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The imaginative approach: Characteristics of craft artisans' and design trainers' in-depth cognitive levels during a design training program

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Abstract: *This paper investigated and discovered the differences that exist between craft artisans' and design trainers' in-depth cognitive levels during the use of the imaginative approach in a design training program. We employed a concept network method based on the associative concept dictionary to extract the verbalized thoughts of four craft artisans and four design trainers. We then identified semantic relationships based on factor analysis. Our findings revealed that craft artisans tended to activate lower in-depth cognitive levels and design trainers tended to generate deeper in-depth cognitive levels. Our study demonstrated that craft artisans tended to place greater focus on aspects of an artifact, such as operation (replace, reduce, and so on); shape (waist, body, and so on); proportion (length, size, and so on). Alternatively, design trainers gave more consideration to the presence of surroundings issues such as scene (silverware, custom, and so on); companion (fruit, bagel, and so on); and appeal (fresh,salad, and so on). We discovered that the employment of widely used design methods for training tended to keep craft artisans in a mental state that created perceptual barriers and obstructed their imaginative approach.*

Keywords: Creativity, cognition, imagination, craft artisan, design trainer.

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Introduction

Many developing countries have begun to focus on rural industry development because of its potential for new job creation and to maintain national and cultural identities. They have begun to implement technical assistance programs, such as design training, to improve traditional artisans' skills and creativity levels. However, there is currently a lack of capable design trainers who possess the ability to understand indigenous cultures and environments and to translate these cultural values into improved designs (Suzuki 2005). In addition, gaps in the design thinking process during the idea generation stage can occur between traditional craft artisans and design trainers. Often, artisans may become uneasy if problems develop. They may also feel sceptical about unconventional design concepts (Nagai 2012). We use the following terminologies in this paper:

- *Design Training* consists of a nationwide governmental HRD program that operates in developing countries. It provides in-studio type design and creativity training for traditional craft artisans. It aims to improve product quality.
- A *Craft Artisan* is a traditional master craftsperson who resides in a developing country. He or she may possess less formal education. However, he or she has acquired special artisan skills and gained expertise in his or her local village's traditional crafts that have been passed down from one generation to another.
- A *Design Trainer* is an industrial or architectural design graduate who possesses work experience as an instructor in a design training program aimed at the promotion of traditional crafts.

Creativity and design training

In some cases, the teaching of design and creativity to traditional craft artisans can be a difficult task because traditional artisans often possess conservative viewpoints and lack an understanding of the creative process. However, scholars believe that creativity can be learned by instruction and training. Efforts have been made to provide direct instruction that involves the students' cognitive abilities and processes (Ripple 1999). At a basic level, creativity and design training hopes to introduce widely known design methods. Its purpose is to encourage creativity. During training classes, craft artisans receive an introduction to Design Principles (e.g. balance, proportion, and so on). They begin the course by engaging in Creativity Icebreakers. They then participate in design exercises and develop prototypes. A typical training program may last between five and seven days.

In this paper, we assume that differences in creative cognitive abilities exist between traditional craft artisans and design trainers. Perceptual barriers or fixations are obviously rooted in each individual's unique experiences, interests, biases, and values (Davis 1999). Gaps that may develop in the conceptual design process that occurs between craft artisans and design trainers during a design training program (Nagai 2011) may correspond to the most obvious barrier to creative thinking: habit. The term habit refers to an individual's well-learned ways of thinking and responding (Dodds 1999). At the same time, a design training program cannot simply rely on the typical conceptual design process because this process may serve as another fixation. Hence, we believe that an investigation of the cognitive level of creativity that operates in craft artisans' design processes can provide fertile ground for the development of more effective teaching methods for design training programs.

Early Stage of Idea Generation

Idea generation is an essential step in the design thinking process. It involves the interplay between cognitive and affective skills that leads to the resolution of recognized difficulties (Houtz and Patricola, 1999). The general steps involved in design thinking are listed below. The most discussed step is the early stage of idea generation.

1. Imagination (early stage of idea generation): The stage during which artisans and designers observe and reframe the design problem.
2. Ideation (later stage of idea generation): The stage during which artisans and designers employ sketches, graphs, or paper models to generate visual ideas.
3. Prototyping: The stage of making rough models to convey ideas concretely.
4. Evaluation: During this stage, users' feedback is acquired by evaluations of affective preferences. (The step that occurs after the design thinking process consists of realization or production for commercial purposes.)

The early stage of idea generation involves observations by artisans and designers based on first-hand experiences. This stage is associated with a greater diversity of ideas (Leijnan and Gabora, 2010). In particular, this stage of imagination is associated with differences in creative cognition. Therefore, it is reasonable to assume that an individual's fundamental thoughts are captured to a fair degree at this point. This is an appropriate stage to examine artisans' and designers' first-hand experiences as they observe and reframe design problems.

