Mixing Up Social Traits for Co-Design Practices

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Abstract

Background Cooperating with other designers is an essential aspect of every design project. This article empirically demonstrates that mixing up designers with different social traits would be better in co-design practices than forming a design team composed of members with similar traits. Here, one way to categorize designers' social traits was by their tendency of having "social influence" as the classification of having either a dominant or submissive trait.

Methods Six co-design groups were formed: two Group Mix-up D-S – one dominant type designer and one submissive type designer; two Group D-D – two dominant type designers; and two Group S-S – two submissive type designers. They were asked to develop a fictitious vacuum cleaner and think aloud in their co-design practice. Their verbal protocols were then analyzed to see how they behaved towards each other in their co-design decision-making.

Result We found that mixing up the heterogeneous social traits in a team was better for triggering a heavy "test-retest" discussion (Group D-S), and teaming up designers with the same tendencies show either a quick affirmation (Group D-D) or a tendency for last-minute decision-making (Group S-S). Marrying different social styles is beneficial for leveraging a high level of design decision-making.

Conclusions Our findings suggest that mixing up different social traits in co-design practices may induce design decision-making for robust and coherent solutions. Though a scaled-up study is further needed, diverse social styles in a co-design group could trigger the members to seek different design solution spaces and be less primed to a first ideation sketch.

Keywords Co-Design, Social Trait, Social Influence, Dominant, Submissive, Decision-Making

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1. Introduction

We know that human beings are limited, not only in our memory abilities (Berch, 2011), but also in our perceptual direction (Coulter and Coulter, 2007) and reasoning strategies (Tversky and Kahneman, 1983). Paradoxically, this limitation leads us to work together. The concept of "*distributed cognition*" (Hollan et al., 2000) represents well why we human beings are in need of interacting with others, for a large and complex problem-solving/decision-making.

This is not an exception for design practices. Schön (1988; 1992) described the process of designing as a reflective conversation with the materials of a design situation. This concept has mainly addressed the distribution of cognitive components in forms of internal/external representations (e.g., Brereton, 2004) and shared mental models in design teams (e.g., Goldschmidt, 2007).

Recently, with increasing needs to understand this cognitive phenomenon in the context of co-designing practices, distributed cognition has become a widely accepted concept in related design research and labeled with different terms, such as domains of social psychology (e.g., "socially shared cognition," Resnick et al., 1991). Busby (2001) has explained that one of the ways of distributed cognition in design practices is learning from social observation of co-design member's trial and error.

In the paper, the term "distributed" refers to the fact that thinking and subsequent decision processes may be distributed among co-design members. We have a particular interest in how the degree of similarity in social traits of design team affects the early design decision-making process. One way to categorize designer's social traits was by their tendency of having '*social influence*' as the classification of having either dominant or submissive trait.

2. Social Influence and Design Decision–making

Even though human beings are thought of individual decision-makers, social psychologists reveal that social influence is the most pervasive determinant of an individual's behavior to the influence of those around him or her (Asch, 1953; Sherif, 1936). In these lines of studies, social influence has become an increasingly important organizational concern in the effectiveness of the group decision-making process (Gruenfeld et al., 1996). In the field of Decision Science, Bandwagon effect represents this phenomenon, "*the desire of people to conform with those who they wish to be associated with; or, in order to appear to be one of the boys.*" (Leibenstein, 1950). This is also easily observable in the designer's attitude. Kleinsmann and Valkenburg (2008) claimed that one's social traits would be a critical component to trigger this attitude, and in the co-design practices this could be an important consideration to build up a cooperative culture between the co-designers.

Reviewing research literature in social psychology on social traits and team decision-making pattern, the mere perception of others' behavior, belief, and thinking automatically increases the likelihood of engagement in that behavior, belief, and thinking in oneself (Chartrand and Bargh, 1999). The existence of a built-in, unintended and passive effects of perception (even mirror neurons cause similar neuropsychological effects) on others' behavior has important ramifications for our decision-making patterns. Bargh (1989) and Higgins (1990) claimed that such social priming would change our interpretation of a decision problem through temporarily increasing our accessibility or readiness to make an empathy (at least sympathize) with others' decisions.

Two dissimilar complementary social types (i.e., one's attitude toward social influence) can be of value in design decision-making: Dominant and Submissive (Aronson et al., 2005; Leary, 1958). The former refers to the tendency to be direct and decisive, those who prefer to lead rather than follow, and tend towards leadership and management positions (i.e., dominant type). By comparison, the latter suggests that one can make a decision inferring from others' decisions, and a person strongly believes it when the most influential one or majority also believes the concept (i.e., submissive type).

