Abstract

The quality of ideas a team generates constitutes an upper limit on the quality of the problem-solving process. Much research has been done about causes of idea quantity and causes of idea quality. It has been noted by some researchers that idea quality appears to correlate with idea quantity, and several have argued that it is not necessary to go to expense and effort required to evaluate idea quality since it correlates with quantity. This paper draws on Team Theory to develop a causal link between quantity and quality. It then presents a low-cognitive-load, high-reliability method for evaluating idea quality. It reports on a study that addresses the question, “Will an increase in idea quantity cause more good ideas to be generated?” The results support the hypothesis that there is a modest causal connection between quantity and quality, but the data suggest other factors are far more important for determining the number of good ideas a team generates. It concludes that researchers must continue to measure the effects of their brainstorming treatments on idea quality; it is not sufficient to assume that quality will always track quantity. Other factors not accounted for by the quality-quantity model may well counter and outweigh this effect.

Introduction

Idea generation is an important part of all phases of problem solving (Andriole, 1983; Brightman, 1980; Bross, 1953, Dunker, 1945). The quality of ideas generated constitutes an upper limit on the quality of the problem-solving process. Many problems are so large that no one person has all the experience, insight, or resources to solve the problem alone. In such cases people must make a joint effort to achieve their goal. A key part of that effort is group idea generation.

A great deal of research has been completed to create and improve methods for group idea generation. (See Diehl & Stroebel, 1987; Dennis & Gallupe, 1993; Fjermestad, Hiltz, & Turoff, 1993 for reviews). Since Osborn first introduced brainstorming it has asserted (or hoped) that groups who produce more ideas would also produce better ideas (Osborn, 1953). Much of brainstorming research focuses on methods to produce more ideas. Several studies have reported idea quality as well, and a few key papers report that idea quality does indeed correlate with idea quantity (Diehl & Stroebe, 1987; Dennis, Valacich, & Nunamaker, 1990; Gallupe, et al., 1992; Valacich, Wachtler, Mennecke, & Wheeler, 1993).

Evaluating idea quality can be a grueling, expensive, and uncertain task. Some studies do not address idea quality (Paulus & Dzindolet, 1993; Gopal, Bostrom, & Chin, 1993; Shepherd, Briggs, Reinig, Yen, & Nunamaker, 1995-96; ). while others argue that the existing empirical evidence precludes the necessity for going to the expense and effort of measuring idea quality.

The empirical record is equivocal, however. Some studies did not find a correlation between quality and quantity (For example, Connolly, Jessup, & Valacich, 1990). Because idea quality limits problem-solving quality, it is important to understand the genesis of idea quality, what causes high quality, and what causes poor quality. A theoretical model of idea quality could lead to rigorous investigation of whether and when quality follows quantity, which in turn could free researchers to pursue quantity secure in the knowledge that quality will follow. Such a foundation might also let practitioners reason about when quality will not follow quantity, and avoid bad meeting practices. Toward these ends, it might also be useful for researchers to find a fast, inexpensive, and reliable way to measure quality, to make investigations more feasible.

This paper offers a theoretical argument about why idea quantity should cause higher idea quality. It then describes a low-cognitive-load, high-reliability method for evaluating idea quality. The paper presents the findings of an empirical investigation into the relationship between idea quantity and quality, and finishes with a discussion on the implications of the results for researchers and practitioners.
Team Theory

Is it reasonable to think that generating more ideas should cause higher-quality ideas? Team Theory (Briggs, 1994, Briggs, & Nunamaker, 1996) offers a basis for arguing that it should. It is beyond the scope of this paper to fully examine the details of Team Theory, but an overview may be a useful foundation upon which to build the argument.

Team Theory offers a causal model for the productivity of a group of people making a joint cognitive effort toward a goal. It defines a group as the collection of people who have agreed to expend effort to achieve a goal. Team theory conceives of productivity as having two key components: efficiency and effectiveness (Prichard, Jones, & Roth, 1990). Efficiency refers to the degree to which resources are conserved during the accomplishment of a goal, while effectiveness refers to the quality of the outcome achieved.

Team theory posits that limits on human attention resources are key constraints on group productivity. Some authors discuss attention in terms of cognitive load or cognitive effort (Gilbert & Osborne, 1989). However, it is important to recognize that attention has a temporal component. People do not exert massive cognitive effort in instantaneous bursts. Attention is therefore defined as cognitive effort over time. This temporal component is a critical element for understanding group processes (McGrath, 1991).

Team Theory posits that in order to achieve the group goal, members must allocate their attention among at least three processes: communication, deliberation, and information access (DeSanctis & Gallupe, 1987) and information access (Figure 1). Each of these processes places demands on limited attention resources, and therefore interferes with the other with the other processes (Brainerd & Reina, 1990). Team Theory further posits that cognitive effort is motivated by vested interest. Therefore, it posits that group productivity will be a function of goal congruence, or the degree to which the public goal of the group is compatible with the private interests of the group members.

Communication, as conceived in Team Theory, is a multilateral process (Hatch, 1977; Poole & Jackson, 1993; Shannon & Weaver, 1964) involving the creation of stimuli -- words, images, behaviors, objects (Burger, 1985) -- in some media (Daft & Lengel, 1984) -- paper, voice, video, etc. The targets of communication perceive and assign meanings stimuli (Daft & Weick, 1984; Kosslyn, 1981; Short, Williams, & Christie, 1976) and create more stimuli which are perceived by the initiator, who may, in turn, modify outgoing communication in response. For instance, puzzled looks from a listener often prompt a rephrasing from a speaker.

Team Theory frames the Information Access process as an economic trade-off of the benefits derived from information and the attention required to access it. It posits that the function of information to increase the probability that one will expect the outcome one derives by selecting one course of action over others. Information has value to the extent that it is timely, accurate, and complete, and this value is offset by the cognitive costs for finding, assimilating, retrieving, and using the information.

Team theory frames deliberation as the cognitive processes required to form and execute intentions with respect to the group goal. The concept of intentions is broader and more inclusive than the concept of goals. A goal is a desired end state, but an intention includes the goal and a notion of the actions required to achieve the goal, the duration and intensity of action, resources required, etc. (Ajzen, 1985; Campbell & Prichard, 1976; Kuhl, 1985; Tubbs & Ekeberg, 1991).

There is a generic and seemingly ubiquitous set of deliberative processes associated with goal attainment. Many disciplines formalize their deliberative processes into structured methods. While the methods of these many disciplines differ, there are striking similarities in the processes upon which they are founded. Team Theory describes a generic deliberative process:

1. Understand the existing and desired situations
2. Generate alternative courses of action

Figure 1. The Constructs of Team Theory

---

1 Team Theory originally appeared under the name, “Focus Theory.”