

# Empowering Cognitive Fixedness

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## ABSTRACT

Our goal was to understand potential aspects of cognitive fixedness in people who possess traditional viewpoints. We conducted an experiment that involved design training (in-studio design and creativity training). We observed several stages of idea generation during which artisans generated ideas for new design of traditional wooden sandals. During the first stage, artisans were challenged to generate ideas at extreme levels based on their prior knowledge. We examined their conceptual sketches and verbalized thoughts to obtain stimuli (stimulating keywords). Interestingly, the stimuli, *painful*, *broken*, and *upside-down*, did not match their fundamental knowledge and conceptions of sandals related to criteria, “continuity” and “appropriateness.” During the second stage, the artisans redeveloped previous ideas by employing stimulating keywords. Finally, design trainers evaluated transformations that occurred during idea generation. The experiment demonstrated that the ability to capture and utilize stimuli during extreme levels of cognitive fixedness may lead to unconventional ways of thinking.

## Author Keywords

Craft Design Training; Cognitive Fixedness; Artisan; Designer

## ACM Classification Keywords

J.m. Computer Applications: Miscellaneous

## General Terms

Design

## 1. INTRODUCTION

In today’s technologically-driven and fast-changing environment, it appears that traditional knowledge or native know-how intrinsic to complex social systems have become increasingly unfamiliar to most of us [16]. In fact, some scholars have long alleged that creativity had its origin in native know-how. The ancient practice of expressing feelings by the use of pieces of tree bark, reeds, stones or

flowers provides demonstrations of early humans’ primeval motivations to create. It is easy to imagine how profound it must have felt when ancient humans expressed their feelings by presenting or creating art with natural objects. This genuine creative process helped develop our present culture. It involved early transcendental thoughts that defined the purposes of “gift” and “giving.” It offered humans ways to instill complex, intangible feelings into simple, meaningful objects. Over time, as humans learned to seek out perfection and exquisiteness, they acquired unconventional ways of thinking. Four thousand years ago, early humans imagined what finished implements might look like as they knapped finely-wrought stone tools [2]. These primeval motivations are a part of the creative process that has long been integrated into humanity’s existence since the early days when ancient craftsmanship began.

### 1.1 Traditional Artisans in Today’s Creativity

A traditional artisan or master craftsperson is a current example of an individual who engages in art and employs native know-how during acts of creativity (hereafter referred to as “Artisan”). Our case study observed wooden sandal artisans who reside in a developing country. Traditional artisans nurture their knowledge in ways that makes them appear conservative in their approaches to production novelties, as well as product concepts [15]. Artisans are often recognized for their traditional viewpoints that may be structured by prior knowledge and typical features contained in familiar categories [7]. Numerous studies have affirmed that reliance on past experience is a type of cognitive fixedness in which an individual remains stuck with one perspective and struggles to find new alternatives [9]. Recent research focused on the differences that exist between the in-depth cognitive levels of artisans and designers has revealed that artisans tend to capture operational and object attributes, rather than the presence and surroundings of objects. [10]. At the same time, this symbolic domain offers artisans the chance to become empowered. Many creative people believe that artisans’ works have high development potential [13]. How can we actually challenge a culture’s symbolic domain so we can “*make the familiar strange*” [3, 4]?

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## 1.2 Cognitive Fixedness

Most studies in the field of creativity have focused on the role of stimulus freedom that leads to creative solutions. These studies have designated the traditional viewpoint and its cognitive fixedness as an undeniable mastermind of mental constructs that can impede our ability to develop creative ideas. Cognitive fixedness is a perceptual barrier created by old ways of thinking and responding. It is most often demonstrated by functional fixedness [5, 8]. A large number of published studies have also described how stereotypical and conventional thought may lead to decreased creativity [12, 1, 6, 11]. It can be difficult to find studies that examine the potential aspects of cognitive fixedness. To date, most creativity studies have tended to focus on stimuli, rather than barriers. Only a limited amount of attention has been given to explorations of potentials hidden in barriers (i.e., cognitive fixedness). Therefore, this study will consider the traditional viewpoint that has long been regarded as a perceptual barrier that tends to inhibit traditional artisans' mental sets.

