Nick Hughes’ development team at Vodafone partnered with Safaricom (Kenya’s largest cellphone provider) to figure out how people could wire money to their families in rural areas without relying on bank accounts, credit cards, paper money, or even credit history. The development team worked with two key facts: 75 percent of Kenyans do not have a bank account, but 80 percent have a cellphone. The company brainstormed and created a network of kiosks throughout the country in fruit stands, spice shops and barber shops, where currency is converted to virtual currency in seconds. The key challenge about how to increase the speed of transaction time was met by having customers simply type in a mobile number, the amount to be paid, and hit a send button. What happened next surprised even Hughes’ development team. Instead of simply sending money to family members and repaying bank loans, customers also used the service to pay for business-to-business trading, as an overnight safe, as a secure way to hold money while traveling from one place to another, and as a way of repaying loans for others in return for cash.1

Creativity requires departure from tradition and the established way of conducting business. There is good reason to believe that innovation and insight pay off. For every dollar companies spend on research & development, they realize on average, $7.25 in new product sales.2 In 2013, R&D in the United States totaled $456.1 billion, as compared to $435.3 billion in 2012 and $427.8 billion in 2011. In 2008—just before the onset of the main economic effects of the national and international financial crisis and the Great Recession—U.S. R&D totaled $407 billion. Inflation-adjusted growth in total U.S. R&D averaged only 0.8 percent annually during the five-year period 2008–13 and was behind the 1.2 percent annual average for the U.S. gross domestic product (GDP).3

1Consultative Group to Assist the Poor. (Producer). (2016). Nick Hughes. cgap.org; Stahl, L. (2015, November 22). The future of money. 60 Minutes. cbsnews.com; Introducing fortune’s change the world list: Companies that are doing well by doing good. (2015, August 20). Fortune. fortune.com
In an analysis of 65 sales teams spanning 35 branches, team creativity predicted team financial performance: The most creative teams were those that utilized team knowledge. The positive relationship between team knowledge utilization and team creativity was stronger when the team leader had a systematic cognitive style and when teams were exposed to high environmental uncertainty.4

In the scientific world, creative breakthroughs often result from intense team collaborations. For example, in physics, the discovery of the “God particle” or Higgs boson, was the equivalent of Columbus discovering America, and the great majority of the research was conducted by teams of people.5 However, just because the task facing a team calls for creativity, there is no guarantee that the team members will be creative. In fact, many factors inhibit idea exchange in groups.6 Many people believe that teams are more creative than individuals. However, there is no empirical support for this; in fact, the opposite is true!

In this chapter, we examine whether creativity stems from nature or nurture. We distinguish creativity from innovation and examine convergent versus divergent thinking, and radical versus incremental innovation. Brainstorming, brainwriting, speedstorming, and electronic brainstorming are examined. We provide data indicating that teams are less creative than individuals and examine four key threats to team creativity, including: social loafing, conformity, production blocking, and performance matching. Finally, we examine some best practices to enhance team creativity, ranging from motivational methods, such as quantity (versus quality) goals; cognitive methods, such as explicit rules; facilitator-led methods, including scheduling brief breaks; and finally, organizational approaches, such as team diversity and membership change.

NATURE VS. NURTURE

Creativity is highly correlated with intelligence, motivation, ambition, persistence, commitment, determination, education, and curiosity. Creative people are passionate about specific things. Perhaps this is why when Professor Joseph Campbell selected postdoctoral students for his laboratory at Sarah Lawrence College, he did not want people who earned straight A’s or B’s. He searched for the student who made both A’s and F’s because he believed that these people are not just smart—they let their passions rule them.7 People who are motivated to understand the world—high in epistemic motivation—are more creative.8 According to Teresa Amabile, the most important aspect of creativity is loving what you do.9 As a case in point, Michael Jordan, who by the mid-1990s, was the most financially successful basketball player in history, had a “love of the

---

game” clause in his contract, which secured him the right to play in “pick-up games” whenever he wished. Jordan did not always play because it was contracted for him to do so; rather his love of the game guided him. Evaluation, surveillance, and even offering rewards to people can undermine creativity.10

Creative people work very hard. For example, creative scientists typically work 70 to 80 hours per week. It typically takes people at least 10 years to develop expertise in their domain, no matter what it is—chess, tennis, astrophysics, or management. Skilled chess players undergo years of study before they become “masters.”11 And, no one composes outstanding music without at least 10 years of intensive musical preparation.12 This all adds up to about 10,000 hours of focused practice. Basically, if you have been working hard for years at something, think in terms of decades before you become truly great!

Creative combinations of people can be more effective than trying to select creative people because creativity is more a function of the right idea at the right time than a chronic disposition. For this reason, companies should select people who are passionate and skilled in what they do and then bring together those people with others who are similar (in the sense of being passionate) but different (in terms of ways of thinking). For example, when MIT offered Solve, a cross-disciplinary program addressing the world’s most pressing challenges in health care, education, energy and environment, infrastructure, and the economy, it convened scientists and thinkers from across the world. Jason Pontin, editor-in-chief and publisher of MIT Technology Review, said, “Solve doesn’t pretend that MIT has all the solutions to the world’s most pressing problems, but MIT can convene on its campus some of the smartest people working on those problems. We can help participants see what they share, eliminate frictions where that is possible, and perhaps, spur breakthroughs with new approaches.”13

**CREATIVITY VERSUS INNOVATION**

Most people think that creative ideas are wild ideas; on the contrary, creativity or ideation is the production of novel and useful ideas—the ability to form new concepts using existing knowledge; innovation is the realization of novel and useful ideas in the form of products and services.14

**CONVERGENT VERSUS DIVERGENT THINKING**

Two key skills are involved in creative thinking: divergent thinking and convergent thinking.15 Convergent thinking is thinking that precedes toward a single best answer. For example, the expected value of a 70 percent chance of earning $1,000 is obtained

---

10Ibid.
by multiplying $1,000 by 0.7 to reach $700. Conversely, divergent thinking does not require a single, correct answer; rather, divergent thinking moves outward from the problem in many directions and involves thinking without boundaries.

After a team has generated ideas in a divergent fashion, they eventually need to select an idea to develop. This is where convergent thinking is necessary. In convergent thinking, a team or person evaluates the various ideas presented as to their feasibility, practicality, and overall merit. For example, in one financial institution, top executives select a dozen high-potential managers from across the company to be “idea champions.” These idea champions train employees to sharpen their idea inputs, sort and rank ideas, and give feedback to contributors. Submitted ideas are divided among the champions, who use standardized criteria to sort and select those ideas with the greatest potential for impact and achievability. The champions each are paired with a senior manager, and each pair brings their small portfolio of high business value ideas and creates plans for testing, prototyping, and driving the idea forward (or a quick failure) with the help of the original idea submitter.