A pioneering attempt on the study of social influence in design decision-making process was made by Yang (2010). She compared the quality of design decision process between a consensus building group and a single leader decision-making group. The results reported that no significant relationship between decision outcome and the decision styles existed; however the decision-making process, in particular, decision speed and the perceptions of team member's decision quality, was different in the groups. (here, the dominant, single leader's decision process was faster than the other group). The study suggested interesting findings. However, in experimental conditions, it was limited to reflect subjects' inherent social traits in that the experimenter randomly assigned team members in one group from another. Chamorro-Koc et al. (2009) investigated interaction types of designers by their skills, knowledge, and experience, which are brought together in design practice. They found that a highly experienced and/or dominant type designer would lead decision dynamics. In contrast, those who were susceptible to other's behavior were more reserved and quiet, and quickly changed their beliefs or thoughts according to the majority's opinion.

However, it is still open to question whether the designer's attitude toward social influence would have a different effect on the "co-design" practice and how this cooperative decision-making would take place.

3. Methods

We tested three types of co-design team formats: Group Mix-up D-S (a dominant type designer and a submissive type designer), Group Dominant D-D. (two dominant type designers), and Group Submissive S-S. (two submissive type designers). These groups designed a fictitious design brief, the "Nike™ vacuum cleaner," and their interactions and

decision-making patterns were analyzed to examine if each designer's social traits would affect the "co-design" practice differently.

3. 1. Group conditions

Table 1 Questionnaires for social influence (revised the work from Bearden et al., 1989)

Social influence	Questions
Normative	1. I rarely purchase the latest fashion styles until I am sure my friends approve of them. 2. It is important that others like the products and brands I buy. 3. When buying products, I generally purchase those brands that I think others will approve of. 4. If other people can see me using a product, I often purchase the brand they expect me to buy. 5. I like to know what brands and products make good impressions on others. 6. I achieve a sense of belonging by purchasing the same products and brands that others purchase. 7. If I want to be like someone, I often try to buy the same brands that they buy. 8. I often identify with other people by purchasing the same products and brands they purchase.
Informational	1. To make sure I buy the right product or brand, I often observe what others are buying and using. 2. If I have little experience with a product, I often ask my friends about the product. 3. I often consult other people to help choose the best alternative available from a product class. 4. I frequently gather information from friends or family about a product before I buy.

Then, two psychometrists (13 years and 17 years of experience, respectively) consulted each subject's past behavioral history and decision patterns around half an hour, presenting participants with some speculative daily situations (e.g., how much they are concerned about others' preferences in dining-out) (see Figure 1). With these data, both psychometrists independently evaluated and categorized each participant's social traits (whether dominant or submissive). The inter-rater reliability was found to be 0.77 (Kappa statistics).

Figure 1 Interview session (left: first assessment interview; right: second assessment with prerecorded clip)

To balance the number of co-design group, we have chosen a total of twelve industrial designers (eight males and four females aged 21 to 28 (M = 26.6, SD = 3.9) to take part in the study. They were divided into one of three co-design groups according to their social trait: *Group Mix-up D-S, Group Dominant D-D,* and *Group Submissive S-S.*

3. 2. Procedure

The experiment consisted of three phases. In Phase I, each participant was introduced to the experiment procedure and asked individually to develop design solutions within ten minutes in response to the design brief "*Designing Nike™ vacuum cleaner to give a pleasurable experience.*" In Phase II, each participant could meet the other team members and carry out co-designing for 20 minutes to finalize their design concept together. During phases I&II, designers were asked to think aloud while developing their design concepts. In the last phase, a semi-structured interview about the experiences of the co-design practice was conducted.

3. 3. Analysis

Two researchers familiar with co-design practices independently coded the verbal protocol and suggested two classes of the thematic codes regarding how the participants participate in co-designing: the “Decision choice process” and “Interaction process” as shown in Table 2. The inter-rater reliability of the verbal protocol analysis was found to be 0.81 and 0.78 (Kappa statistics) for "Decision choice process" and "Interaction process" respectively.

Table 2 Coding scheme of the decision choice process and interaction process in the co-design practice

Class 1: Decision choice process (Kim and Ryu, 2014)		
Categories	Description	Examples
Affirmative decision	Define design direction; decide a synthesis of design outcome	*“I will design my vacuum cleaner like a Nike logo” (Designer #4)* *”I think our vacuum cleaner has to be a something which can decorate our living room, like a trophy” (Designer #10)*
Decision to compare options	Make a comparison between design options	*“We can make a small vacuum cleaner model, but what do you think about small one?” (Designer #5)* *“How about designing a combined form rather than a separated one?” (Designer #6)*
Decision to go for new design alternatives	Express designer’s needs to find design alternatives (intention, goal, plan)	*“Let’s think about another concept except exercise” (Designer #3)* *“Try some different design which does not look like normal vacuum cleaner” (Designer #6)*
Class 2: Interaction process		
Ask for other designer’s empathy	While discussing about design concept, ask for other designer’s empathy	*“I thought about the shape like Nike shoes. How about this?” (Designer #3)* *“During the World cup season, people decorate their living room with soccer ball, don’t they?” (Designer #10)*
Positive feedback	Express positive feedback to other designer’s design	*“Wow, that is a really nice idea” (Designer #4)* *“I can fully understand what you are saying” (Designer #9)*
Positive feedback	Requiring more specific information about the design concept	*“You mean that people can also wear this device?” (Designer #11)* *“Can you explain about your design concept little bit more?” (Designer #10)*