## 2. AIM

Our goal was to better understand the potential aspects of cognitive fixedness that might empower artisans who possess traditional viewpoints that drive their creativity. We investigated the stimuli for cognitive fixedness in traditional viewpoints that tend to inhibit traditional artisans' mental sets during idea generation.

## 3. METHOD

We conducted an experiment in which we offered design training (in-studio design and creativity training). We observed later stages of idea generation as artisans developed new ideas for traditional wooden sandals. During the first stage, design trainers challenged artisans to generate ideas at extreme levels based on their prior conceptions and knowledge. Artisans' conceptual sketches and frequently verbalized thoughts related to unfamiliarity or skepticism were later examined to obtain stimulating keywords. During the second stage, the artisans redeveloped previous ideas by employing these stimulating keywords. Finally, the design trainers evaluated transformations that occurred during idea generation (see, Fig. 1).

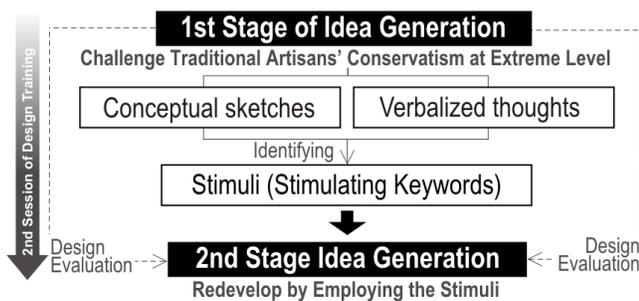


Figure 1. Research framework: design training experiment.

## 3.1 Participants

The subjects consisted of 15 male traditional wooden sandal artisans whose ages ranged between 27 to 51 years. They are respected as master craftspeople who possess special skills and artistry. Two designers served as design trainers. They guided this experiment.

## 3.2 Procedure

The experiment was conducted during a 20-day period (eight hours per day). An outline of the procedure and discussion of the second session (Design Exercise\*) are provided below:

- a. First session: Design Basics lecture:
  - Design Principles (balance, proportion, and so on).
  - Creativity Icebreaker games for habituation.
- b. Second session: Design Exercise\*
  - From preliminary ideas to idea development.
- c. Third session: 1:1 workshop prototyping.
  - Foam modeling, upper strap variations, and finishing.

During the second session (Design Exercise\*), we employed the followings steps:

1. The first stage of idea generation:
  - a. Escalating artisans' extreme conservatism.
  - b. Identifying stimuli in artisans' conceptual sketches and verbalized thoughts.
2. The second stage of idea generation:
  - a. Redevelop previous concepts by employing obtained stimuli (Stimulating Keywords).
3. Finally, we evaluated transformations that occurred during idea generation and reviewed potential aspects.

## 4. ANALYSIS AND DISCUSSION

### 4.1 The First Stage of Idea Generation

The artisans were encouraged to achieve extreme levels to generate their best ideas. They were instructed to generate ideas in their usual manner, but they were asked to generate these ideas as extreme levels. Rather than requesting that they act unconventionally, they were challenged to employ their old ways/conservatism to extreme levels. We observed that they elaborated their prior conceptions and knowledge in designs that contained meticulous curvature forms, complex decorative shapes, and linear, repetitive-patterns (see, Fig. 2). We realized that the artisans believed that these conservative ideas fulfilled fundamental conceptions of appropriate sandal shapes: "continuity" and "appropriateness." A good sandal design must correspond to the requirements of "continuity" and "appropriateness." The sandal's shape must be continuously streamlined and the design must perform well as a finished sandal. However, in contrast, artisans' verbalized thoughts revealed their unfamiliar or skeptical feelings generated by their extreme cognitive fixedness. Some examples of artisans' expressions of unfamiliar or skeptical feelings include "seems like it might be so painful to wear," "seems like it might break easily," "it's an odd upside-down sandal." We omitted less relevant verbalizations, sorted artisans' relevant, frequently verbalized thoughts, and transcribed them into English. We designated "painful," "broken," and

“upside-down” as Stimulating Keywords (stimuli). These terms were associative words that artisans produced after reflection. These terms corresponded to their in-depth cognitive levels [14]. Verbalized thoughts with discrepancy to their fundamental comprehension were not taken into consideration. The selection was also based on repeated verbalization performed by 87% of artisans.