Task conflict stimulates divergent thinking in teams. For example, teams in which a single member proposes unusual or even incorrect solutions outperform teams in which no such “deviance” occurs. Teams instructed to “debate” are more creative than teams instructed to “brainstorm.” Furthermore, these performance advantages generalize to subsequent, unrelated tasks, even when the vocal, cognitively deviant member is not present. A study of 71 IT project teams revealed that task conflict had a curvilinear effect on creativity, with creativity highest at moderate levels of task conflict.

People working independently excel at divergent thinking because there are no cognitive or social pressures to constrain their thought. In contrast, teams are much less proficient at divergent thinking. To avoid social censure, people conform to the norms of the team. Divergent thinking is somewhat like Janusian thinking, referring to the Roman deity Janus, who had two faces looking in opposite directions. Janusian thinking refers to the ability to cope with (and even welcome) conflicting ideas, paradoxes, ambiguity, and doubt. Teams that use paradoxical frames—mental templates that encourage people to recognize and embrace contradictions—are more creative than those who don’t use frames.

There are several ways to stimulate divergent thinking, including asking open-ended questions. At Chicago’s Second City, comedy shows are built in a 10- to 12-week process of generating ideas for sketches, incorporating audience feedback, and determining the

---

best sequence for the show. Shooting ideas down outright is not allowed, but affirming ideas and building upon them is encouraged. To suspend judgment, the actors use an exercise known as “point and untell,” where someone will walk around the room pointing at different objects and someone else is charged with saying anything but what the object actually is.\textsuperscript{22} Impossibilities also can stimulate divergent thinking. For example, challenging participants to think of ideas that are impossible to execute (e.g., living on the moon traveling by satellite) and then identifying conditions that may lead to the idea’s fruition.

Even though the scientific evidence is clear, most people strongly believe that teams are more creative than individuals when, in fact, they aren’t. Teams are better than groups at convergent thinking, but they are worse at divergent thinking.

**Radical versus Incremental Innovation**

Creativity occurs along a continuum from \textit{incremental innovation} to \textit{radical innovation}\.\textsuperscript{23} Two indices: feasibility and value give rise to different types of creativity, that fall into four quadrants: foolishness, disruptive, radical, and breakthrough (see Exhibit 9-1). To become part of an innovation, ideas ultimately must achieve some minimum level of value and feasibility. Ideas on the radical continuum are valuable, but lack feasibility and thus, leaders need to protect such ideas through skunkworks or other havens until they become viable.

**Creative synthesis** is a process in which innovation occurs through a process of radical innovation by emphasizing \textit{affirmation} rather than \textit{negation} and integrates their

\begin{center}
\begin{tabular}{|c|c|}
\hline
\textbf{Breakthrough} & \textbf{Disruptive} \\
Management needs present orientation; make business case & Management needs present orientation and find a champion \\
\hline
\textbf{Radical} & \textbf{Foolishness} \\
Management needs future orientation & Management needs future orientation via skunkworks or a safe haven; and boundary testing \\
management & \\
\hline
\end{tabular}
\end{center}

**Exhibit 9-1 Continuums of Creative Ideas based on Feasibility and Value**


\textsuperscript{22}Wilson, D. (2012, June 29). The Second City way of better brainstorming. \textit{Fast Company}. fastcompany.com

different perspectives. In a complementary fashion, disruptive ideas are feasible but
not deemed valuable. This means that the leader needs to find a champion to promote
the idea’s value.

Teams developing radical innovations face greater uncertainty and risk of failure
than do teams facing incremental innovation. Teams’ ability to shift goal orientations
to meet acute “shocks” that disrupt regular team activities requires leadership and a
reflexive team process.

**CREATIVE REALISM**

In Finke’s model of creativity, there are two dimensions: creativity and structural con-

nectedness, or usefulness (see Exhibit 9-2). With regard to creativity, ideas can be
either conservative or creative. Teams should strive to achieve creative ideas (i.e., highly
original and novel ideas) as opposed to conservative, traditional ideas.

The other dimension is **structural connectedness**. Ideas that work with exist-
ing products and services are high in structural connectedness; ideas that cannot work
with existing products and services are low in structural connectedness. Structural

---


connectedness distinguishes ideas that are realistic (connected to current ideas and knowledge) from ideas that are idealistic (disconnected from current knowledge). If ideas are not connected to current ideas and knowledge, they probably are not implementable.

The most desirable ideas are those in the upper-left quadrant. This domain is called **creative realism** because these ideas are highly imaginative and highly connected to current structures and ideas. An excellent example of creative realism was Thomas Edison’s development of the electric light system. Many of Edison’s inventions developed through continuity with earlier inventions (see Exhibit 9-3).²⁷

As for the other quadrants, **conservative realism** represents ideas that are highly traditional and highly connected to current knowledge and practices. This creates little ambiguity and little uncertainty. **Conservative idealism** is an extension of a common idea that is unrealistic to begin with. These ideas exhibit little or no imagination and are not connected to existing knowledge. **Creative idealism** represents highly original, yet highly unrealistic ideas.

How can teams maximize the probability of generating ideas that eventually will lead to novel and useful products and services? The key is to actively encourage team members to generate ideas in all of the quadrants. David Kelley, former CEO of IDEO, believes that *enlightened trial and error beats the planning of the lone genius.*²⁸ According to the IDEO philosophy, people *should fail early and fail often.*²⁹

---

**Exhibit 9-3 Analogy in Edison’s Development of an Electric Lighting System**


One common way of evaluating the creativity of a team’s ideas is via three indices: fluency, flexibility, and originality.  

- **Fluency:** how many ideas a person (or team) generates  
- **Flexibility:** how many types of ideas a person (or team) generates  
- **Originality:** the ability to generate unusual solutions and unique answers to problems  

As a way of thinking about these three indices of creativity, do the following exercise: See how many uses you can think of for a cardboard box. (Give yourself about 10 minutes to do this.)

Now let’s score your creativity (or your team’s creativity) on the cardboard box challenge. Suppose Geoff generated three ideas: using the box as a cage for a hamster, a container for a turtle, and a kennel for a dog. Geoff receives three points for fluency of ideas because these are three different ideas, but only one point for flexibility because the ideas are of the same category (i.e., a home for animals). Suppose Avi generates these unusual ideas for a cardboard box: placing it on an altar, using it as a telephone (e.g., two boxes and some string), and trading it as currency. Avi would get a score of three points for fluency (the same as Geoff) and three points for flexibility because there are three separate categories of ideas for use, one involving religion, another communication, and yet another entirely different idea concerning economics. Think of flexibility as a kind of mental gymnastics—the ability to entertain different types of ideas, all in a short amount of time. Most people, and in particular, most teams tend to get stuck in one of two types of categories of thought. This is a kind of cognitive arthritis. To be sure, some of Avi’s ideas clearly do not meet the requirements for structural connectedness, but as we will see, Avi and his team are in a much better position to set the stage for creative realism than is Geoff.

