

Study on Personal Characteristics and Emotional Affordances through User Activity Analysis

Yong Se Kim - Creative Design Institute, Sungkyunkwan University, Suwon, Korea,
(8231)2996581, yskim@skku.edu

Min Kyong Kim - Creative Design Institute, Sungkyunkwan University, Suwon, Korea,
(8231)2996584, skylord@skku.edu

Ji Yun Jeong - Creative Design Institute, Sungkyunkwan University, Suwon, Korea,
(8231)2996585, jiyunjeong@skku.edu

Jae Ho Moon - Institute for Design, Semyung University, Jechon, Korea, (8243)6491438,
jhomoon@semyung.ac.kr

Abstract

Design methodology should address psychological and cognitive aspects based on human emotion and feeling as well as physical and functional aspects based on product structure. Donald Norman introduced perceived affordances as characteristics in the appearance of an object that gives clues for its proper operations. We conducted a case study in a public space - building lobby - used by many general people. User activities and behaviors were analyzed in several specific tasks given to twenty participants with similar cultural background in the lobby of a building they have never been to before. Then we identified affordances and building structure elements, called affordance features, critically related to those affordances.

While performing the tasks in the same building lobby, user activities can be classified into several different groups for each task based on affordance features involved in their activities. These user activity differences are then compared with their personal cognitive characteristics derived from their perception and judgment preferences using intuitive and factual perception orientation and objective and subjective decision making inclination respectively. For user of less common activities for some tasks, personal cognitive characteristics have been identified. This study could help in affordance-based design so that alternative affordance features are designed considering diverse user cognitive characteristics.

Conference theme: Design & Emotion: Theoretical Issues

Keywords: Emotional Affordances, Affordance Features, Personal Characteristics, User Activity Analysis

1. Introduction

User activities in performing tasks are influenced by the way the user perceives the related surrounding environment and determined with user judgment preferences. Physical environment structures afford user activities when they are perceived. Also, user activities reflect their emotional situation. Affordance is a concept that is highly related to human perception, judgment and action. Thus it is to be used in designing various artifacts such as products, architectural structures, and space, as well as services. Norman mentioned ‘unarticulated needs’, which cannot easily be known with simple interviews, focus group interviews, surveys or questionnaires: (Norman, 2004). In reality, these unarticulated needs could be dug out by monitoring and analyzing user activities. Since affordance is also highly associated with activities of users, it is necessary to substantially consider the affordance and its linkages with human characteristics and emotions.

Recently, the relationship between users and designers has been one of important issues in the design field. To properly address this issue, it is necessary to understand the emotional characteristics of the users. The emotion could have a significant influence on human decisions and activities. However, human emotion is very complicated, and can be expressed very differently according to one’s personal characteristics. Several methodologies to reflect users and context in the course of design have been devised and used. Those are usage analysis: (Kanis and Rooden, 2005), affordance-based design, scenario based analysis and context mapping: (Visser et al, 2005).

This paper addresses how user activities and emotional affordances are different reflecting personal creativity modes, which are determined by factual-intuitive perception inclination and subjective-objective decision preferences as well as introverted-extroverted nature. We conducted a case study in a public space, building lobby. User activities were analyzed in several specific tasks given to twenty participants in the lobby they have never been to before. User activities can be classified into several different groups for each task based on affordance features, which is structure elements critically related to affordances, involved in their activities. These user activity differences are then compared with their personal creativity modes.

2. Background

2.1 Affordance

Affordance was coined by perceptual psychologist Gibson: (Gibson, 1979). The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. Gibson's essential concept of affordance is that relationship exists in a pair of animal and environment and some parts of this relationship are the invariant features of the environment permitting the animal to do things. Norman also introduced perceived affordance that is about characteristics in the appearance of an object that gives clues for its proper operations. According to Norman, the Gibson's affordance is real affordance that is about physical characteristics of an object or interface allowing its operation: (Norman, 2002). From the user's perspective, he focused on three kind of user's emotional response to product. Users show perceptually induced reactions and expectation as well as intelligently induced reactions including cultural and social influences: (Norman, 2004), (Norman and Ortony, 2003). Affordance features should be designed in to assure proper activities of users. When only two center doors are used, proper user activities are afforded by putting door mats in front of these doors only as shown in Figure 1.