Cognitive aspects of creativity

No concrete references exist that provide methods to be used to teach skills during design training programs. Design training programs are often devised to develop crafts that will meet consumers' needs. Trainers are often solely concerned with the appearance of the crafts. Strong evidence has revealed that design trainers tend to recycle whatever information they learned at university to create design training programs. Many design trainers report a lack of clear understanding of the tasks involved. They may miss opportunities to enhance creativity (Suzuki 2005).

In general, cognition is considered a major factor in the creative process (Finke, Ward, and Smith 1992). Most of the conceptualization of creativity in the design process is based on exploration of the cognitive aspects of creativity (Casakin 2011). Extensive studies have been conducted to capture the cognitive levels of creativity used during the design process. These studies attempted to understand users' affective preferences, such as taste, and the feelings they may experience that can result in successful impressions of products (Cross 2006; Nagai 2011). However, only a limited number of studies have explored the cognitive level of creativity that occurs during the design process at the very early stage of idea generation. This stage is associated with a greater diversity of ideas (Leijnan and Gabora 2010). In particular, this stage is associated with differences in creative cognition that occur between traditional craft artisans and design trainers.

Surface cognitive level and in-depth cognitive level

It can be difficult to explicitly describe our thoughts. Our explicit expressions and/or words may result from shallow analysis. Therefore, these expressions and/or words are referred to as being on the surface cognitive level. However, the term implicit impression refers to that which is not explicitly recognized or verbalized (Reingold, Colleen 2003). This underlying form of cognition may be difficult to express. Thus, it is referred to as the in-depth cognitive level (e.g. feelings, tastes, and

impressions) (Taura 2010; Nagai 2011; Georgiev 2011). Implicit impressions are implied beneath explicit impressions that are related to deep impressions. This process establishes extremely rich metaphorical concepts that become key features of cognition that occurs during the creative design process. Additional studies have focused on the use of metaphors to enhance creative design solutions. These studies hoped to discover how rich metaphorical words formed the basis of creative design (Goldschmidt, Tatsa 2005; Lugt 2005; Yamamoto et al. 2009).

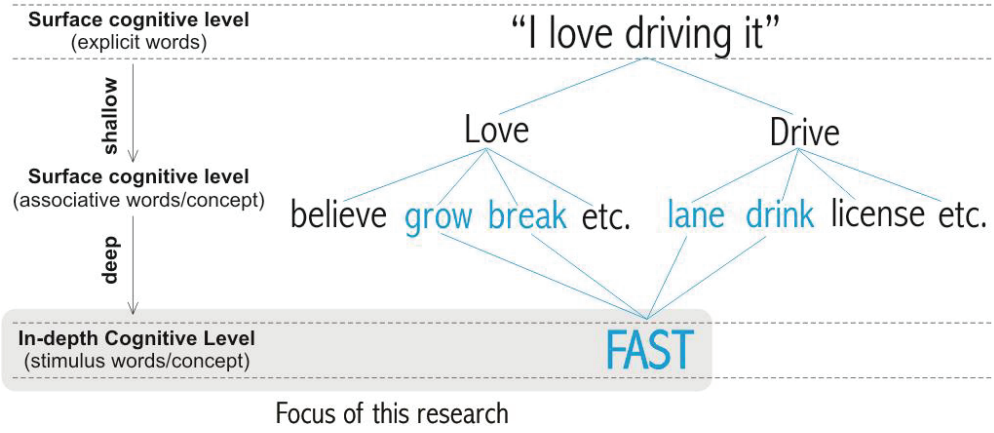

Figure 1. Capturing the in-depth cognitive level using an Associative Concept Dictionary

To examine cognitive levels based on subjective experiences, researchers may employ think-aloud method as part of protocol analyses that can be applied to produce verbal reports of thinking processes (Ericsson, Simon 1993) (Figure 1).

Associative concept network analysis

An associative concept is a representation of an individual's expression. It is a stimulus that can lead to another associative meaning. It is comprised of six sub-types: connotative, collocative, social, affective, reflected, and thematic (Mwihaki 2004). The conceptual network depicts human memory as an associative system, in which a single idea can contain multiple meanings (i.e. it is polysemous). A concept network employs a computational model to reproduce observable aspects of expressions associated with an individual's mental state. It is a suitable tool for associative analysis that can be used to explore latent links that exist among concepts. The concept dictionary utilized in conceptual networks originated at the University of South Florida Free Association Norms database (USF-FAN). It consists of free associations, rhymes, and a word fragment norms database. It is the largest database of free associations ever collected in the United States (Nelson et al. 2004; Maki and Buchanan 2008).

Aim

In this paper, we investigated the different characteristics of in-depth cognitive levels that occur in craft artisans' and design trainers' imaginative approaches during the early stage of idea generation. Our goal was to develop an effective design training program that might provide effective teaching methods and resources for design trainers. We hope that our results will provide a more reliable and understandable approach to the training of traditional craft artisans.

