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# Applying the BaGua to revitalize the creative problem solving process during a goal oriented contest

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ABSTRACT

Ancient Chinese wisdom has had a significant cultural impact, especially the philosophical system known as *I-Ching*. The BaGua (eight trigrams) provide a systematic method for creative problem solving that can be followed in both daily and professional life. Thus, the present study aimed to determine whether the application of the BaGua to creative problem solving (CPS) processes could be used to construct a model that could enhance problem-solving effectiveness across different domains. Research data were obtained from 188 of the 256 individuals who participated in the 2011 GreenMech contest. The contest required groups of 4 students to assemble parts into an unchained reaction system based on scientific principles and green concepts. Because each team was required to assemble their unchained reaction system in the morning and be evaluated in the afternoon, students were under pressure to solve problem to complete the target job. To underlie the BaGua to the CPS process into five stages corresponding: sensitivity to problem occurrence, mental activation, idea generation, idea transformation, and idea consensus (agreeing on a solution) as the essence of this study. The results of this study indicated that these five stages were directionally and sequentially correlated. All 12 hypotheses were supported except Hypothesis 4 which correlation was explained by beta and alpha brainwaves. The results showed that the BaGua model for CPS was applicable to individuals involved in high-pressure contests.



## 1. Introduction

Problem solving by nature is a complex process that requires mental effort and the gathering and processing of numerous ideas to reach a solution. The creative problem solving (CPS) process has been described as the "mutation" of a thought into many variants to generate ideas and the evaluation of these ideas to select the "fittest" or best variant (Ellamil, Dobson, Beeman, & Christoff, 2012). Most researchers agree that there are four core processes associated with the creative problem solving process (Illies & Reiter-Palmon, 2004; Reiter-Palmon & Illies, 2007). Those four processes are (a) problem identification and construction, (b) identification of relevant information, (c) idea generation, and (d) idea evaluation. If any of these processes are ineffectively performed, idea implementation may be poor. The first three processes are typically viewed as part of the idea generation phase, whereas the latter is considered part of the implementation phase (Mumford, 2001) or transforming phase (Treffinger, Selby, & Isaksen, 2008).

Most creative problem solving models suggest that the quality of the later processes may depend on the successful application of the earlier processes, which indicates that all of the processes are important (Valacich, Jung, & Looney, 2006).

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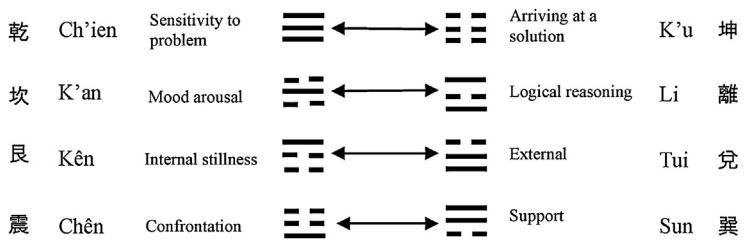


**Fig. 1.** The BaGua (eight-trigram) model of creative problem solving.

The theory of reasoned action (Ajzen & Fishbein, 1980) sought to understand the links among the concepts of action, where action was considered a particular subset of thought that consequentially controlled other actions. Thus, one's sense of control is stronger when a consistent "prior thought" (Wegner, 2002) precedes its effect. Wenke, Fleming, and Haggard (2010) note that such effect-priming may work by increasing the predictive representation of the effect. They believe that the theory of reasoned action could be extended to predicting the effects of thought and action.

Thoughts, when considered as part of a process, are either "identical to" or "realized by" action. Reasoning based on such representations will be able to predict the next action. The present study uses these distinctions between potential thoughts and actions and the results of a study by Hong et al. (in press), which used the BaGua to generally examine problem solving patterns, to divide contemporary approaches to CPS into five epistemic categories: *sensitivity to the problem, mental activation, idea generation, idea transformation*, *and idea consensus*, during which a solution is agreed upon. Each stage of problem solving affects the next stage. A previous stage, therefore, can predict the effect of the next stage, and the final success results from success in each of the stages. To test the effectiveness of this BaGua CPS model, this study confirmed the problem solving patterns implemented during a high-pressure, goal oriented contest.

## 2. Theoretical framework

A problem represents a gap between where we are or what we have and the desired location or outcome. Isaksen, Dorval, and Treffinger (2000) explain that problems can also be understood more broadly as questions for inquiry. The way to obtain a solution or identify a solution pathway or method can be known, predetermined, and relatively simple, or it can be unknown, complex and non-determined. Finding a solution in the former case is more a function of memory, expertise and knowledge. Finding a solution in the latter requires creativity of thought (Geary, 2005; Kirton, 2003; Treffinger et al., 2008). The desired outcome can already exist or be readily available or might not exist or be currently unavailable. The former situation calls for focused inquiry problem solving, the latter calls for creative problem solving (CPS) (Beer & Nohria, 2000; Bossidy & Charan, 2002; Jaarsveld, Lachmann, & van Leeuwen, 2012). In this study, CPS is being applied in the latter situation.

### 2.1. The essence of the BaGua system

*I Ching* is a philosophy of divination (TenHouten & Wang, 2001). The BaGua (eight trigrams) are derived from *I Ching* and propose that the complementary opposites Yin (broken; negative) and Yan (unbroken; positive) are the source of creativity for problem solving (Pham, Liu, & Dimov, 2006). Pham, Liu, and Dimov suggested that each *Yao* (line) contains *Yin* and *Yan*, which form two opposite extremes. Based on Baynes' (1967) and Flowers' (1998) interpretations, Hong et al. (in press) describes the Ch'ien trigram as the opening of problems; the Kun trigram represents the effectiveness of the final solution; the Tui trigram is associated with the pleasure associated with the action of reproducing an idea; the Kên trigram is connected with meditation; the Chen trigram is a confrontational force that awakens the revising process; the Sun trigram is the supporting force that helps one penetrate an idea; the Li trigram represents the light of logical thinking that gives all things their brilliance; the Kan trigram signifies passion and mood alteration (see Fig. 1).

Pham et al. (2006) explained that the CPS represented the five stages fundamental behavior: (1) sensing that a problem has occurred or will occur, (2) generating and gathering ideas, (3) decreasing conflict and increasing consensus, (4) transforming ideas, and (5) implementing the idea to solve the problem. In this process, elements of combination, segmentation, replacement of logical thinking and mood arousal are adapted. These stages correspond to the categories of CPS and can be arranged in an octagonal format with four axes. According to Hong et al., applying the binary system from *I Ching*, the 'A axis' (see Fig. 2) represents the problem-solving process; the Ch'ien trigram represents "beginning" in the universe and can be represented as the problem of an individual's openness to the world; the K'un trigram represents "ending," which can be interpreted as the effectiveness of the solution. Using the extended explanation provided by Pham et al., Hong et al. assign the generating and gathering ideas process to the Tui trigram and the Kên trigram. In the CPS process, finding a solution to a problem involves three basic interactions with data, devices and people through reading, observing and discussing (Bahra, 2001). This interaction is represented by the Tui trigram (see Fig. 1). The Kên trigram, however, represents a period of mental "stillness", or "self-contemplation," which is used to refine and master ideas. Bring BaGua to CPS process, an idea should be