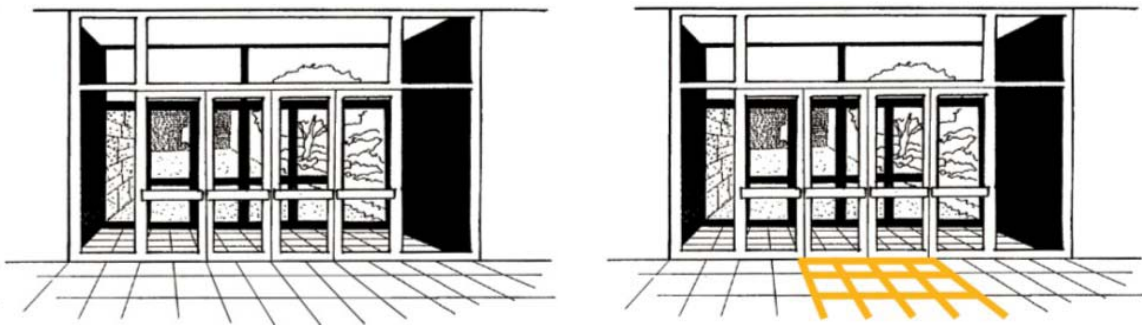


Figure 1: Without and with the door mat affordance features (Evans and Mitchell McCoy, 1998)

Recently, research efforts to develop design theory and methodology reflecting the concept of affordance have been made. Maier and Fadel proposed the affordance-based design method to overcome the weaknesses of function-based design, thus to take the synergy between affordance and function based approaches for better design: (Maier and Fadel, 2003), (Maier and Fadel, 2005). They also introduced Affordance-Structure-Matrix for evaluating what affordances are embedded in each component of a product: (Maier et al, 2007). Galvao and Sato proposed Function-Task Interaction Method where product functions and user tasks were linked to identify affordances: (Galvao and Sato, 2005). Affordances in social interaction were introduced: (Kim et al, 2007). Structural elements that are tightly related to activities and tasks are identified as affordance features: (Kim et al, 2008). Affordance features are used in this research as a way to identify user and activity characteristics.

2.2 Personal Creativity Modes

Wilde developed Personal Creativity Modes Test (PCMT) based on the cognitive theory of Jung. PCMT has drawn a considerable attention since it can be used for promoting performances of creative design activities. Personal creativity modes represent the different creativity modes of individuals, which are intrinsically related to their personal cognitive preferences: (Wilde and Labno, 2001). There are four aspects in the personal cognitive preferences including perceiving/judging preference, factual/conceptual perception, thinking/feeling judgment, and introverted/extroverted cognitive motivation: (Wilde, 1999). These four aspects can be deployed into eight different modes of creativity, as shown in Figure 2. The characteristics of each personal creativity mode have also been described: (Levesque, 2001). At the Creative Design Institute, research work toward design creativity education is being conducted such that various underlying cognitive elements of design creativity, including personal creativity modes, and then develop training programs reflecting individual learner's characteristics to enhance design creativity: (Kim et. al., 2006).

The personal creativity modes of users may have significant influence on their activities when they carry out certain tasks. In the case of this research, they perceive different affordances and show diverse activities reflecting their personal characteristics. This paper discusses the relationships between individual personal characteristics and affordance features used in their tasks.