Method

In this study, we used a concept network method based on the associative concept dictionary described above to extract verbalized thoughts. The framework for this research consisted of the steps listed below (Figure 2).

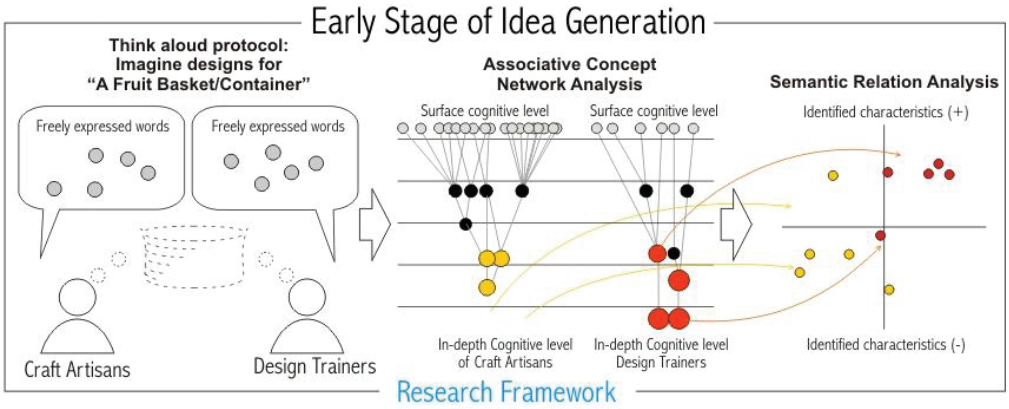

Figure 2. Research framework: Identifying the different characteristics of in-depth cognitive levels

Participants

We chose eight subjects to participate in this experiment: four craft artisans and four design trainers. They ranged in age from 27 to 51 years. Each of the four craft artisans are known as master craftspeople who possess special skills in artistry. Their special expertise in their local village's traditional bamboo crafts has been passed down from one generation to another. The four design trainers were graduates of industrial design programs. Each had experience as an instructor in a design training program.

Procedure

The participants were not required to engage in specific activities, such as drawing or observation of stimuli. They were deliberately conditioned. We provided the minimum instructions they required to understand fundamental associative concepts. Factors such as background, tradition, culture and context might influence the verbalized thoughts, therefore this study focus only at the very early stage of idea generation (imagination). This stage is believed provide a neutral, fundamental and fair playing field. In addition, we avoided rigid instruction about determinations of design themes, market segmentation, or design functions because we believed that the provision of excessive information might be unfair. The provision of minimum instructions created a fair playing field. It allowed us to observe craft artisans' and design trainers' responses and motivations as they reframed design problems. We placed no constraints on the subjects when they verbally expressed their ideas and engaged in spontaneous thinking that mirrored their process when they searched for new design ideas.

The main instructions for the think-aloud protocol experiment asked participants to imagine designing a fruit basket/container. We encouraged free expression of their ideas. The direct instructions are listed below:

'Please imagine designing a fruit basket/container.'

'Please freely express any ideas that arise.'

No time limits were imposed on participants during the think-aloud protocol experiment. On average, participants took about six minutes to express their imaginative thoughts. All procedures were recorded as verbal data that would be sorted later.

Participants were instructed to imagine designs for a fruit basket/container and they were encouraged to freely express their ideas (i.e. think-aloud protocol). All procedures were recorded as verbal data. This data was sorted based on grammatical rules that addressed connecting words, such as prepositions, a few general verbs, articles, and pronouns. We omitted other less relevant explanations. Finally, we transcribed the sorted verbal data that consisted solely of nouns, adjectives, adverbs, and verbs into English. Furthermore, the data was visualized by the use of Pajek 2.05 based on 2D layers in Y direction. The data was analysed according to the concept network method based on the USF free association dictionary. The resulting visualization presented an observable conceptual network that displayed low or highly weighted associative words indicated by the out-degree centrality score (ODC). The concept network depicted the structure of participants' surface and in-depth cognitive levels. Next, we identified the concept network by analyzing semantic relationships.

Analysis

During the first stage of the analysis, we obtained 201 sorted verbal expressions (i.e. nouns, adjectives, adverbs, and verbs) from craft artisans, and 213 sorted verbal expressions from design trainers. At that point, it was difficult to identify the tendency of these expressions (Table 1). The sorted verbal data was further visualized as graphs of the conceptual network (Figure 3 and 5). Craft artisans' conceptual networks generated 2991 vertices (nodes), and design trainers' networks generated 2760 vertices (nodes).