It is easy to see how flexibility, or thinking about different categories of use, influences originality. Thus, one simple key for enhancing creativity is simply to think about different categories, which can act as “primes” or “catalysts” for more ideas. By generating different categories of use for a cardboard box (containers, shelter, building material, therapy, fashion, politics, weaponry, communication, etc.), a person’s score on these three dimensions could increase dramatically. This exercise often can help teams escape from a narrow perspective on a problem and open up new opportunities for creative solutions. For example, teams generate more diverse ideas when they are exposed to ideas from a wide range of categories.

Originality refers to creativity on the conservative–creative continuum in Exhibit 9-2. A given idea is considered “original,” if less than 5 percent of a given

---

30 Guilford, Personality; Guilford, The nature of human intelligence.  
population thinks of it. Thus, if there are 100 people in a company, an originality point is given to a given idea only if five or fewer people think of it.

There is a strong correlation among the three measures of fluency, flexibility, and originality. The people who get the highest scores on originality also get high scores on flexibility and fluency. According to Guilford, flexibility is the most important. This contradicts most business notions of creativity, in which diversity of ideas often is not rewarded and quantity is viewed as poor quality.

**Exploration versus Exploitation**

Companies oscillate between exploration and exploitation. Exploration refers to activities such as search, variation, risk taking, experimentation, play, flexibility, discovery, and innovation. The question that the team at startup Liquid Light contemplated was how to turn carbon dioxide—the gas pollutant largely responsible for global warming—into a consumer product. The team found that a relatively pure source of carbon dioxide was spewing out of factories and power stations, and they were able to use it to create glues, soda bottles, and skin care ingredients inexpensively.

Exploration often can come from getting out of one's usual domain and exploring a new area of study. For example, evolutionary biologist Andrew Parker applied designs from his walks through the Australian outback to solve problems in engineering, materials science, and medicine. In one investigation, the iridescence in butterflies and anti-reflective coatings in moth eyes led to the development of brighter cellular phone screens and an anticounterfeiting technique.

Autonomy and freedom are key for creativity. Leaders who provide their teams a great deal of autonomy are more creative. At Ohio-based Hyland, creator of OnBase, employees generate new ideas, share them on the company's Innovation Portal, and then vote. Exploitation refers to the refinement, choice, production, efficiency, selection, implementation, and execution of an idea. Teams that engage in exploration to the exclusion of exploitation are likely to find that they suffer the costs of experimentation without gaining many of its benefits and will exhibit too many underdeveloped new ideas and too little distinctive competence. Teams and organizations that engage in exploitation to the exclusion of exploration may find themselves trapped in old ways of thinking. There needs to be a balance between the two activities. For people who are high in learning orientation (dispositionally inclined to learn), team learning behavior and exploration bolster creativity. Despite the seemingly contradictory tasks of exploration (creativity) and exploitation (standardization), they can be complementary.

---

39 Best places to work for Generation X (2015, April 4). Crain’s Chicago Business. chicagobusiness.com
For example, 90 service technician teams of a large multinational corporation found that standardization leads to greater customer satisfaction, but greater creativity leads to better team performance.41

BRAINSTORMING VERSUS BRAINWRITING

BRAINSTORMING

Alex Osborn, an advertising executive in the 1950s, believed that one of the main hindrances to organizational creativity was the premature evaluation of ideas. Osborn was convinced that two heads were better than one when it came to generating ideas, but only if people could be trained to defer judgment of their own and others’ ideas during the idea generation process. Therefore, Osborn developed the most widespread strategy used by organizations to encourage creative thought in teams: brainstorming.

In an influential book, Applied Imagination, Osborn suggested that brainstorming could dramatically increase the quality and quantity of ideas produced by group members.42 In short, Osborn believed that the group product could be greater than the sum of the individual parts if certain conditions were met. Hence, Osborn developed rules to govern the conduct of brainstorming. Contrary to corporate lore that brainstorming sessions are wild and crazy free-for-alls where anything goes, Osborn’s rules were specific and simple: (1) criticism is ruled out, (2) freewheeling is welcome, (3) quantity is desired, and (4) combination and improvement of ideas are encouraged (see Exhibit 9-4).

Expressiveness: Group members should express any idea that comes to mind, no matter how strange, weird, or fanciful. Group members are encouraged not to be constrained or timid. They should freewheel whenever possible.

Nonevaluation: Do not criticize ideas. Group members should not evaluate any of the ideas in any way during the generation phase; all ideas should be considered valuable.

Quantity: Group members should generate as many ideas as possible. Groups should strive for quantity, as the more ideas, the better. Quantity of ideas increases the probability of finding excellent solutions.

Building: Because all of the ideas belong to the group, members should try to modify and extend the ideas suggested by other members whenever possible.

Exhibit 9-4 Rules for Brainstorming


Brainstorming caught on like wildfire in corporations and is a technique that has remained very popular.43 The goal of brainstorming is to maximize the quantity and quality of ideas. Osborn aptly noted that quantity is a good predictor of quality. A team is more likely to discover a really good idea if it has a lot of ideas to choose from. But, there is more to brainstorming than mere quantity. Osborn believed that the ideas generated by one person in a team could stimulate ideas in other people in a synergistic fashion, also known as cognitive stimulation.

Osborn believed, as did others, that the four rules enhanced motivation among team members by stimulating them to higher levels of productivity via establishment of a benchmark or via competitive rivalry to see who could generate the most ideas. Osborn also thought that the social reinforcement of fellow members increased motivation. Finally, Osborn believed in a priming effect, namely that members would make mutual associations upon hearing the ideas presented by others.

### Brainstorming versus Nominal Group

Osborn claimed that a team who adopted these four rules could generate twice as many ideas as a similar number of people working independently. No scientific evidence supported this. Consequently, the question that organizational psychologists and management theorists asked of the brainstorming technique was, “Is it effective?” Controlled, scientific studies supported Osborn’s intuition. Brainstorming instructions enhance the generation of ideas within a team in comparison to teams working without those instructions.44

However, Osborn’s most controversial claim was that group brainstorming would be more effective—“twice as productive,” in his words—than individual brainstorming, in which group members work independently.45 The research evidence testing this assertion has found that the opposite is true (see Exhibit 9-5). In a typical investigation, four rules enhanced motivation among team members by stimulating them to higher levels of productivity via establishment of a benchmark or via competitive rivalry to see who could generate the most ideas. Osborn also thought that the social reinforcement of fellow members increased motivation. Finally, Osborn believed in a priming effect, namely that members would make mutual associations upon hearing the ideas presented by others.