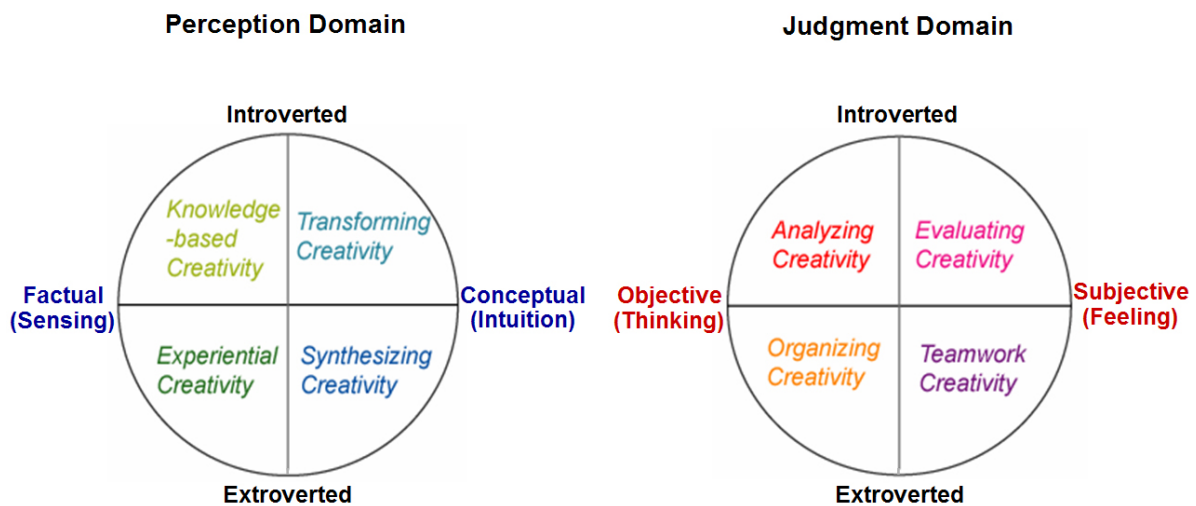


Figure 2: Eight Personal Creative Modes.

3. Case Study - Experiment

The case study was conducted to investigate the relationships between personal characteristics and users' emotional affordance. The personal creativity modes of participating students were identified and their activities under the given tasks were monitored. And then, their activities were analyzed, and their relations with the personal creativity modes were studied by considering the associated affordance features.

3.1 Participants and User Tasks

For the case study, twenty freshmen students of Sungkyunkwan University participated to do simple tasks in a building lobby. It is assumed that these students share similar cultural and societal backgrounds for the given simple tasks. The participants' activities were observed with video recording and photos. The task sessions were conducted individually, and each took 20-30 minutes. The lobby space of the commercial building was divided into 3 sub-spaces as shown in Figure 3. Space A on the basement second floor was further divided into six zones; space B on the second floor, three zones; space C on the lobby level, two zones.

Each participant was asked to *eat snack (a cup of beverage and boiled eggs) and read a magazine* (task T-1). Afterwards, they were asked to *sketch an impressive scene on a given piece of paper* (task T-2). Finally, they were asked to *tie shoelaces and shake sand out* (task T-3). The detailed user tasks associated spaces and participants are summarized in Table 1. For task T-1, 15 students participated in space A. For task T-2, 15 students participated in space B. For task T-3, five participants carried out the task in space A and nine did in space C. Note that the participants for the tasks are not fully identical.

3.2 Activities and Related Affordances

We extracted affordances by observing the participants' activities under the given tasks. From the three tasks, 33 different activities were observed as shown in Table 2. A total of 17 affordances were extracted from the activities of the participants as follows: (Kim et al, 2008).

Look-ability, Walk-ability, Sit-ability, Step-ability, Lean-ability, Place-ability, Support-ability, Drink-ability, Tap-ability, Eat-ability, Read-ability, Touch-ability, Information Access-ability, Draw-ability, Tie-ability, Hang-ability, Hold-ability

Two kinds of affordance features were identified: physical features of the building lobby, and participant’s human body elements or belongings. For instance, some students placed magazines on a bench or on a cylinder box located in the building, while some students placed magazines on their laps or on their bags.