Table 1. Sorted verbal expressions (partly shown)

CRAFT ARTISANS	DESIGN TRAINERS
above, abundant, add, adjust, angle, appear, apple, apply, artistic, asia, attach, ball, bamboo, base, basic, basket, beak, between, big, body, booming, boss, both, box, businessman, buy, buyer, capable, capacity, capital, category, centimeter, ceramic, choose, circle, coating, colour, combine, concern, consistent, consumer, contain, container, corner, correspond, cost, count, cover, craftsman, curve, cut, dark, decor, delivery, demand, depend, design, develop, diameter, dice, differ, different, difficult, dimension, duck, easy, economy, edging, egg, end, europe, experience, extraordinary, five, flat, flower, food, form, frame, free, fruits, fulfill, function, gambier, general, glue, good, goods, grape, grip, handle, head, height, heron, high, hobby, idea, ideal, imagine, income, increase, insert, international, etc.	accommodate, according, added, aesthetic, age, appeal, appear, apple, apply, appreciate, artificial, attention, attractive, available, bamboo, banana, base, basket, big, bowl, box, bread, break, buy, ceramic, chance, character, children, clean, clear, coating, coiling, colour, combine, commercial, community, concern, consider, contain, container, conventional, craft, craftsman, create, crowd, crush, culture, curve, cute, cutlery, damage, decorate, delicious, design, develop, different, dignity, direct, display, distinct, durian, dust, dye, easy, eat, environment, everyday, example, expensive, experience, explore, extraordinary, facilitate, factor, first, frame, fresh, fruits, function, general, grape, habit, hand, hang, hoe, hygiene, idea, identical, imagination, imagine, immediate, etc.

Craft artisans' associative concept network

Tables 2a and 2b display the craft artisans' highest score of ODC: 0.0397 with a total of 12 words. This figure describes the levels of their in-depth cognitive levels, based on comparisons with Figure 4a. This shows that most of the associated words are ranked at the level below 0.0200. This means that many words lie at the surface cognitive level. If we consider the range between 0.0300 and 0.0500 as a representation of highly weighted associative words within the in-depth cognitive levels, we can see that craft artisans generated 146 associative words (0.048%) and do not exceed range of 0.0400. These highly weighted associative words demonstrated their imaginative approach as illustrated in Figure 4.

Table 2a. Distribution of ODC scores

CRAFT ARTISANS		
Range	ODC Score	Words
≤ 0.0500		
≤ 0.0400	0.0341-0.0398	12
≤ 0.0300	0.0227-0.0284	134
≤ 0.0200	0.0114-0.0170	1039
≤ 0.0100	0.0057	1630
0.000	0.0000	176
Total		2991

Table 2b. Highly weighted ODC scores

HIGHLY WEIGHTED WORDS (FEW)		
No.	Associative Words	ODC Score
1	Clothes	0.0398
2	Shape	0.0398
3	Replace	0.0341
4	Curve	0.0341
5	Waste	0.0341
6	Grow	0.0341
7	Etc.	-

