherent if it shows above-average semantic similarity to speaker turns in the past (but not the preceding speaker turn) or future. These turns either conclude or integrate what has been said before or they contain information that is picked up one or multiple times in future. Global high coherent turns are similar to Goldschmidt’s critical moves (2014).

**Local low coherence (Quadrant 3).** A local low coherent turn shows no semantic connection to its preceding turn. Local low coherent statements often reflect mental focus shifts on the individual level. On the team level, the utterance of a local low coherent statement by one team member disrupts the thought process of all team members (Menning et al. 2017). Given this definition, we can now specify that by off-topic contributions we mean local low coherent statements. These turns are the initial elements for the idea generation sequence discussed in Sect. 4.

**Local high coherence (Quadrant 4).** A local high coherent turn continues the topic of its preceding turn. Discourse participants generally intend to achieve high coherence. This is known as the ‘coherence assumption’ (Graesser et al. 1994) and is a crucial element of sense-making. However, a conversation that exclusively consists of local high coherent turns is unlikely. It would resemble something between association chain exercises and small talk.

Design conversations contain low coherent statements “for good”. To a certain extent every conversation exhibits a tension between the “need for renewal and progression” (Korolija and Linell 1996: 799) and the need for sense-making, between low and high local coherent statements.

Design conversations happen to resolve ill-defined problems (Cross 2011). They contain vague language (Glock 2009) and are highly progressive by definition. Therefore, low coherent contributions have natural and frequent occurrence in design conversations. Accordingly, this chapter is not occupied with how to converse off

topic (although producing good off-topic contributions is a mastery itself), but rather how to deal with off-topic contributions productively.

Designers probe the potential of local low coherent turns and based on the CSF, we can capture this probing activity.

### 3 The Interplay Between Local Disruption and Global Integration

We can now assess which possible transitions between local disruption and global integration exist. For example, if perceiving a local disruption, it would be possible to follow up with another low coherent turn (global low coherence or local low coherence). The sequence of two subsequent topical disruptions often comes up when the initial off-topic contribution is ignored and the next person jumps back to the previous topic. Another situation in which two subsequent off-topic contributions may occur would be to “fire back” by responding to a verbal disruption with another verbal disruption. In both cases, the creative potential of the initial off-topic contribution is not further explored. A chain of multiple subsequent disruptions can also be observed in brainstorming when a list of ideas is generated. Within this list, while one idea may not necessarily pick up the topic of the idea before, they all relate to the topic of the list, which is the global topic of the design issue. In this situation, local disruption and global coherence exist simultaneously. This example shows that the sequencing of coherence styles has an extension: two coherence styles may exist at the same time.

The activity of building lists of ideas (also known as ideation or brainstorming) qualifies for the first criterion of idea generation (having many different new ideas), but it does not necessarily secure the second criterion, which is about the usefulness of ideas. Conventional brainstorming is efficient, because it promotes free and associative thinking. These brainstorming techniques leave the assessment of the creative potential of an utterance implicit and, in the interest of creating many and new ideas, do not make it a collective matter (this is usually suggested by the prompt “defer judgement”).

The brainstorming technique *silent brainstorming* is a classic example for list creation. When performing *silent brainstorming*, the team members are invited to create as many ideas as possible for a certain amount of time. The ideas are not shared immediately but shared afterwards. This technique is highly effective in terms of idea quantity, but it does not necessarily make use of the full potential of the group. For *silent brainstorming* the argument more people = more ideas may hold true (better overall fluency), but this does not automatically mean more people = different (better) ideas, e.g. better cumulated flexibility, novelty or degree of elaboration.

When selecting brainstorming techniques, it is crucial to find a good balance between a mere quantity of ideas and amount of collective idea generation. In other

words: The chances of having a good idea by having many ideas counter the chances of developing a good idea out of any idea.

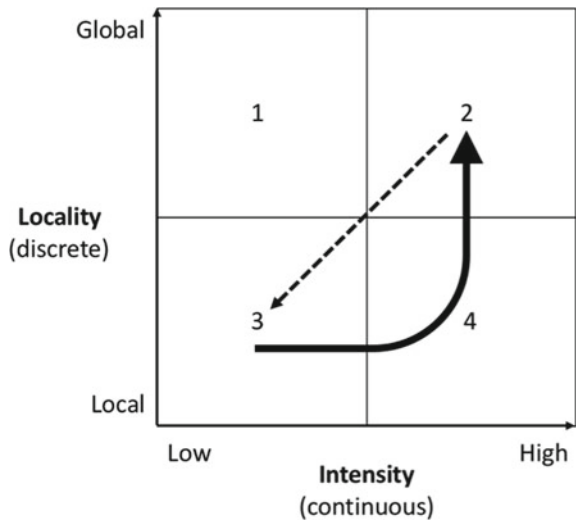
We have mentioned that brainstorming as list creation is reflected in many local low coherent turns that are at the same time globally coherent.