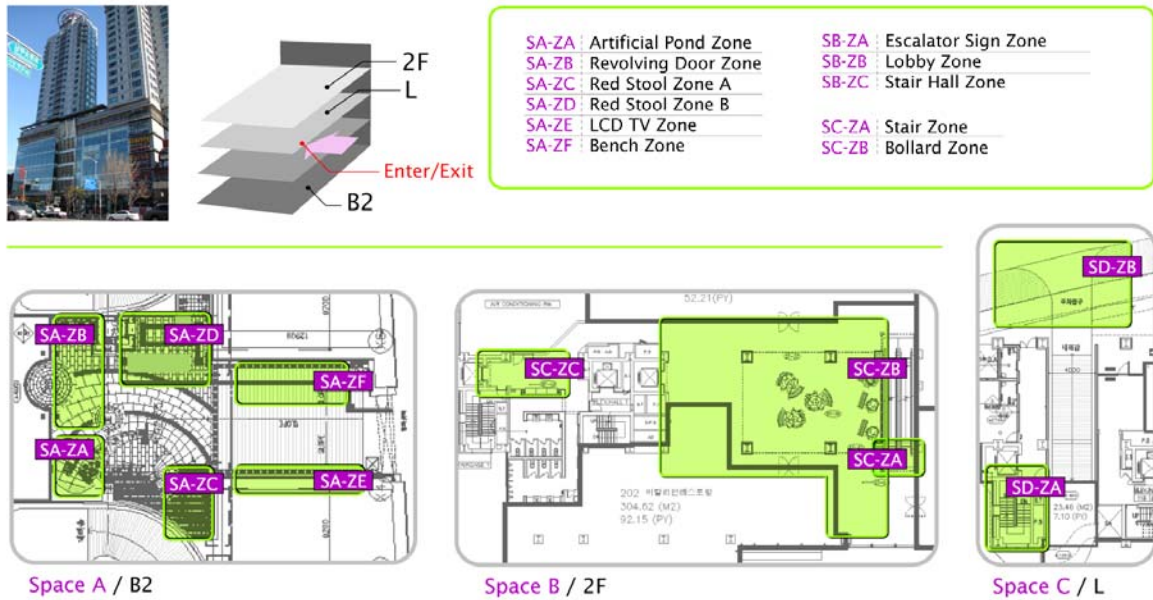


Figure 3: Floor plan of the experiment space.

| Task No. | Task | Space | Zone | Participants | # of Participants |
|----------|--------------------------------------|---------|--|--|-------------------|
| T-1 | Eating snack and Reading a magazine | Space A | SA-ZA, SA-ZB, SA-ZC, SA-ZD, SA-ZE, SA-ZF | P-01, P-03, P-05, P-07, P-09, P-11, P-12, P-13, P-14, P-15, P-16, P-17, P-18, P-19, P-20 | 15 |
| T-2 | Sketching on a piece of paper | Space B | SB-ZA, SB-ZB, SB-ZC | P-02, P-04, P-06, P-08, P-10, P-11, P-12, P-13, P-14, P-15, P-16, P-17, P-18, P-19, P-20 | 15 |
| T-3 | Tying shoelaces and Shaking sand out | Space A | SA-ZD, SA-ZF | P-01, P-03, P-05, P-07, P-09 | 14 |
| | | Space C | SC-ZA, SC-ZB | P-11, P-12, P-14, P-15, P-16, P-17, P-18, P-19, P-20 | |

Table 1: Tasks and spaces.

| Task No. | Activity No. | Activities of Participants | Related Affordance | |
|----------|------------------------------|---------------------------------------|----------------------------|-------------------------------|
| | | | with Physical Feature | with Human Feature |
| T-1 | A-01 | Looking for sitting place. | Look-ability, Walk-ability | |
| | A-02 | Sitting. | Sit-ability | |
| | A-03 | Walking. | Walk-ability | |
| | A-04 | Stepping up and down. | Step-ability | |
| | A-05 | Leaning. | Lean-ability | |
| | A-06 | Placing the bag on somewhere. | Place-ability | |
| | A-07 | Supporting the bag on somewhere. | Support-ability | |
| | A-08 | Hanging the bag. | | Hang-ability |
| | A-09 | Placing a cup of beverage and eggs. | Place-ability | |
| | A-10 | Holding a cup of beverage. | | Hold-ability |
| | A-11 | Drinking a beverage. | Drink-ability | |
| | A-12 | Tapping eggs. | Tap-ability | |
| | A-13 | Eating eggs. | Eat-ability | |
| | A-14 | Placing the magazine. | Place-ability | Place-ability |
| | A-15 | Supporting the magazine. | | Support-ability |
| | A-16 | Holding the magazine. | | Hold-ability |
| | A-17 | Reading the magazine. | Read-ability | |
| T-2 | A-18 | Looking for place to draw painting. | Look-ability, Walk-ability | |
| | A-19 | Touching tree. | Touch-ability | |
| | A-20 | Looking at framed picture. | Look-ability | |
| | A-21 | Looking at the warning message. | Information Access-ability | |
| | A-22 | Placing bags and belongings. | Place-ability | |
| | A-23 | Holding and Biting a cup. | | Hold-ability |
| | A-24 | Sitting and Leaning to draw painting. | Sit-ability, Lean-ability | |
| | A-25 | Supporting paper. | Support-ability | Support-ability, Hold-ability |
| A-26 | Biting a pen cap with teeth. | | Hold | |
| A-27 | Drawing. | Draw-ability | | |
| T-3 | A-28 | Looking for place to tying. | Look-ability, Walk-ability | |
| | A-29 | Placing bags and belongings. | Place-ability | Place-ability |
| | A-30 | Placing foot. | Place-ability | |
| | A-31 | Holding shoe. | | Hold-ability |
| | A-32 | Tying shoelaces. | Tie-ability | |
| | A-33 | Tapping shoe. | Tap-ability | Tap-ability |