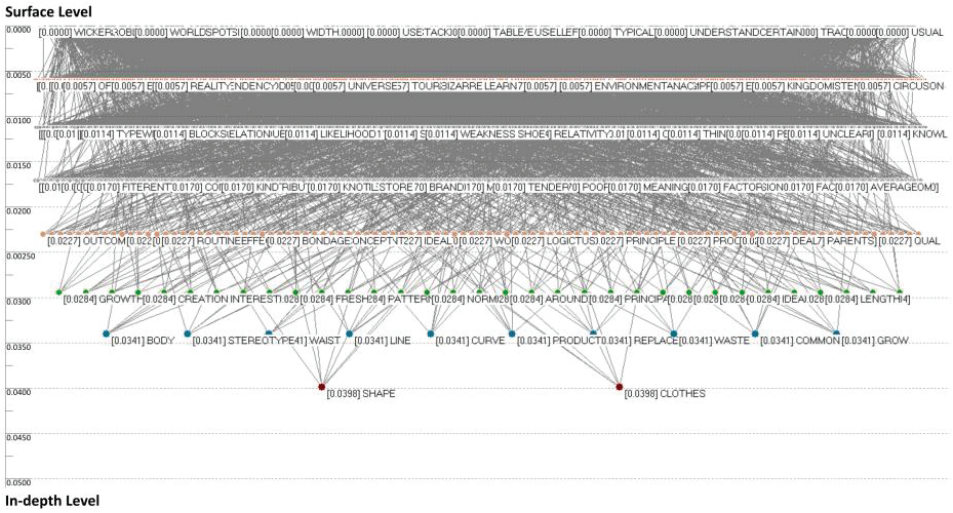

Figure 3. Associative concept networks of Craft Artisans

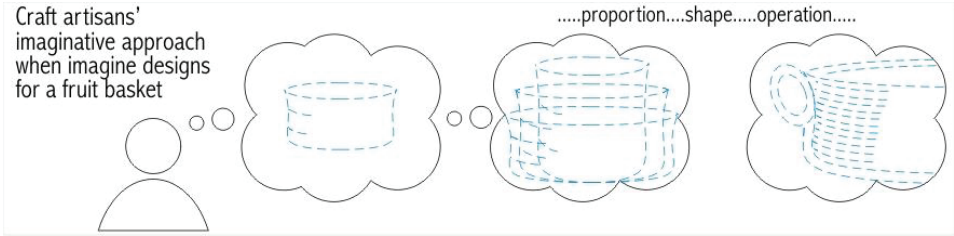

Figure 4. Illustration of craft artisan imaginative approach

Design trainers' associative concept network

Tables 3a and 3b display the design trainers' highest score of ODC: 0.0497 with a total of one word. This figure describes the level of their in-depth cognitive levels, based on comparisons with Figure 3. We can see that most of the associated words are ranked in the level below 0.0200. This rank is similar to the rank achieved by craft artisans. If we consider a range between 0.0300 and 0.0500 to be a representation of highly weighted associative words, then we can see that design trainers generated 112 associative words (0.040%). This result is slightly lower than the result achieved by craft artisans. However, the highest ODC score of 0.0497 achieved by design trainers ranked in the above 0.0400 range. This means that design trainers generated deeper in-depth cognitive levels, and their imaginative approach as illustrated in Figure 6.

Table 3a. Distribution of ODC scores

DESIGN TRAINERS		
Range	ODC Score	Words
≤ 0.0500	0.0497	1
≤ 0.0400	0.0331-0.0387	13
≤ 0.0300	0.0221-0.0276	98
≤ 0.0200	0.0110-0.0166	927
≤ 0.0100	0.0055	1540
0.000	0.0000	181
Total		2760

Table 3b. Highly weighted ODC scores

HIGHLY WEIGHTED WORDS (FEW)		
No.	Associative Words	ODC Score
1	Silverware	0.0497
2	Fruit	0.0387
3	Tupperware	0.0387
4	Focus	0.0331
5	Dish	0.0331
6	Dishes	0.0331
7	Etc.	-

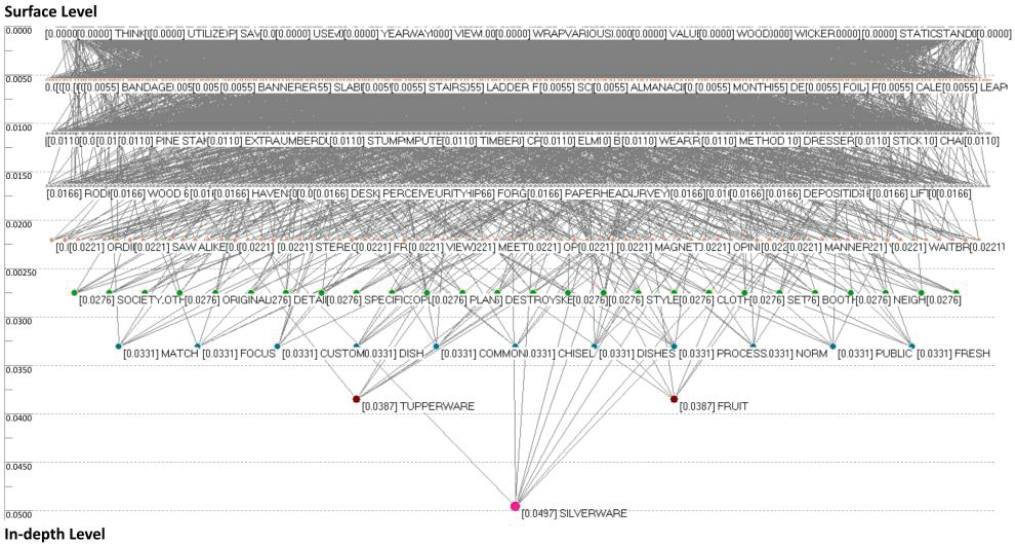

Figure 5. Associative concept networks of Design Trainers

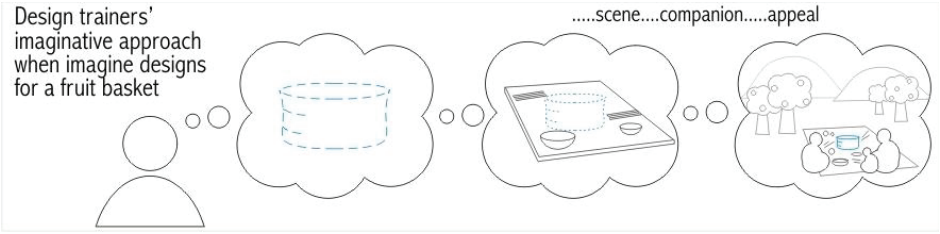

Figure 6. Illustration of design trainers' imaginative approach

Identification of the list of characteristics of associated concepts

Until this stage, data extraction based on the associative network revealed that craft artisans generated 0.048% words at the in-depth cognitive level. This was only slightly higher than the 0.040% words generated by design trainers. However, the design trainers generated a deeper in-depth level of cognition during the imaginative approach. To detect the distribution and tendency of these associative words, we first identified the craft artisans' and design trainers' collected generated associative words based on their characteristics (Table 4). Further, we intended that these identified characteristics would serve as variables to be analysed in the factor analysis we would perform to obtain semantic relationships.