4. Results & Discussion

Figure 2 reports frequencies of the decision choice process and interaction process produced by co-design groups. Results show a rather differnt decision-making pattern among the groups. Heterogeneous social traits groups were better at triggering a heavy ‘test-retest’ discussion (Group D-S), and teaming up designers with the same tendencies show either a quick affirmation (Group D-D.) or a tendency to the last-minute decision-making (Group S-S.). Marrying the different social styles is of value to leverage a high level of design decision-making process.

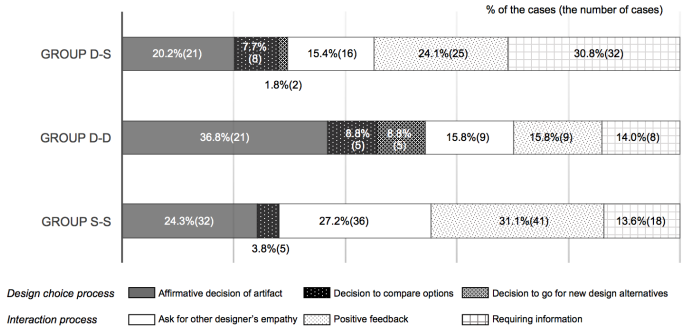

Figure 2 Frequencies of the decision choice process and interaction process produced by co-design groups

4. 1. Group Mix-up D-S (a dominant type designer – a submissive designer)

It is interesting to examine the total amount of coded occurrences produced by each co-design group. First, Group Mix-up D-S produced more "Interaction process" (70.3% of the total codes) than "Design choice process" (29.7%) which means the group produce more social interaction with each other rather than define, compare, and propose new design concepts. Among the "Interaction process", 'Requiring information' was the most frequent pattern compared to the other two design groups (i.e., Group D-S: 30.8%; Group D-D: 14.0%; Group S-S: 13.6%). Of interest the second-highest portion of "Interaction process" was given to 'Positive feedback.' For instance, in our verbal protocol, the results somehow indicate that the dominant type designer is familiar with proposing a new design concept (i.e., design choice process), a submissive type designer is better at giving feedback or asking more specific information about the proposed design concept (i.e., interaction process) rather than expressing new design alternatives. The following conversations between Designer #3 and #4 clearly show this.

"I designed my Nike vacuum cleaner like this. I made this for both my parents and child" [Designer #4 - dominant type]

After watching the sketch of Designer #4, Designer #3 expresses positive feedback and requires more information about the design concept:

"Your concept is very interesting. Can you explain more about this part? It looks like a razor" [Designer #3 - submissive type]

"Yes, that is a razor for some entertainment service while cleaning. It can light some images like a soccer ball, and a user can follow this ball" [Designer #4 - dominant type]

"Hmm... This lighted soccer ball can move? Do you have any specific example for this content?" [Designer #3 - submissive type]

The successive turns of the questions-answers in Group D-S might have arisen from their dissimilar social traits. When a dominant designer invites a particular response (e.g., "I would like to speak. You listen."), a submissive designer listen and actively participate in the design discussion. This "*test-retest*" capability might allow *Group D-S* to concern about

each other's design decision, and perhaps this attitude might be able to help them to have more look-out opportunities to find better explanations during design decision-making (i.e., rationale construction).

However, not all information requested was available, and sometimes it was simply ignored and the other designer would not be able to provide any further design alternatives. At the interview session, most of the designers in Group D-S mentioned that it was difficult to find answers to deep questions regarding their design concepts, for instance:

> *"It was really hard to answer all of the questions, and also it was hard to narrow our design decision gaps about Nike vacuum cleaner"* [Designer #4 - dominant type]
>
> They also admitted that all the questions raised by the co-designer who have different social traits were really helpful for them to understand the other's mental conception, so as to improve the co-design decision-making quality, at the very least, to persuade the other designer:
>
> *"Thanks to my partner's questions, I was able to look back at my design concept. I also asked lots of questions to my partner. Finally, after going through all that questions with each other we can make a satisfactory design outcome"* [Designer #1 - dominant type]

4. 2. Group Dominant D–D (two dominant type designers)

Group D-D made rather different patterns in their co-design practice. The group produced a similar number of codes in "Design choice process" (54.4%) and "Interaction process" (45.6%). The two dominant type designers tended to have a rather strong affirmation of their design decisions for the artifact compared to the rest of codes (categorized as *'Affirmative decision of artifact'*, Group D-D: 36.8%; D-S: 20.2%; S-S: 24.3%). An opposite pattern was found in the category of "interaction process" including 'empathy for the other designer's idea' and 'positive feedback' (Group D-D: 45.6%; D-S: 70.3%; S-S: 71.9%). This type of affirmative design choice process seems to trigger the difference in decision to go for new design alternatives, suggesting that dominant type designers express less feedback and ask fewer questions about the proposed design concept. This was clear in the case of Designer #7 and #8.