Table 2: Activities and affordances.

3.3 Personal Creativity Modes of participants

The personal creativity modes of 20 participants are summarized in Table 3. For each student, the perception mode and the judgment mode are shown in separate diagrams. In perception, the left-right axis indicates factual/intuitive preferences. In judgment, the left-right axis represents feeling/thinking preferences. The top-down axis shows introverted/extroverted nature. The stronger their preferences are, the bigger bubbles are to be shown.

For example, participant P-01 has the transforming creativity mode as shown in the upper-right quadrant of the perception domain. He also has the evaluating creativity mode as shown in the upper-right quadrant of the judgment mode. Participant P-11 also has the transforming creativity mode in the perception domain and the evaluating creativity modes in the judgment domain. But we can identify the difference between P-01 and P-11 that the level of evaluating creativity of P-11 is much stronger than that of P-01 as reflected in the size of the bubbles.

| Partici- pant | PCMT Result Diagrams | | Partici- pant | PCMT Result Diagrams | |
|------------------|---|---|------------------|--|--|
| P-01 / I | <p>In the Perception Domain: (with preference data falling at $X,Y = (30,28)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (10,14)$)</p> | P-02 / I | <p>In the Perception Domain: (with preference data falling at $X,Y = (0,21)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (35,28)$)</p> |
| P-03 / I | <p>In the Perception Domain: (with preference data falling at $X,Y = (-25,48)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (-20,18)$)</p> | P-04 / E | <p>In the Perception Domain: (with preference data falling at $X,Y = (40,-42)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (40,6)$)</p> |
| P-05 / I | <p>In the Perception Domain: (with preference data falling at $X,Y = (-10,-7)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (30,48)$)</p> | P-06 / I | <p>In the Perception Domain: (with preference data falling at $X,Y = (-20,18)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (10,-11)$)</p> |
| P-07 / E | <p>In the Perception Domain: (with preference data falling at $X,Y = (35,11)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (-5,11)$)</p> | P-08 / E | <p>In the Perception Domain: (with preference data falling at $X,Y = (25,-18)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (0,18)$)</p> |
| P-09 / E | <p>In the Perception Domain: (with preference data falling at $X,Y = (35,-39)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (-20,-11)$)</p> | P-10 / I | <p>In the Perception Domain: (with preference data falling at $X,Y = (-5,11)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (15,11)$)</p> |
| P-11 / I | <p>In the Perception Domain: (with preference data falling at $X,Y = (40,42)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (30,28)$)</p> | P-12 / E | <p>In the Perception Domain: (with preference data falling at $X,Y = (-10,-25)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (35,-11)$)</p> |
| P-13 / E | <p>In the Perception Domain: (with preference data falling at $X,Y = (20,21)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (10,-21)$)</p> | P-14 / I | <p>In the Perception Domain: (with preference data falling at $X,Y = (0,28)$)</p> | <p>In the Judgement Domain: (with preference data falling at $X,Y = (10,-7)$)</p> |