Table 4. Generated associative words at surface and in-depth cognitive level (partly shown)

List of 2991 generated associative words (ordered by the highest ODC score)	List of 2760 generated associative words (ordered by the highest ODC score)
Craft Artisans	**Design Trainers**
clothes, shape, replace, curve, waste, grow, waist, product, stereotype, line, common, body, reduce, corner, creativity, balloon, round, sphere, stripe, standard, chest, growth, population, portion, hip, intestine, slender, principal, suggestion, around, oval, bond, interest, cloth, pattern, norm, normal, ordinary, basic, decision, fresh, sample, idea, length, creation, numbers, geometry, bite, green, rotten, continent, basket, bowl, cube, rubber, string, wicker, third, neutral, etc.	silverware, cinnamon, tupperware, focus, dish, dishes, match, fresh, chisel, public, custom, norm, common, process, gravity, produce, wicker, waste, elaborate, basket, porcelain, booth, destroy, replace, creativity, neighborhood, cloth, detail, perception, clothes, society, originate, people, pattern, original, specific, position, plan, set, style, mental, charm, wrinkle, cobbler, orange, peel, rot, natural, important, pretty, slender, apple, monkey, split, etc.

We discovered that *Scene, Companion, Appeal, Operation, Shape* and *Proportion* were the most closely identified characteristics of a number of selected words at the in-depth cognitive levels (see, Table 6). These characteristics are listed below:

Scene: A word that corresponded to the presence of surroundings (i.e. object, nature, customs, etc.);

Companion: A word that corresponded to the a ready-made counterpart, accompanying, matching to the presence of food (i.e. fruit, orange, bagel, etc.);

Appeal: A word that corresponded to the serving, preparation, processing, or presentation (i.e. juice, style, slice, etc.);

Operation: A word that corresponded to processing, or other physical activity (i.e. reduce, bond, etc.);

Shape: A word that corresponded to particular form or body-part, (i.e. waist, prism, body, round, etc.);

Proportion: A word that corresponded to physical elements or units of measurement, (i.e. length, size, rectangle, etc.).

The identified characteristics of crafts artisans' and design trainers' associative concepts are described below.

Table 5. Identified characteristics of associative concepts

List of identified characteristics
(Scene) silverware, tupperware, dish, custom, norm, booth, picnic, woods, etc.
(Companion) fruit, dishes, carrot, orange, apple, bagel, olive, lemon, pastry, pear, etc.
(Appeal) match, fresh, style, peel, rot, sauce, cooked, soup, slice, salad, juice, etc.
(Operation) replace, reduce, bond, elaborate, develop, detach, form, magnify, change, etc.
(Shape) curve, waist, prism, body, corner, round, sphere, chest, portion, hip, oval, etc.
(Proportion) length, size, tall, wide, rectangle, square, inch, diameter, weight, feet, etc.

Analysis of semantic relationships

We distributed 120 associative words that corresponded to the identified characteristics of associative conceptual structures. ODC scores ranged from the highest to the lowest (Table 5). The identified characteristics consisted of proportion, shape, operation, scene, appeal, and companion. We used these six variables in our factor analysis. Furthermore, the correlation among variables was extracted into two factors. The KMO score of 0.639 was significant. The factor matrix and corresponding names are listed below.

Table 6. Rotated factor matrix

Adjectives (+)	Adjectives (-)	F1	F2
Scene	Less Scene	,931	-,296
Companion	Less Companion	,916	,057
Appeal	Less Appeal	,910	-,164
Operation	Less Operation	,217	,942
Shape	Less Shape	-,339	,925
Proportion	Less Proportion	-,328	,914
Eigenvalue (After rot):		2,80	2,69
KMO:			,639

Table 7. Corresponding name

Factor	Adjectives	Eigenvalue	Factor Name
F1	Scene, Companion, Appeal	2,80	SURROUNDINGS
F2	Operation, Shape, Proportion	2,69	OBJECT-ORIENTED

For Factor 1, *Scene*, *Companion*, and *Appeal (*hereafter referred to as *Surroundings)* were associated with the presence of the fruit basket/container. For Factor 2, *Operation, Shape*, and *Proportion (*hereafter referred to as *Object-Oriented)* were associated with technical aspects of the fruit basket/container. Furthermore, factors were displayed on an orthogonal map to investigate the semantic relationships that existed between the identified characteristics of craft artisans' and design trainers' associative concepts (Figure 5).