### Face-to-Face Brainstorming Group vs. Same Number of People Working Independently (Solitary Brainstorming)

<table>
<thead>
<tr>
<th></th>
<th>Face-to-Face Brainstorming Group</th>
<th>Same Number of People Working Independently (Solitary Brainstorming)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity</strong>: The number of ideas generated</td>
<td>28</td>
<td>74.5</td>
</tr>
<tr>
<td><strong>Quality</strong>: Percentage of “good ideas” as judged by independent experts who did not know whose ideas they were evaluating</td>
<td>8.9%</td>
<td>12.7%</td>
</tr>
</tbody>
</table>

**Exhibit 9-5 Performance Data of Brainstorming and Solitary Groups**


---


the performance of a real group is compared to a control group consisting of the same number of people who work alone and never interact. The control group is called a **nominal group** because they are a group in number only. Nearly all controlled investigations have found that group brainstorming is less efficient than solitary brainstorming in both laboratory and organizational settings.46 Solitary brainstorming is much more productive than group brainstorming in terms of quality and quantity of ideas.47

In fact, virtually all of the empirical studies on group brainstorming are strongly (not just mildly) negative in regard to its effectiveness compared with solitary brainstorming.48 Thus, more than 50 years of research about brainstorming has found that brainstorming is significantly **worse** in terms of fostering creativity than having the same number of people work independently on a given task.

These results have been replicated several hundred times with a variety of teams brainstorming about all kinds of things. “It appears particularly difficult to justify brainstorming techniques in terms of any performance outcomes, and the long-lived popularity of brainstorming techniques is unequivocally and substantially misguided.”49 While nominal groups outperform real groups when it comes to idea generation, nominal groups do not outperform real groups when it comes to idea selection.50 Thus, official rules of brainstorming when followed enhance team performance, but brainstorming teams still generate fewer ideas than similar numbers of solitary brainstormers (nominal groups). Despite the empirical evidence attesting to the ineffectiveness of brainstorming, teams engaged in brainstorming suffer from an illusion of productivity.51 In short, they believe that they are more creative, when in fact they aren’t.

**Brainwriting**

**Brainwriting** is not brainstorming. Brainwriting is the simultaneous generation of written ideas. Brainwriting works like this: At key intervals during a brainstorming

---


49Mullen, Johnson, & Salas, “Productivity loss in brainstorming groups,” p. 232.

50Rietzschel, Nijstad, & Stroebe, “Productivity is not enough,” p. 232.

session, group members cease all talking and all interaction and write their ideas silently and independently.52

Writing ideas instead of speaking them eliminates the problem of production blocking because group members do not have to “wait their turn” to generate ideas. It also might reduce conformity because the written format eliminates the need for public speaking and typically is more anonymous than verbal brainstorming. The written ideas subsequently can be shared by the group in a round-robin fashion and summarized on a blackboard or flip chart. Investigations of brainstorming groups of four people revealed that brainwriting followed by round-robin exchange, eliminated production blocking and social loafing as compared with standard brainwriting.53

Many groups may not welcome the idea of brainwriting, claiming that it ruins the flow of the group process, but the data are incontrovertible: Brainwriting groups consistently generate more and better ideas than groups that follow their instincts. Alternating between team ideation and individual ideation is desirable because it allows teams to circumvent production blocking (coordination problems), and it also sets the stage for divergent thinking. This two-step technique requires a considerable number of conditions to be in place for optimal productivity in group brainstorming. Each member needs to take time out for solitary meditations. Similar benefits can be accomplished through preliminary writing sessions, quotas or deadlines, brief breaks, and the use of specific, simple, and subdivided problems. Thus, by working together, then alone, and then together, teams are more likely to achieve the best in creative thinking.54

Even if brainwriting is not used, at the very least, all talking should be stopped periodically to allow members to think silently; the more pauses and silences that occur during brainstorming, the higher the quality of the ideas. Giving members brief breaks, even if they don’t write anything down, also can help.55 Indeed, periods of incubation in which group members reflect on ideas can generate additional ideas.56

**Speedstorming**

Speedstorming is somewhat like brainstorming and speed dating that involves pairwise brainstorming in a round-robin fashion. Speedstorming pairs have an explicit purpose, time limits, and one-on-one encounters. One investigation examined speedstorming in nanoscience collaborations and found it more efficient and effective than group brainstorming and ideas developed are more technically specialized.57

---


53Paulus & Yang, “Idea generation in-groups,” p. 244.


56Dugosh, Paulus, Roland, & Yang, “Cognitive stimulation in brainstorming.”

Electronic Brainstorming

Electronic brainstorming (EBS) uses computers and other forms of information technology to allow members to interact and exchange ideas. In a typical EBS session, members are seated at a table that contains computers or other technology. A large screen projects all ideas generated by members. EBS also can occur among people not physically in the same location, and ideas can appear on a common website. The ideas that are generated using EBS are anonymous and thus, tend to be expressed more freely and in greater quantity.

EBS is used as part of a regular organizational meeting process. It gives organizations the opportunity to gather ideas efficiently, organize those ideas, and subsequently make decisions. It speeds up the meeting at which it is used, increases productivity, and allows the focus to remain on the ideas rather than on the people who spawn them. When members run out of ideas, they access the ideas produced by the team.

In EBS, people usually are not identified by their contributions. Typically, participants can view subsets of ideas generated by other team members on part of the screen at any time by using a keystroke. Ideas are projected on a large common screen or individual screens, and people are asked to evaluate them. The team eventually might vote on the most preferred ideas. A facilitator guides both the idea generation and the decision processes.58

Fortune magazine annually holds electronic brainstorming sessions, such as Brainstorm E, which brought together people in energy, technology, and sustainability industries and challenged the group to explore disruptive technologies and new business models.59 EBS addresses many of the shortcomings of traditional brainstorming. For example, one company used traditional brainstorming to develop one-year and five-year plans.60 The committee composed of five members, spent two days trying to develop a mission statement. In the end, the statement was unacceptable to several key people in the company. When the same team used EBS, they developed a mission statement in two hours. Then they developed further objectives, goals, and strategies, and the plan was accepted by the board with no changes. However, EBS does not guarantee effectiveness: In one investigation, meetings held by 11 groups that used group decision support systems had lower fluency.61 For an overview of advantages and disadvantages, see Exhibit 9-6.

One investigation compared EBS with brainwriting and found that EBS is more effective for idea generation because of the pooling approach (in which members see one another’s ideas).62 however, if extra effort is required to see other members’ ideas, the relative benefits of EBS disappears.

---

60 Dennis, Nunamaker, Paranka, & Vogel, “A new role for computers in strategic management.”
Chapter 9 • Creativity and Innovation in Teams

THREATS TO TEAM CREATIVITY

Why are individuals more creative than teams? Four major problems stifle the effectiveness of team brainstorming.