> *"I thought about making the experience with our Nike vacuum cleaner like a workout. While using our stuff, people can exercise their forearm or thigh"* [Designer #8 - dominant type]
>
> Unlike the *Group D-S's* active discussion, Designer #7 was reluctant to ask any questions about a proposed design concept. After a moment of silence, Designer #8 tried to define one's design:
>
> *"How about making a game like a cleaning experience?"* [Designer #8 - dominant type]

This kind of less sympathetic design decision-making patterns in Group D-D made each dominant designer dig into their own design concepts, and this might have stimulated the

dominant designers to define their own design concepts rather than synthesizing different design alternatives.

The interviews *of Group D-D* also revealed that they were less sympathetic to the other designer's design solutions:

> *"My partner did not care about my ideas and only talk about her design concept. It was good to hear about other designer's different viewpoint, but also it was really hard to satisfy both at all."* [Designer #8 - dominant type]

In effect, Group D-D seems to have a tendency to avoid a longer cyclical process of 'trial-and-error' or 'test-retest' than *Group D-S or Group S-S.* Instead, they tend to rely on their own dominant expertise, past project experience, and/or their satisficing (Simon, 1987). Moreover, as is shown in Figure 2, the dominant designers seem to focus longer on the inspiring set of their own design decisions. The possibility of the potential *'confirmatory bias'* (Kosnik, 2008) that the expert designer might have in the course of design practices would hinder them from having better design alternatives at the later design stages.

4. 3. Group Submissive S–S (two submissive type designers)

Similar to the *Group D-S,* the Group S-S showed around 2.5 times more "Interaction process" (71.9%) (vs. "Design choice process", 28.1%). However, differences exist between *Group D-S* and *Group S-S.* For instance, among the three interaction categories, Group S-S represents less *'Requiring information'* pattern (Group S-S: 13.6% vs. Group D-S: 30.8%). The most frequently mentioned codes were *'Ask for other designer's empathy'* (27.2%) and *'Positive feedback'* (31.1%). The conversation between Designer #9 and #10 shows these tendencies:

> *"During the World Cup games, people decorated their living room with soccer balls, didn't they?"* [Designer #10 - submissive type]
>
> *"Yes, you are right. My boss also decorated his office with the official ball"* [Designer #9 - submissive type]
>
> After asking for a consensus from the other designer's sympathy, Designer #10 was encouraged to define his own design direction in the following way:
>
> *"I think our Nike vacuum cleaner should have the same concept like an official football. People have to be able to decorate their living room with our vacuum cleaner"* [Designer #10 - submissive type]

This particular pattern amongst Group S-S might result from the fact that due to their submissive social traits they feel that they don't have enough capacity to make decisions quickly. This tendency makes them postpone decision-making until the last moment and to look for other's empathy. This finding is much in line with the study of Hallihan et al. (2012), who otherwise claim that this sympathetic confirmation from the other people can help them to make confident about their design outcomes though this cannot guarantee the highest design quality.

5. Conclusions & Future Work

Designer's social trait is an interesting feature that influences the quality of decision-making process in many co-design practices (Dong et al., 2013; Hallihan et al., 2012; Kim et al., 2013). In this study, we categorized the participants into dominant or submissive type according to their attitude toward social influences from others. Based on this social trait, we formed three co-design groups and compared their decision processes: *Group Mix-up D-S,* *Group Dominant D-D,* and *Group Submissive S-S.*

Our findings suggest that mixing up two people with different social traits in the co-design practice might be beneficial for robust and coherent design decision-making. In a similar vein, Kristof-Brown et al. (2005) emphasize the importance of complementary social traits for team formation, which can be significant for team performance. Our results show that dominant designers increase their confidence after interacting with submissive designers, and this *"test-retest"* discussion prompts co-design team to find better design solutions. On the contrary, *Group D-D* shows a possible weakness to *"quick affirmation."* As to the submissive designers group, the *"last-minute decision-making"* seems to be preferred.

Of course, the generalization of this claim urgently needs a scaled-up study, or, at the very least, care taken when forming designers into a group is important for co-design practices, and, for the group with different social traits, the expectation would be that they are less primed to a first ideation sketches.

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