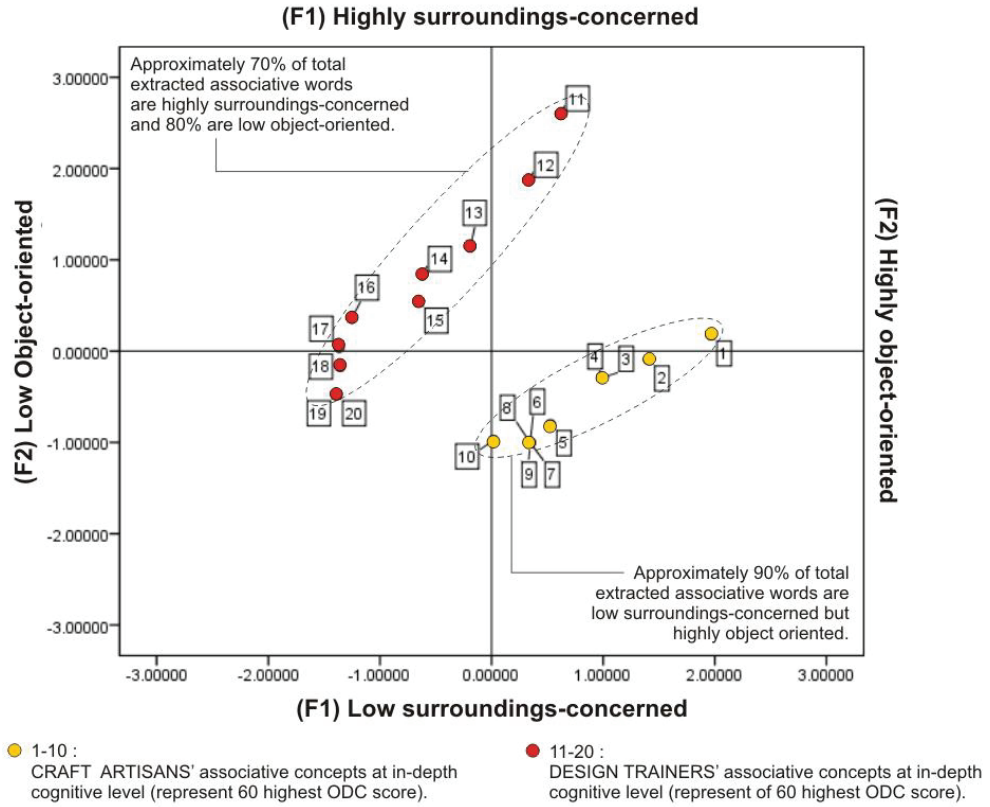

Figure 7. Semantic relation map

Discussion

In-depth Cognitive Level and Creativity

We identified the extracted words obtained from the concept network analysis revealed that craft artisans seemed to place greater focus on the appearance and technical aspects of the fruit basket/container. It featured such as shape, body, chest, waist, hip, size, tall, wide, reduce waste and so on, identified as characteristics of *operation, shape* and *proportion.* In contrast, design trainers gave more consideration to the presence of the fruit basket/container. It generated following associated words, such as silverware, tupperware, napkin, norm, soup, salad, cinnamon, kitchen, neighborhood, and so on, identified as characteristics of *scene, companion,* and *appeal*. This is confirmed by Figure 5, approximately 70% of total extracted associative words of design trainers were highly surroundings-concerned and 80% are low object-oriented. Whereas, approximately 90% of total extracted associative words of craft artisans were low-surroundings concerned but highly object-oriented.

We discovered that the craft artisans generated 0.048% words at the in-depth cognitive level. This was only slightly higher than the 0.040% words generated by the design trainers. However, the design trainers generated deeper in-depth levels of cognition during the imaginative approach (i.e. above 0.0400 range). Design trainers tended to use more highly weighted associative concepts (polisemous words). This was

demonstrated by the highest ODC score achieved at the in-depth cognitive level that corresponded to remote association.

To explore these results, we referred to the Associative Gradient Theory. It proposes that more closely associated or 'stereotypical' representations may lead to lower creativity. The greater the number of associations, the greater the probability of reaching a creative solution, because remote associations (i.e. highly weighted associative concepts) are best suited to these solutions (Mednick 1962; Baer 1993; Eysenck 1997; Martindale 1995). Yamamoto et al. (2009) argued that the polysemy of a design idea is significantly correlated with its originality. This indicates that design trainers' deeper in-depth cognitive levels have greater probability of achievement of creative solutions. The creative process that produce the polisemy of a design idea which establishes extremely rich metaphorical concepts become key features of cognition that occurs during the creative design process (Yamamoto et al. 2009). Additional studies have also focused on the use of metaphors to enhance creative design solutions (Goldschmidt, Tatsa 2005; Lugt 2005). This study confirmed that there were significant differences of associative concept at the in-depth cognive levels between craft artisans and design trainers. Design trainers' associative concept comprised of deeper in-depth cognitive levels represented by more number of highly polysemous or methaporical concepts than craft artisans.