SOCIAL LOAFCING

As noted in chapter 5, social loafing is the tendency for people to not work as hard (either mentally or physically) in a group as they would alone. Indeed, as the number of team members increases, each person is more likely to free ride.63 It is as if members say to themselves, “I don’t need to work really hard when thinking of ideas, because everyone else is working, too.” Most people believe that groups are more creative than individuals, but they also believe that groups generate fewer ideas per member as the number of people working together increases. Moreover, these low-performance expectations create a self-fulfilling prophecy, resulting in lower performance.64 Moreover, when team members perceive their own contributions to be unidentifiable and dispensable, they are likely to loaf.65 Contrary to intuition, the degree to which a brainstorming topic is regarded as “enjoyable” does not affect persistence.66

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parallel Entry of Ideas:</strong> all members of the team generate ideas simultaneously</td>
<td><strong>Loss of Social Interaction:</strong> EBS may promote antisocial behavior</td>
</tr>
<tr>
<td><strong>Anonymity:</strong> people can express themselves without having to worry about criticism</td>
<td><strong>Lack of Recognition:</strong> EBS members who generate ideas don’t receive credit</td>
</tr>
<tr>
<td><strong>Size:</strong> EBS can handle large teams</td>
<td></td>
</tr>
<tr>
<td><strong>Proximity:</strong> distance-challenged groups can meet synchronously</td>
<td></td>
</tr>
<tr>
<td><strong>Equality:</strong> nobody can dominate a meeting</td>
<td></td>
</tr>
<tr>
<td><strong>Organizational Memory:</strong> all ideas are recorded</td>
<td></td>
</tr>
<tr>
<td><strong>Refinement &amp; Evaluation:</strong> software tools can mine the database</td>
<td></td>
</tr>
</tbody>
</table>

Exhibit 9-6 Advantages and Disadvantages of Electronic Brainstorming


**Conformity**

People identify with groups and will sometimes engage in bizarre behaviors to gain acceptance by the group.67 People on a team may be somewhat apprehensive about expressing their ideas because they are concerned about others judging and evaluating them.68 This is the need to be liked, which we discussed in Chapter 7 (decision making). Most people desire to be viewed positively by others.69 This concern for “what others will think of me” may inhibit idea generation in teams.70 **Conformity** can occur even when group members are concerned that others in the group will be critical of their suggestions, despite instructions designed to minimize such concerns.71 Conformity generally decreases creative idea generation. For example, people make more conventional and clichéd responses to word associations when they are in a group than when they are alone. However, when people score low on the creative personality scale,72 conformity pressure, in terms of adhering to an individualist norm, can actually increase creativity.73

**Production Blocking**

A person who works alone on a problem can enjoy an uninterrupted flow of thought. Participants in a face-to-face brainstorming group however, not only must think of ideas but also listen to others’ ideas. Moreover, they have to wait for their turn to speak and remember to use conventional floor-taking and floor-yielding signals. **Production blocking** occurs when group members cannot express their ideas because others are presenting their ideas. It is cognitively difficult to maintain a train of thought or remember ideas generated while others are talking.74 Research on multitasking unambiguously reveals that trying to do two or more things makes people less productive.75 Members of teams may be prevented from generating new ideas during a team discussion because they are distracted by hearing the contributions of other members while waiting for their turn to participate. During the waiting period, members might listen to others’ contributions and in the process, forget to rehearse the ideas they want to mention. Consequently, people

---

68Mullen, Johnson, & Salas, “Productivity loss in brainstorming groups,” p. 232.
may forget their ideas or decide not to present them during the waiting period. Furthermore, the inability to express ideas or get floor time might be frustrating and depress motivation. While Osborn theorized that groups could “build on” the ideas suggested by others, there is no evidence for any stimulating impact of unique or rare ideas in brainstorming. Production blocking interferes with idea generation in two distinct ways: (1) it disrupts the organization of idea generation when delays are relatively long and (2) it reduces the flexibility of idea generation when delays are unpredictable.

**Performance Matching**

The performance of people working within a group tends to converge over time. Social comparison processes may lead team members to converge their performance levels into one another. For example at CDW, salespeople working in the same physical location in the building report monthly sales figures more similar to one another than those working in other buildings and areas. There is a pervasive tendency for the lowest performers in a group to dampen the team average. Indeed, people working in brainstorming groups tend to match their performance to that of the least productive members, also known as **downward norm setting**. Performance matching is most likely to occur when there are no strong internal or external incentives for high performance in teams. For example, the initial performance level of the two lowest-performing members predicts the performance of a group of four toward the end of the session. This performance level may set the benchmark for a team, in that it is seen as an appropriate or typical level of performance. Because groups start their brainstorming by performing at a relatively low level, high performers might feel like “deviants.” As a result, they might move their performance in the direction of the low-group standard. For example, participants in interactive dyads or groups of four tend to be more similar in their rate of idea generation than noninteracting groups. Unfortunately, the least productive members of the team often are more influential in determining overall team performance than the high performers. When teams compete against another team however, they do not fall victim to performance matching.

---


78Nijstad, Stroebe, & Lodewijkx, “Production blocking and idea generation.”


80This observation was shared by a manager in the company.


WHAT GOES ON DURING A TYPICAL GROUP BRAINSTORMING SESSION?
What exactly could we expect to observe in a typical team brainstorming session? People in brainstorming groups often:

- Fail to follow or abide by the rules of brainstorming.
- Experience inhibitions, anxiety, and self-presentational concerns.
- Suffer decreased production, with the majority of the ideas suggested in the first few minutes.
- Participate in nonproductive social rituals, such as telling stories, repeating ideas, and giving positive feedback (a natural pattern of conversation that works well at social events but that kills creativity).
- Set their performance benchmarks too low.
- Conform in terms of ideas.
- Conform in terms of rate of idea generation.

Most disturbing is that most people on brainstorming teams have no idea that this occurs, and interactive brainstorming teams feel quite confident about their productivity. Thus, the group suffers from a faulty performance illusion. In fact, the illusion of performance is so self-serving that people often take credit for the ideas generated by others.86

BEST PRACTICES FOR ENHANCING TEAM CREATIVITY
Fortunately, there are actions that team leaders can take to ward off the typical problems that brainstorming produces.87

MOTIVATIONAL METHODS
QUANTITY GOALS  Brainstorming groups often underperform because they don’t have relevant goals or benchmarks. Information about other members’ activity levels may increase performance as long as the benchmark is not too discrepant.88 Providing brainstormers with high performance standards greatly increases the number of ideas generated.89 Even when members work independently and announce how many ideas they generate every five minutes, the number of ideas generated by the team is enhanced.90 Similarly, a facilitator periodically can call brainstormers’ attention to a graph on a computer screen indicating how the team’s performance compares with that of other teams, a challenge that significantly enhances the number of ideas generated by the teams.

group. Forewarning teams that they will see a display of all ideas at the end of the session increases the number of unique ideas generated. Exposure to a high number of ideas increases creativity. It is desirable to set goals for quantity, but it is undesirable to set actual production goals. Some teams are focused on reaching certain desirable goals (promotion focused); whereas other teams are focused on preventing disastrous or disappointing outcomes (prevention focused). Teams who have a promotion focus are more innovative.