Our intention was to capture stimuli that activated their prior knowledge and conceptions of beautiful sandals. A current design of extreme beauty might include a plain hyper-flat shape that is immensely minimalistic. In contrast, the artisans believed that a design of extreme beauty would include a super-meticulous, exaggerated shape (see, Fig. 2).

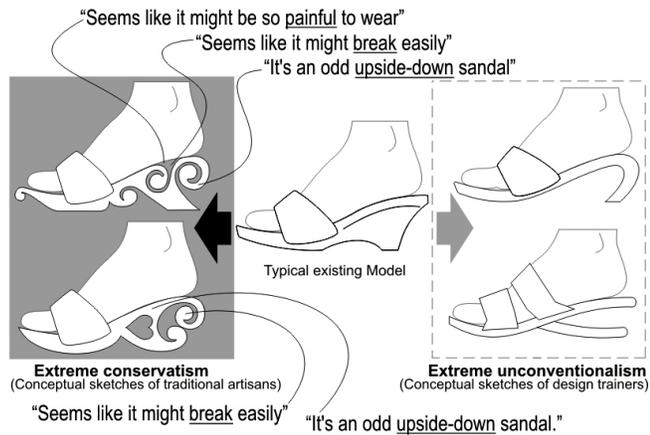


Figure 2. Extreme conservatism in idea generation.

### 4.2 Second Stage of Idea Generation

Csikszentmihalyi has stated that creativity is the process by which a symbolic domain in the culture is changed [3]. We challenged artisans to redevelop their previous ideas (extreme conservatism) by the use of Stimulating Keywords: “painful,” “broken,” and “upside-down.”

During the second stage of idea generation, artisans tended to maintain a moderately fundamental comprehension of sandal (“continuity” and “appropriateness”). Although they still felt awkward, at the same time, they did not express reluctance or rejection. In all likelihood, the stimuli (“painful,” “broken,” and “upside-down”) were derived from their unconscious minds. Thus, they were willing to experiment. Their search for the beauty in “broken,” “upside-down,” and “painful” released them from their strict fundamental comprehension of “continuity” and “appropriateness.”

### 4.3 Evaluation

Artisans’ conceptual sketches during the first stage revealed that they had taken a completely different direction. The features of extreme conservatism were complex-decorative. In contrast, the features of extreme unconventionalism were minimum-attribute. However, during the second stage of idea generation, evaluations by design trainers revealed that artisans’ conceptual sketches had become increasingly unconventional. They yielded some potential accents that

looked promising for realization. The artisans became a bit more flexible in heel size composition, direction, and orientation. In fact, they did not become awkward as they deformed the basic structure of the sandal (see, Fig. 3)

