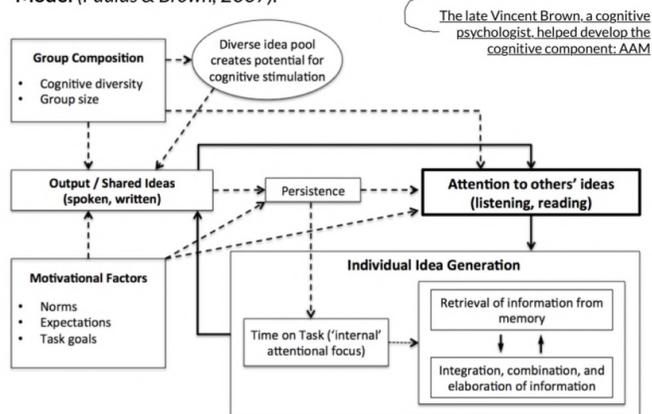


# Effective Brainstorming

## Two major cognitive models of brainstorming

**The Cognitive-Social-Motivational Model of Group Brainstorming** with details of the cognitive processes from the **Associative Memory Model** (Paulus & Brown, 2007).

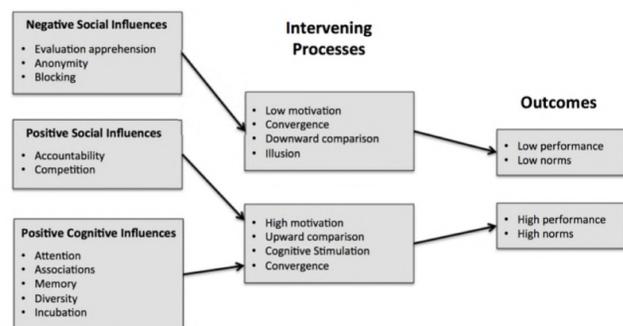


This model highlights key factors in low performance in groups.

**Apprehension** about sharing one's ideas in groups, low identifiability of one's performance (anonymity) and **production blocking** (inability to express ideas because of competition for speaking time) can lower motivation to perform. The inhibitory effects of evaluation apprehension, anonymity and blocking will lead to convergence toward a rather low level.

Increasing **accountability** and inducing a **sense of competition** may increase motivation to perform. (...) Awareness can increase if group **members pay attention to each other's ideas** and can retain them in their working memory. **Cognitive diversity** in the groups in terms of knowledge and experience should increase the range of ideas and categories being shared

A key factor in brainstorming is the extent to which shared ideas can stimulate retrieval of low accessible ideas.



The cognitive-social-motivational model of group creativity (Paulus, Dugosh, Dzindolet, Larey, Coskun & Putman, 2002)

Key factor in brainstorming is the extent to which shared ideas can stimulate retrieval of low accessible ideas.

importance of priming of ideas from low accessible categories, the benefits of sequential priming of categories, of brief breaks during the brainstorming process, of attention to shared ideas the benefits, of having an alone session after group brainstorming, and of cognitively heterogeneous

## The SIAM Model

- Search for Ideas in Associative Memory (Nijstad, Stroebe and Lodewijckx)

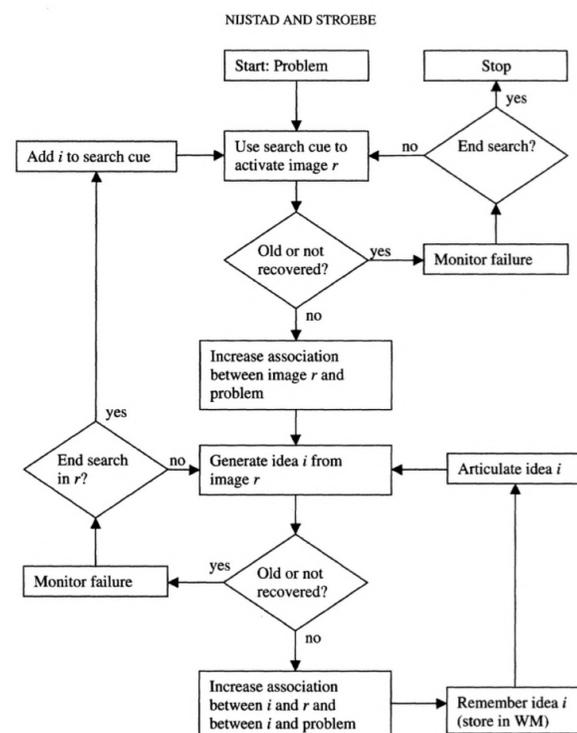


Figure 1. Flowchart of SIAM.

When confronted with a brainstorming problem, a person needs to use search cues to tap long-term memory for relevant knowledge which can then be the basis for formulating ideas. These ideas can serve as cues in the search process and will likely be semantically related. However, when this train of thought no longer leads to additional ideas, new cues have to be used to tap other knowledge. Group interaction can both facilitate and interfere with this search process.