**COMPETITION** Competition can occur on an individual level (between people in a given team) or a team level (between competing teams). People working on a task perform better when they are paired with a partner who is slightly better (versus slightly worse or the same). When power positions in the team are unstable and perhaps lead to competition for power, low-power individuals are more creative than high-power persons. Low-to-intermediate competition produces the greatest amount of creativity in groups that do not change members. The company, InnoCentive leverages competition using social networking, cloud computing, and crowdsourcing. Specifically, a problem from a real client is posted, such as General Fusion’s difficult attempt to create a seal for its fusion energy creation system that must withstand incredible pressures and sun-like temperatures. The winner of the engineering challenge, titled “Method for sealing anvil under repetitive impacts against molten metal,” earned a $20,000 prize. Another investigation revealed that groups who combine a collectivistic (versus individualistic) value orientation with an individualistic self-construal are more creative. Yet another investigation examined how goal faultlines, hypothetical dividing lines created within a group on the basis of different performance goals, affect creative idea generation. Groups with goal faultlines are more creative than those with specific difficult goals or do-your-best goals.

---


95 Seta, “The impact of comparison processes on coactors’ task performance.”


REGULATORY FIT  In one investigation, members of groups were given either a promotion focus or a prevention focus and then were given an “eager” strategy or a “vigilant” strategy for performing a brainstorming ask. Groups experiencing non-fit (promotion+vigilant; prevention+eager) worked longer and generated more unique ideas than did groups experiencing goal fit (promotion + eager; prevention + vigilant). Another investigation found that the impact of open-system team culture and team creative performance was enhanced when teams had a promotion (versus prevention focus).

ACCOUNTABILITY  Team members who feel individually accountable for their ideas are more productive than teams in which it is not possible to discern who contributed what. People who have high organizational commitment are less likely to breach psychological contracts (tacit expectations and norms), resulting in more innovation.

ENERGIZING MOODS  Energizing moods, which often accompany positive affect, increase creativity. In contrast, deactivating moods decrease creativity. For example, the creativity of a large, high-technology firm was studied before, during, and after a major downsizing. Clearly, downsizings engender negative mood and in this case, were accompanied by decreases in project team creativity. In an investigation of 222 employees in seven companies, positive affect was associated with greater creativity. With regard to stress, there is a curvilinear relationship between evaluative stress and creativity, such that low-evaluative contexts increase creativity, but highly evaluative contexts decrease creativity.

COGNITIVE METHODS

CATEGORIES  In one investigation, members generated abstract categories before they brainstormed. Category generation hindered the group ideation process. When groups engage in sequential category generation (i.e., brainstorming one category at a time), their productivity increased. Groups that focus on a small set of categories at the outset of a brainstorming session generate more ideas and explore more categories than do groups whose members have their own category focus.

---


Beatles used a type of category to write songs: He’d pick up a book at random, open it, and write a song about whatever words first struck him. In one such exercise, Harrison saw the words, “gently weeps.” The song that he then sat down and wrote, “While My Guitar Gently Weeps,” is considered one of his best songs.\(^{109}\)

**EXPLICIT RULES** Teams that follow Osborn’s four rules of brainstorming are more effective than those that don’t.\(^{110}\) For example at IDEO, seven rules govern every brainstorming session: defer judgment, encourage wild ideas, build on the ideas of others, stay focused on the topic, one conversation at a time, be visual, and go for quantity.\(^{111}\) Val Wright Consulting has its own seven rules when it comes to brainstorming: no more than 10 people; don’t include the ego invite; never split into breakout discussions; provide a thought-provoking prelude; require everyone’s physical presence; set the right time horizon so employees know if the brainstorming session is for this quarter, or for a future product not even developed; and book double the time and finish early.\(^{112}\) One investigation examined how constraints allow groups to accomplish elastic coordination in a modern dance creative project.\(^{113}\)

Paulus and his colleagues scientifically examined the effects of four additional brainstorming rules.\(^{114}\)

- Stay focused on the task.
- Do not tell stories or explain ideas.
- When no one is suggesting ideas, restate the problem and encourage each other to generate ideas.
- Encourage those who are not talking to make a contribution.

In one investigation, either a trained experimenter or someone selected from the group enforced the rules.\(^{115}\) A 40 percent increase in the number of ideas generated using the new rules was reported. These groups generated ideas at a level comparable to that of nominal groups. The benefits of the additional rules also increase the efficiency of ideas, meaning that members are more parsimonious (i.e., use fewer words) to express a given idea.

Rules are effective in enhancing creativity, but priming creativity may have unintended negative consequences. People who are primed to “think creatively” are more likely to behave dishonestly than those who are not primed.\(^{116}\)

---


\(^{112}\)Wright, V. (2015, February 27). The surprising truth about the perfect brainstorm. *Inc*. inc.com


FEEDBACK  People who actively seek feedback are proactive. A study of 456 employees from four organizations revealed that people who sought feedback—either directly or by monitoring the environment—were considered to be more creative. Similarly, people who seek help from others in their teams and organization are more creative than those who don’t actively seek help. However, because help seekers became indebted to others after receiving help, they tended to give more help to others and thus hindered their own creativity.

One way of getting feedback is to observe. For example, toy manufacturer Fisher-Price’s PlayLab gets feedback by spelunking, which in the toy world refers to simply watching children play. At PlayLab, infants and toddlers play with phone apps and other electronic toys. Observations about the play patterns and interest level of the kids regarding various products are passed along to toy designers and marketers.

ANALOGIES  Analogical reasoning is the act of applying one concept or idea from a particular domain to another domain. Consider, for example, Johannes Kepler’s application of concepts from light to the development of the orbital motion of planets theory. Similarly, chemist Friedrich Kekulé discovered the closed hexagonal structure of the benzene ring by imagining a snake biting its own tail. Teams at Apple visited a candy factory to study the nuances of jelly bean making and used the jelly bean idea as an analogy for the Apple iMac contained in a translucent blue shell.

New ideas are often old ideas wrapped in new clothing. Finding innovative solutions by analogy requires: (1) in-depth understanding of the problem and (2) searching for something else that already has solved the problem. In one demo, business executives were challenged to think about how to engage in their weight-training program while on business travel. It is not practical to travel with 50-pound dumbbells, but thinking about how water contains weight, leads to an analogy of a fillable water mattress. Water weights are small and compact, and they can be filled with tap water from hotel bathrooms. Following is another analogy: When a team of NASA scientists needed to fix the distorted lenses in the Hubble telescope in orbit, one of the experts mentioned that small inversely distorted mirrors would adjust the images. However, they were impossible to fit into the hard-to-reach space inside the telescope. Engineer Jim Crocker noticed the European-style showerhead mounted on adjustable rods in a German hotel and thought to extend the mirrors into the telescope by mounting them on similar folding arms.