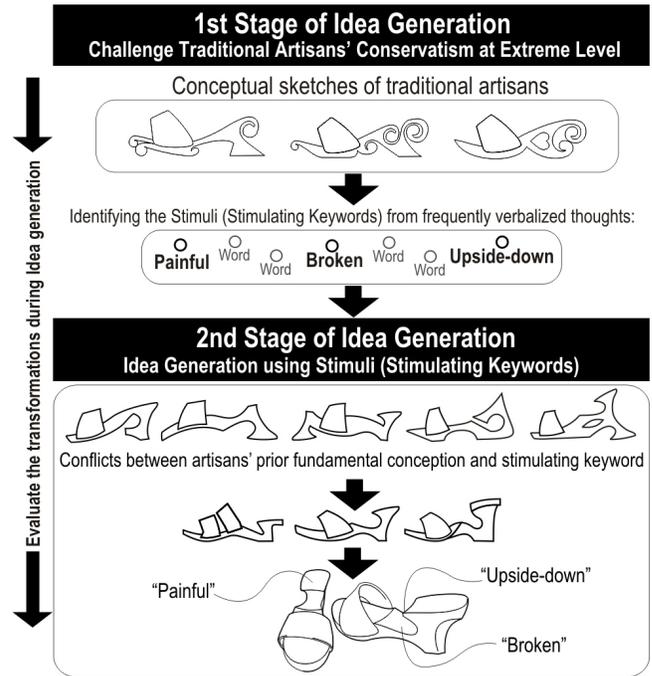


Figure 3. Design Experiments.

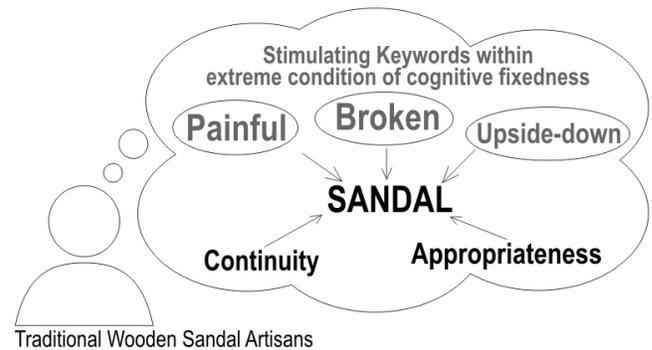
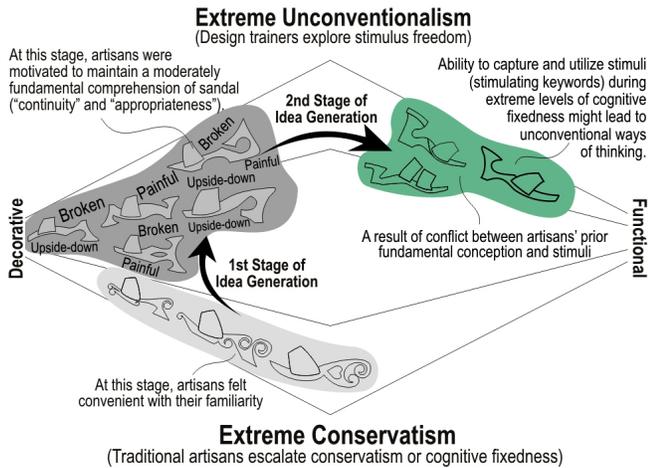


Figure 4. The conflict that exists between fundamental comprehension and stimuli contained in extreme levels of cognitive fixedness.

Finally, we realized that artisans apparently were motivated to transform their fundamental comprehension when they engaged in extreme levels of conservatism. They were motivated to become flexible in the face of fundamental comprehension (see, Fig. 4). This conflict was confirmed in their frequently verbalized thoughts that employed the opposite terms of fundamental comprehension. During the second stage of idea generation, they were introduced to their own stimuli that were obtained during their exposure to extreme levels of conservatism. They became more spontaneous and allowed ideas to flow that modified their fundamental comprehensions of “continuity” and “appropriateness.” Ultimately, this experiment

demonstrated that, in all likelihood, when artisans' conservatism is pushed to extreme levels, they will become more unconventional during their creative activities (see, Fig. 5).



**Figure 5. Traditional artisans' transformations during idea generation.**

## 5. CONCLUSION

This study makes substantial contributions to our understanding of the ways that stimuli can inhibit or encourage artisans' cognitive fixedness. Conservative artists who gain the ability to capture and utilize these stimuli may develop increasingly unconventional ways of thinking. Artisans have traditionally learned craftsmanship through apprenticeships in which they acquire ancient creative know-how. We suspected that this ancient know-how contains certain stimuli that become activated during creative cognition. They continue to cause inhibition deep within traditional artisans' minds.

Several years after the completion of this design training, the upside-down wooden sandal, known as the Extreme Wooden Sandal (*Kelom Ekstrim*), became popular and entered the international market.



**Figure 5. Before and After**

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