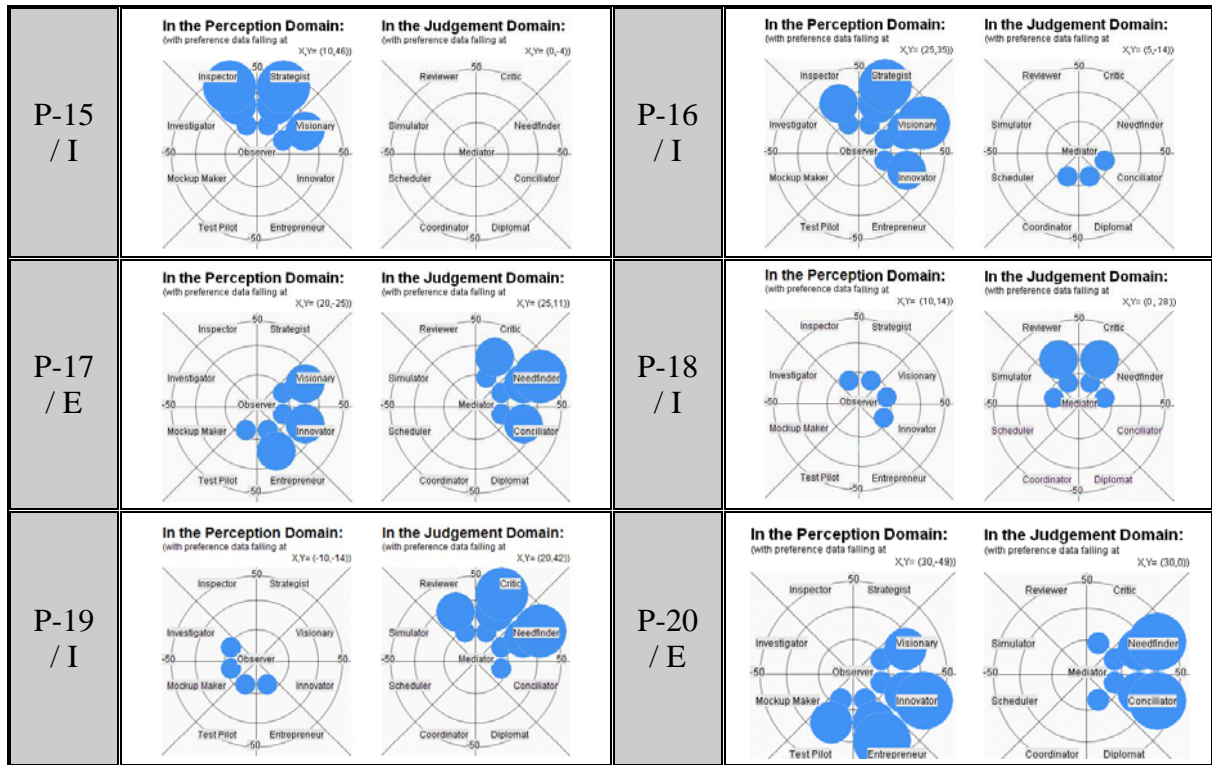


Table 3: Personal creativity modes of all participants.

4. Case Study-Analysis on Personal Creativity Modes and Activities

4.1 Task: Eating snack and reading a magazine (T-1)

Task T-1 of eating snack and reading a magazine was assigned to participants in space A. The detailed composition of space A is shown in Figure 4. There were six zones and an open space. SA-ZC and SA-ZD are somewhat separated due to the structure of stairs of the floor. In particular, more private atmosphere could be found at SA-ZC since it included a hidden area due to winding stairs.

Out of 15 participants who carried out T-1, 10 participants performed T-1 at the bench in SA-ZF. This bench can allow several people to sit. The associated affordances were sit-ability, eat-ability, drink-ability, read-ability, place-ability, support-ability, tap-ability and hold-ability. The scenes of various activities of T-1 performed by participants are given in Figure 5. Most of participants performed T-1 while sitting. However, P-20 carried out T-1 while leaning on the feature that afforded lean-ability. This feature also afforded drink-ability and read-ability.