Given that a team works well (in terms of team dynamics, team cohesion and psychological safety) there are alternative routes of idea generation, not via lists and close to what a natural discussion is. Instead of creating lists, the potential of a low coherent input is examined collectively. This eventually leads to a meaningful integration into the design issue at hand or the overall discourse. Representing this procedure in the CSF would mean that local low coherent statements are proceeded with a sequence of local high coherent statements (exploring the local low coherent statement). These statements are again proceeded by a global high coherence statement signaling the integration of the off-topic contribution into the general design conversation (see Fig. 2).

This procedure makes up the title of this book chapter: Collective creativity is an interplay between local low coherence and global high coherence.

Off-topic turns invite participants to infer connection (cf. Grosz et al. 1995). This is relevant for idea generation. Being exposed to and exploring the meaning of low coherent statements increases the likelihood of creating new ideas. Off-topic contributions shift the team members' focus of attention. These focus shifts are beneficial for idea generation (Suwa and Tversky 1997). This is especially the case if the creative value of the initial disruptive contribution cannot be directly realized, but in search of a meaningful connection other, new associations and ideas come to mind. Similar principles of idea generation are reported by Einstein, (cf. combinatorial play, 1954), Koestler (cf. Bisociation, 1964), and Finke et al. (cf. conceptual blends, 1992). Ideally, these local low coherent turns are integrated back into the greater picture of

**Fig. 2** Collective exploration of low coherent turns as an alternative to conventional brainstorming



the design. Therefore, once the idea of an off-topic contribution is examined and turned into a manageable proposition, the next step is to explore ways to re-integrate it. Either one is able to relate the proposition to a specific statement that has been brought up earlier, or it is integrated into a bigger discourse segment topic (e.g. design issue). This happens rather explicitly by proposing what the relationship could be and in which way the off-topic contribution makes sense. The sequence of creative topic treatment ends in global high coherence. It can be reinitiated as soon as a perceived low coherent statement disrupts the course of the conversation again. The dashed line in Fig. 2 proposes that the sequence has cyclic characteristics. This means ideally the team cycles through the quadrants over and over again. Different existing ideation techniques work that way. Take, for example, the brainstorming method “What would XYZ do?”, where XYZ is substituted with a well-known and distinguished character such as Superman. The well-known attributes of that person are then used to approach a certain issue with this new perspective. Or the ideation method called *idea blossoming*: The team members are asked to pick another idea of a team member and then build around this idea eight more that are further elaborating the critical functions and features of the initial idea concept. Many variations of these ideation techniques exist. They work on the principles of associative and lateral thinking (de Bono 1991; Mednick 1962; Sternberg and Lubart 1993), and they have proven to produce a lateral variety of ideas. Of course, the effectiveness of these techniques depends on the experience of the team applying them. In conclusion: Idea generation can be most efficiently facilitated if different brainstorming techniques (list creation and collective exploration) are combined and balanced.

## 4 Implications

There is a lack of exercises that systematically advance team-skills in merging, combining and integrating a batch of diverse pieces. We have shown that it is crucial to design conversations to work with off-topic contributions and to put them forward. We therefore need to build more systematic training exercises for high-quality idea generation in teams.

Of course, the direct examination of ideas limits the number of ideas to be produced. It is about finding a good balance of having enough low coherent input, and actually working with it. With this book chapter we want to make practitioners aware that the ratio of quantity of ideas and instant examination of an idea is a factor to play with.

Some more general implications can be drawn. On a theoretical level, this work brings us closer to understanding the complexities of collective creativity. Most ideas in design thinking are not centrally planned and not the work of a single creator. Instead, novel and useful ideas arise out of the interplay of divergent flexibility and convergent combination/synthesis and thorough validation.

On a practical level, this paper underpins the relevance of teamwork. Based on the CSF, we call for more training and methods that build up awareness for exploring



and integrating local low coherent statements into “the bigger picture”. Once a team feels proficient in interacting local low coherent and global high coherent at the same time, they will always have a standardized rhythm to rely on, which can also prevent them from getting stuck (cf. design fixation).

We primarily address design conversations. But we assume that this model is of such robustness that it can be extended to other interactional activities within the creative domain.

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