The following is another use of analogy: A manufacturer of potato chips faced a frequently encountered problem—potato chips took up too much shelf space when they

---

were packed loosely, but they crumbled when packed in smaller packages. The manufacturer found a solution by using a direct analogy: Dried leaves are highly similar to potato chips. They crumble very easily, and they are bulky. Pressed leaves are flat. Could potato chips be shipped flat? As it turned out, they could not. The team, however, realized that leaves are not pressed when they are dry, but when they are moist. So they packed potato chips in stacks, moist enough not to crumble, but dry enough to be nearly flat. The result was Pringles. Speedo’s Fast Skin Shark Suit, a full body swimsuit with a fabric surface modeled after shark skin, used testing techniques reserved for Formula One race cars and jet planes. When Dyson company founder James Dyson visited a local sawmill, he associated the mechanical analogy of an industrial funnel-shaped dust collector and invented one of the best-selling vacuums in the world.

The most dramatic impacts of new technologies often come from industries other than the ones in which they first emerged. For example, the steam engine, developed in the mining industry, revolutionized the railroad and shipping industries. Hargadon and Sutton outline four critical steps in the knowledge brokering cycle: (1) capturing good ideas, (2) keeping ideas alive, (3) imagining new uses for old ideas, and (4) putting promising concepts to the test.

**EPISODIC MEMORY** When people imagine a future event or recollect the details of a recent event, they are more creative. By imagining details of future events or recollecting details of recent events, people show more divergent thinking as compared to people not instructed to do so.

**FACILITATOR-LED METHODS**

A trained facilitator can better follow rules of brainstorming (which are often unwittingly violated), help create an organizational memory and keep teams on track. Indeed, trained facilitators can bring the level of team performance up to that of nominal groups. Furthermore, this investment produces long-term benefits. Teams that are given several sessions in which they are guided by facilitators into productive idea generation patterns demonstrate high levels of productivity in subsequent sessions without the facilitators. Apparently, teams can become accustomed to sharing ideas without extensive social interaction or “filler” talk. Rapid Results uses trained facilitators to solve global challenges with a tight deadline of 100 days. In 2014, the goal was to end homelessness in 25 communities across the United States. Teams in each city participated in

---

128Oxley, Dzindolet, & Paulus, “The effects of facilitators on the performance of brainstorming groups.”
a two-day brainstorming session that focused on restructuring and reimagining their local housing systems and has resulted in 31,000 veterans escaping homelessness.\textsuperscript{130} As this case study illustrates, trained facilitators who successfully eliminate filler talk achieve the highest levels of productivity when the most ideas are allowed to be shared.\textsuperscript{131}

**BRIEF BREAKS** Teams that take a short break (2 to 5 minutes in length) halfway through a 20- or 30-minute brainstorming session increase their productivity following the break compared to teams that brainstorm continuously without a break.\textsuperscript{132} Breaks also allow brainstorming groups to overcome mental blocks through the process of incubation. Breaks can stimulate a different approach to a problem. In one investigation, individuals and three-person groups attempted to solve sets of rebus puzzles; following incubation (taking a break from the problem), groups improved their performance.\textsuperscript{133}

**BACKGROUND NOISE** A moderate level of background noise improves creativity more than does silence. Why? Background noise prompts people to focus. People who are exposed to moderate levels of noise need to work harder to process their thoughts, which increases focus and persistence.\textsuperscript{134}

**NOMINAL GROUP TECHNIQUE** A much better method of group brainstorming is to prepare by having a prior session of solitary writing, known as the nominal group technique.\textsuperscript{135} The nominal group technique, or NGT, is a variation of the standard brainwriting technique\textsuperscript{136} and involves an initial session of brainwriting prior to interactive teamwork. Thus, NGT separates the idea generation phase from the idea evaluation phase. To use the NGT, it is useful to have a facilitator, but it is not necessary. The facilitator introduces a problem on the board or on a flip chart. After members understand the topic or issue, they silently write ideas for 10 to 15 minutes. Members state their ideas in a round-robin fashion, and each idea is given an identification number. Once ideas are all listed, the team discusses each item, focusing on clarification. Following this, members privately rank the five solutions or ideas they most prefer. The leader-facilitator collects the cards and averages the rating to yield a group decision.

\textsuperscript{130}Kanis, B. (2015, July 15). 100,000 homes campaign provides housing to 31,000 chronically homeless veterans. U.S. Department of Veterans Affairs. blogs.va.gov; Kanis, B. (2015, July 15). Washington: 100,000 homes campaign provides housing to 31,000 chronically homeless. Veterans National Center on Homelessness Among Veterans. endveteranhomelessness.org


It is worth noting that the NGT was compared with an interactive brainstorming process and overwhelmingly outperformed the standard brainstorming group.\textsuperscript{137} Also, nominal groups that perform in the same room generate more ideas than those in separate rooms.\textsuperscript{138} The advantage of the NGT is that it maximizes information gain, ensures a democratic representation of all members’ ideas (i.e., avoids the lumpy participation effect), and avoids production blocking. Yet members still have an opportunity for face-to-face discussion of issues. Although it might seem that the NGT would run the risk of generating redundant ideas, they are no more common per number of total ideas than in real face-to-face groups. There are some disadvantages of the NGT; it is less spontaneous and might require a separate meeting for each topic.

One variant of the NGT is the \textbf{rotating nominal group technique}, in which members write down their ideas on individual sheets of paper or notecards. The meeting facilitator (or a group member) collects the notecards, shuffles them, and redistributes them randomly to members, who read the cards aloud or discuss their contents in small groups. This variation creates greater acceptance of others’ ideas because the ideas are semi-anonymous; it also prevents individual members from championing only their own ideas.

\textbf{DELPHI TECHNIQUE} Another variant of the NGT is the \textbf{Delphi technique}.\textsuperscript{139} In this technique, group members do not interact face-to-face at any point. This technique is ideally suited for groups whose members are geographically dispersed (making meetings difficult to attend) and for teams whose members experience such great conflict that it is difficult to meet about sensitive issues. This technique requires a leader or facilitator who is trusted by the team members. The entire process proceeds through questionnaires, followed by feedback that can be computerized. The leader distributes a topic or question to members and asks for responses from each team member. The leader then aggregates the responses, sends them back to the team, and solicits feedback. The process is repeated until there is resolution on the issue in question. The Delphi technique avoids production blocking. Because members respond independently, conformity pressures and evaluation apprehension are limited. One problem associated with this technique, which is not associated with regular brainstorming or nominal brainstorming, is that it can be quite time consuming. Sessions can last several days, even weeks.