## Verbal Brainstorming

Verbal brainstorming in groups is not particularly effective for generating ideas. Groups of four typically generate only about half as many ideas as nominal groups. **Production deficit** relative to nominal groups increases with group size as people have to take turns to share their ideas. interaction anxious individuals perform more poorly in verbal groups

## Electronic Brainstorming

Studies have found that electronic brainstorming leads to more ideas than verbal brainstorming. This advantage increases as group size increases. The number of ideas shared with larger electronic groups increases the degree of cognitive stimulation.

Awareness problem: there is typically no way to insure that participants are attending to the shared ideas as they generate their own.

## Brainwriting

Helps minimize the production blocking problem is brainwriting, which involves sharing of ideas on pieces of paper. Studies found that brainwriting groups generated more ideas than verbal brainstorming groups. The sharing of ideas in written form may also reduce evaluation apprehension.

## Carry-over effect

The AMM model suggests that associations generated during idea exchange sessions may continue to be a basis for new ideas after such a session generated during solitary sessions.

**A critical factor in the impact of shared ideas is the extent to which participants attend to those ideas**

Both the AMM and SIAM models emphasize the importance of the process of searching one's knowledge bases and the stimulation value of the cues that can be provided by exposure to ideas from others. Thus, they imply there must be an appropriate balance between these two processes.

## Alternating Group and Individual Ideation

Some studies find that the alone to group sequence is most beneficial (e.g., Baruah & Paulus, 2008), some find that the group to alone sequence is best.

The hybrid process led to the best outcome in terms of number of ideas, number of categories, and category depth (the number of ideas within categories).

## Methods to Enhance Brainstorming Performance

Even though one method might be generally better than others, situational constraints and personal preferences may dictate the use of a particular paradigm for a specific brainstorming session. No matter which approach is used, research has provided much information on how to maximize performance.

## Osborne rules:

- 1) don't criticize ideas as they are being generated and say everything you think of;
- 2) freewheeling is welcome - the wilder the idea the better, say anything that comes to mind;
- 3) focus on quantity - more ideas will increase the likelihood of good ideas;
- 4) combination and improvement are sought - join ideas take make even better ones.

The clearest evidence exists for the quantity rule. best practice may be to limit criticism in the early idea generation phase but allow for it when group members need to select a small number for further evaluation and development. However, even in this phase, participants probably need to be careful in making sure that evaluation of shared ideas is not taken personally.

## Get "off task"

Individuals and groups often stop their idea generation prematurely. Stay focused on the task; do not tell stories or explain ideas; when no one is talking, restate the problem; and when the talking slows down go back to prior categories of ideas and build on them.

## Facilitators

Since group brainstormers face a number of challenges in coordinating the collaborative ideation process, they are likely to benefit from facilitator support (...) A number of studies have demonstrated that the use of facilitators who provide corrective feedback/interventions for groups leads to enhanced performance in groups (Kramer, Fleming, & Mannis, 2001; Offner, Kramer, & Winter, 1996; Oxley, et al., 1996).

Some degree of facilitative intervention and/or provision of explicit rules and guidelines can be beneficial, but it may be even more useful to train groups to be effective brainstormers so that they will not need the continued intervention and the presence of a facilitator

## "On the same page"

The joint focus led to generation of more ideas, a greater number of categories surveyed, and a higher degree of clustering. If one wants to "jump-start" a group to a high level of productivity one should suggest a joint focus on a limited set of highly related categories. Research suggests diverse teams might first focus on areas of commonality to generate creative flow and positive group feelings. Once they have developed cohesion, trust and a sense of efficacy, they may be able to more effectively build on highly unrelated and distinct information (Paulus & van der Zee, 2015).

## Group Size

The ideal size of groups for brainstorming they will often suggest sizes of seven or more. However, the problem of production blocking increases with group size, especially in groups that share ideas verbally (...) Thus the optimal group size is two.

## Recommendations:

1. There is some evidence that the Osborn rules enhance brainstorming. The strongest evidence exists for the quantity rule.
2. Brief breaks during brainstorming sessions appear to enhance the number of ideas generated.
3. It is useful to structure sessions so that groups focus on one aspect of the problem at a time.
4. Use brainwriting or electronic brainstorming if you want to maximize the number of ideas generated.
5. Keep groups relatively small, especially for verbal and brainwriting groups.
6. Alternate group and individual brainstorming to tap most effectively the benefit of group stimulation.
7. When groups think they have run out of ideas, it may helpful to rotate group members.
8. Groups may benefit from some degree of monitoring or facilitation to insure they all are participating

## Significant gaps in our knowledge for practice:

1. The importance of the "do not criticize rule" needs further evaluation.
2. There is insufficient data to guide the effective implementation of breaks.
3. Although focusing on one aspect or category of a problem at a time can facilitate the number and novelty of ideas generated, the best way to come up with such categories is not clear.
4. Although brainwriting appears to be an effective technique, research is needed to examine different variations of this procedure, the boundary conditions for demonstrating
5. Although there appears to be a benefit of alternating group and individual brainstorming, how such a session is to be partitioned in terms of time allotted to different phases is unclear.
6. Although keeping groups small is suggested by the research, especially for verbal groups, it remains to be determined what the optimum size is for brainstorming groups both in reference to the number of ideas generated and the effectiveness of the collaborative evaluation process
7. more research is needed to determine the best process for moving from divergent to convergent processes.