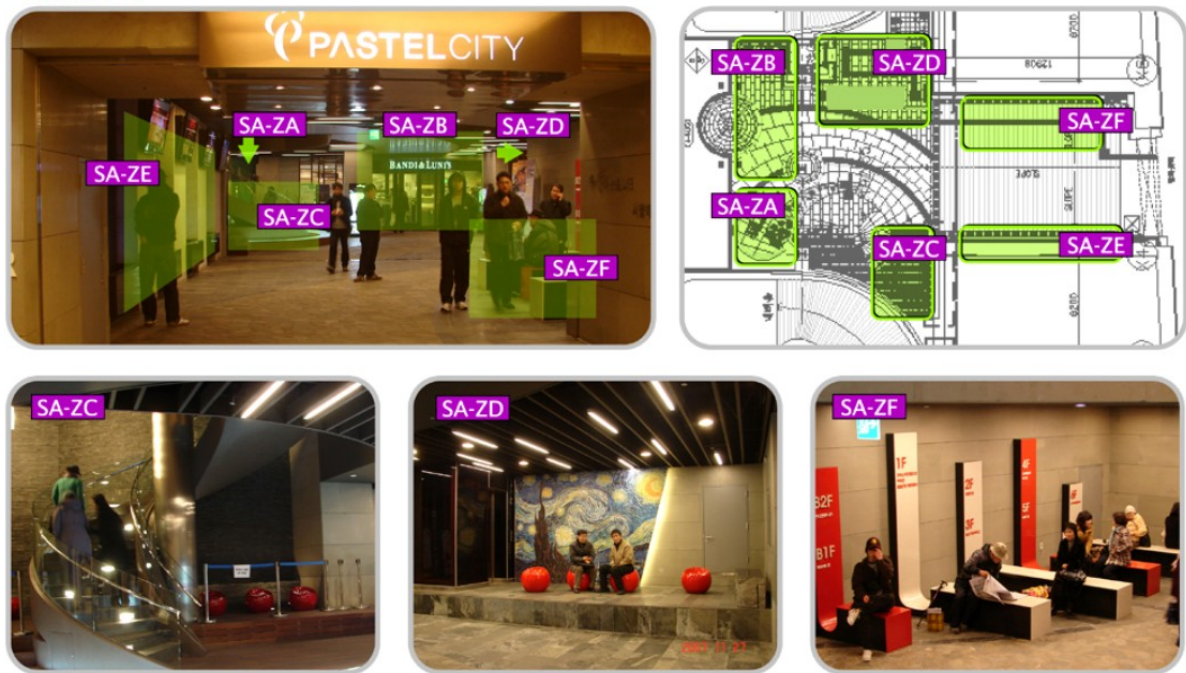


Figure 4: Detailed composition of space A.

Unlike the above 10 participants, P-03 and P-15 of minor group A performed T-1 at the stone stools located in SA-ZD and SA-ZA respectively. These two zones had more private atmosphere than SA-ZF. The affordances associated with the stone stool were sit-ability, eat-ability, drink-ability, read-ability, place-ability, support-ability, tap-ability and hold-ability. The scenes of P-03 and P-15 are shown in Figure 6. In the case of P-15, he performed the task of reading a magazine while walking. His activities were related to the affordances of walk-ability, read-ability and drink-ability. The remaining three participants out of 15, P-01, P-16 and P-18, minor group B, performed T-1 in SA-ZC, which had the most private atmosphere as shown in Figure 7. There sat on red stools, which were located at a distance one another and allowed only one participant to sit.

The personal creativity modes of five participants, of the two minor groups, who showed less common activities of T-1 are shown in Figure 8. Four participants except P-18 showed stronger inclination in perception domain than judgment domain and more introverted inclination. Of above five participants, P-01 and P-16 who performed T-1 at SA-ZC, which was most private zone, showed strong transforming creativity modes in the perception domain. This observation could be related to their introverted attitudes and insight with intuitive nature. In particular, P-01, who recognized the protruded wall and used it as the necessary affordance feature, showed the characteristics of the transforming creativity mode. Their introvertedness could let them to find more private zone to carry out T-1. It could be noted that they used their intuition. Note that P-

15, P-01 and P-16 are those three who have strong transforming creativity out of the entire 20 students.



Figure 5: Activities of T-1(eating snack and reading a magazine): major group.



Figure 6: Activities of T-1: minor group A.



Figure 7: Activities of T-1: minor group B.