\textbf{STEPLADDER TECHNIQUE} The \textbf{stepladder technique}, a variant of the membership change technique, is a decision-making approach in which members are added one by one to a team.\textsuperscript{140} The first step involves the creation of a two-person subgroup (the core), which begins preliminary discussion of the group’s task. After a fixed interval, another member joins the core group and presents his or her ideas concerning the task. The three-person group then discusses the task in a preliminary manner. The process continues until all members have systematically joined the core group. When this

---


\textsuperscript{138}Mullen, Johnson, & Salas, “Productivity loss in brainstorming groups,” p. 232.


occurs, the group arrives at a final solution. Each member must have sufficient time to think about the problem before entering into the core group. More importantly, the entering members must present their preliminary solutions before hearing the core group’s preliminary solutions. A final decision cannot be reached until the group has formed in its entirety. Self-pacing stepladder groups produce significantly higher-quality group decisions than conventional groups.\textsuperscript{141} Members with the best individual decisions exert more influence in stepladder groups than in free interaction groups.

**Leader and Organizational Methods**

**Diversity** The impact of diversity on creative idea generation is complex. Teams with heterogeneous members generate more arguments,\textsuperscript{142} apply a greater number of strategies,\textsuperscript{143} detect more novel solutions,\textsuperscript{144} and are better at integrating multiple perspectives\textsuperscript{145} than teams without conflicting perspectives. A field study of 39 research teams within a global Fortune 100 Science & Technology company revealed that diverse teams, containing a breadth of research and business unit experience, were more effective when there was a knowledge-sharing climate in the team and when the leader also had breadth.\textsuperscript{146} Another field study revealed that teams with greater cognitive diversity were more creative than teams with less cognitive diversity, but only when they had high self-efficacy—that is, when they believed in their ability to be creative.\textsuperscript{147} **Deep-level diversity** within a team, however, hampers creativity, particularly when the team must converge on a single output.\textsuperscript{148} Another study of 176 employees working in 34 research and development teams in four countries revealed that functional background diversity combined with shared “knowledge of who knows what” (KWKW) benefits the creativity of people with high creative self-efficacy.\textsuperscript{149} Perspective-taking is key for diverse teams:

\begin{itemize}
  \item Smith, Tindale, & Dugoni, “Minority and majority influence in freely interacting groups.”
\end{itemize}
Indeed, diverse teams were more creative than homogenous teams when they engaged in perspective-taking, but not when they weren’t instructed to take others’ perspectives.150

**FLUID MEMBERSHIP** People enter and exit groups. Although maintaining consistent membership increases comfort and the perception of creativity, it does not lead to better creativity.151 Teams that experience membership change (i.e., an entry of a new member and an exit of an old member) generate not only more ideas (high fluency) but also more diverse ones (higher flexibility) than do groups who remain intact.152 Teams that stay together, without any change in membership, develop a sort of cognitive arthritis—they get stuck in a rut when it comes to idea generation. There is a negative relationship between repeat collaboration and creativity.153 In contrast, teams that experience a change in membership are exposed naturally to more ideas due to a greater diversity in task-relevant skills and information. When a group experiences a membership change, they are in a unique position to look at themselves more thoughtfully. The presence of a newcomer can motivate old-timers to revisit their task strategy and develop improved methods for performing group tasks.154 This effect is known as creative abrasion, wherein people who lack a previous collaboration are more likely to generate ideas.155 Successful new product development (NPD) teams have: (1) higher project complexity; (2) cross-functionality; (3) temporary membership; (4) fluid team boundaries; and (5) embeddedness in organizational structures.156

**ORGANIZATIONAL NETWORKS** The extent to which teams and their leaders have weak ties across organizational units and boundaries can promote creativity.157 In an investigation of product development in project teams, teams that had fluid team boundaries allowing cross-team networking, were more creative than those with tight boundaries.158 When teams have fluid group boundaries, team members are forced to make new connections across traditional boundaries. In this way, team members trade the depth and intensity of “strong ties” for a larger number of “weak ties.”

---


158Edmondson & Nembhard, “Product development and learning in teams.”
An investigation of 214 employees working in 30 teams revealed that team leader “betweenness centrality” in their team as well as among their peer leaders enhances creativity beyond their employees’ own internal and external ties. Moreover, leaders’ and employees’ internal and external ties interact to predict radical creativity. At BMW, all the major departments work together in a hub-and-spoke office configuration in which a middle core stimulates exchange of creative ideas among functions. With this design, everyone learns and gains insight into different departments.\textsuperscript{159}

Networking also means spending time with customers and clients. A large meta-analysis of team-level antecedents of creativity revealed that organizational support for innovation, vision, task orientation, and external communication were associated with the highest levels of creativity.\textsuperscript{160} And, respectful engagement among organizational members facilitates relational information processing, leading to creative behaviors.\textsuperscript{161}

**EMPOWERMENT** Teams that are empowered—particularly by their leaders—are more intrinsically motivated and more creatively engaged.\textsuperscript{162} Conversely, bureaucracy, particularly centralization and formalization, constrains creative expression.\textsuperscript{163} For example, when Toyota saw rival car companies catching up to them on quality, fuel efficiency, and styling, they empowered their internal teams. Toyota’s chief designer, Tokuo Fujukiuchi, realized that the company’s design process had too many filters and too many people weighing in on the final design. The new framework for vehicle development encouraged parts sharing across vehicle designs during the simultaneous development of multiple models; costs were reduced by 30 percent.\textsuperscript{164} Organizations that use power heterarchies, in which power actively shifts among team members to align member capabilities with situational demands are more creative than teams that don’t shift power.\textsuperscript{165}

\textsuperscript{159}Steep, M. (2014, September 3). How to create innovation cultures that keep working. Forbes. forbes.com
\textsuperscript{164}Kim, C. (2012, April 9). Toyota aims to spice up cars with new development methods. Reuters. reuters.com
Many of our intuitions about creativity are incorrect. We see this most clearly in the case of face-to-face brainstorming. The process of generating novel and useful ideas is often blocked in teams. There is no evidence that conventional brainstorming teams can exceed the performance of people working alone. The various inhibitory social and cognitive factors in teams simply outweigh the potential positive effects of social and cognitive stimulation.¹⁶⁶

Why then, with all of its faults, is face-to-face group brainstorming so pervasive in companies? Part of the reason is that people falsely believe it is effective. Most managers severely underestimate the process loss in teams—that is, the inhibitory cognitive and social factors such as social loafing, production blocking, coordination loss, task irrelevant behaviors, and filler talk—because they lack a relevant benchmark.

We don’t suggest that companies and teams abandon brainstorming. Rather, we suggest that they develop hybrid methods for creative work that capitalize on individuals’ strengths and combine those with team strengths. For example, one manager told us that the simple act of asking team members to submit items before their weekly group meeting resulted in a tenfold increase in volume of ideas and higher quality of ideas. With some simple changes, the productivity of teams can increase dramatically.