Our findings suggest that the roles of closely and remotely associated concepts at the in-depth cognitive level during the early stage of idea generation differ for craft artisans and design trainers when they observe and define design problems. Craft artisans' in-depth cognitive levels have fewer polysemous features. This may explain their concerns about more tangible issues such as proportion and shape. Design trainers' in-depth cognitive levels have more polysemous features. This may explain their concerns about intangible issues such as users' affective preferences (i.e. scene, appeal, and companion). The semantic relationship map confirms that the craft artisans tended to focus on physical properties of the artifact rather than on the surroundings and on users' affective preferences. Alternatively, the design trainers were much more attentive to issues related to the artifact's presence and less attentive to its physical properties.

This experiment demonstrated the weakness of the approach and content that used in a design training program. The approach that tended to dictating disallowed craft artisan's in-depth cognitive levels to be flexible and open. Again, this study focused only at the early stage of idea generation. In all likelihood, if the experiment was carried out at the later stage of idea generation will further demonstrated a much more significant result on low access to in-depth cognitive levels.

Evaluation of the imaginative approach

Numerous international forums have identified there are problems of craft promotion issue, including less effective design training program that operated for years in developing countries. In local Focus Group Discussion, the issue about lack of appropriate methodology and materials often appeared. Design training seemed to be merely a prototype-making training where artisans failed acquiring and exploring creative ways. Many participants or craft artisans admitted of the problem after the training was completed, they encountered difficulty to re-applying the creative approach that has been trained, and in the end, they return to the old ways. We must evaluate the contents and methods used in design training programs to develop effective methods to enhance craft artisans' creativity. The use of typical or widely

accepted design methods may lead to unsatisfactory results (Suzuki 2005; Nagai 2012). Even if we modify the design object to make it easily understandable to craftspeople during training, these efforts may not address the real problem. As we learned in this research, the craft artisans possessed consistent ways of thinking and responding. When they considered an artifact, they tended to focus on tangible issues such as the artifact's technical and physical aspects. Their thinking differed greatly from the design trainers' considerations of the presence of users, their appeal, and scene.

This study demonstrated that these difficulties occurred because, during the design training program, the craft artisans were asked to focus solely on the object (i.e. the designed artifact). In fact, this focus was required by the systematic instructional materials. When the design trainers provided clear instructions about an intended object to be designed during the training, they placed the craft artisans in a status quo mental state. This status quo mentality is a state in which their perceptual sets are tied to their tendency to make quick decisions and jump to familiar conclusions. They were not asked to become flexible and discover alternatives. The craft artisans were given clear guidelines to develop a craft object (a fruit basket/container). These guidelines were intended to enhance their creative process. Yet, these guidelines failed to inspire them to observe and explore in different, creative ways. Design trainers must understand that craft artisans tend to execute these processes based on the heuristics required. Therefore, we propose that design trainers should offer looser and slightly more vague guidelines that may help craft artisans adopt broader perspectives. Rather than providing rigid or clear instructions for the design of a completely understandable object such as 'a fruit basket/container', we recommend that design trainers provide open-ended and rather vague instructions. For example, they could request that craft artisans design 'an object/artifact that would whet the appetites and awaken fresh feelings in family members'.

We suggest that design trainers not request that craft artisans design objects that are concrete or obvious. Rather, they should release craft artisans from this rigid approach by suggesting vague or less concrete design concepts. If design trainers can allow craft artisans to have experiences that inspire them to be more imaginative, it will be easier for design trainers to direct craft artisans to develop more concrete designs. We believe that this approach will free craft artisans from perceptual barriers that were created by their old ways of thinking and responding. In this way, during training, craft artisans can begin to detach from their fixations with familiar concepts, such as tangible or technical aspects (i.e. operation, shape, and proportion). Ultimately, training in creativity must focus on the enhancement of cognitive resources. This can be achieved by the development of teaching methods based on the different characteristics of the imaginative approach used by craft artisans and design trainers.

Conclusion

It can be difficult to describe the nature of the creative cognition that influences the conceptual design processes employed by craft artisans and design trainers. This study discovered the differences between in-depth cognitive levels found in the imaginative approaches used by craft artisans and design trainers. Further, these findings can be developed for use as reference for the co-creation of an educational program (a design training program) to enhance the development of craft artisans' creative cognition. It is currently believed that creativity must be taught by instruction and training. However, the imaginative approach that can free craft artisans from

perceptual barriers to their ways of thinking cannot be developed instantaneously. Yet, efforts should be made to develop the content of design training program and teaching methods to be used to enhance trainees' (craft artisans) creative cognitive abilities. Hopefully, this new approach become critical attention that will exert positive effects on their creative cognition so that, rather than just thinking about beauty or attractive shapes, they will think more flexibly, broadly, and unconventionally. In the future, we hope to extend our research and apply this new approach in a design training program. We will measure results by observing the ways that an artisan's creative cognition is affected by new approach of open-ended and rather vague instructions.

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