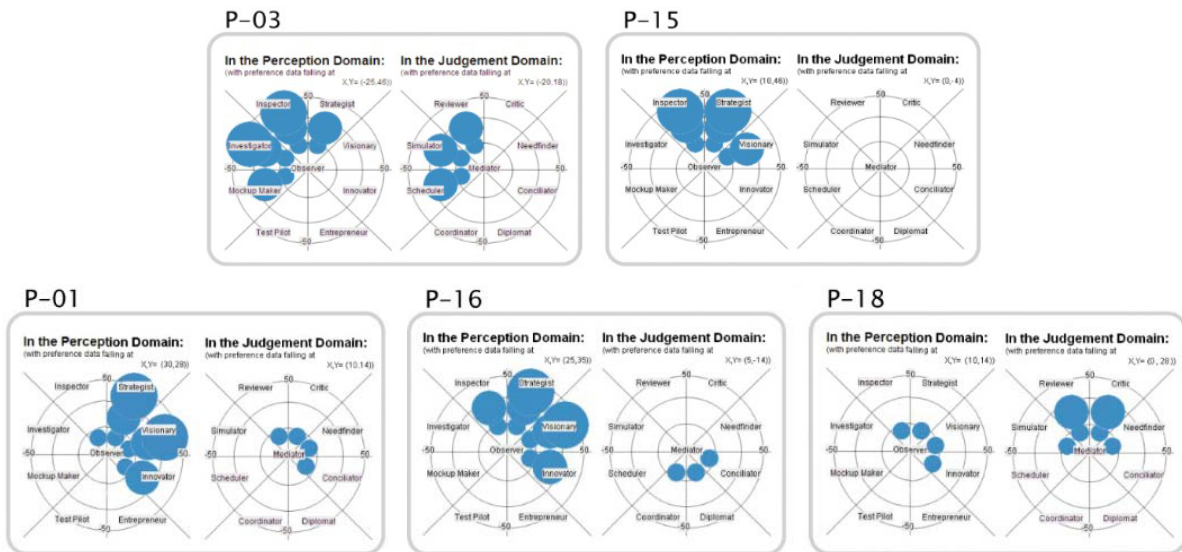


Figure 8: Personal creativity modes of P-03, P-15 / P-01, P-16, P-18.

4.2 Task: Sketching on a piece of paper (T-2)

The task carried out in space B was to sketch any impressive scene of the lobby on a flexible paper. This task was aimed to discover which features were used to afford the drawing activity on a flexible paper. The detailed view of space B is shown in Figure 9. There were three zones such as SB-ZA, SB-ZB and SB-ZC. In particular, there were three sets of artificial tree structure. These tree structures had cylinder boxes with the height of 0.5m, which could afford sitting. Note that warning messages of ‘Do not sit.’ were attached on these.



Figure 9: Detailed composition of space B.

Out of 15 participants who carried out T-2, 5 participants, P-08, P-12, P-13, P-14 and P-17, did not sit on the cylinder box of the artificial tree structure after looking at the warning message, but used the flat surface of the cylinder box to support the paper while sketching. They placed their belongings and a paper on the surface of the cylinder box, sat down on their heels, and sketched as shown in Figure 10. The associated affordances were draw-ability, place-ability, support-ability and information access-ability.

There were four participants, P-06, P-18, P-19 and P-20, minor group A, who used column and wall features to carry out the T-2. They perceived the affordance of support-ability of column or wall feature to fix the paper with hands and to sketch as shown in Figure 11. The affordances they perceived were draw-ability, support-ability and hang-ability.

The participants, P-04, P-11 and P-15, minor group B, ignored the warning message and sat on the cylinder box of the artificial tree structure while sketching as shown in Figure 12. In this case, the affordances they perceived were sit-ability, draw-ability, place-ability, support-ability and information access-ability.

Finally, P-02, P-10 and P-16 of minor group C used their palms to support the paper while they were performing T-2 as shown in Figure 13. In particular, P-16 leaned on the column while sketching. The affordances they perceived were draw-ability, support-ability, hold-ability, hang-ability and lean-ability. These three participants did not find any features to place their belongings and to support the paper, but they used their own human body features.



Figure 10: Activities of T-2(Sketching on a piece of paper): major group.



Figure 11: Activities of T-2: minor group A.



Figure 12: Activities of T-2: minor group B.



Figure 13: Activities of T-2: minor group C.

P-04, P-11 and P-15 who sat on the cylinder box in spite of the warning message, showed very strong cognitive inclinations as shown in Figure 14. It is believed that they intuitively responded to the cylinder box feature to afford the sit-ability before recognizing the warning message due to their strong inclination in perception domain.

The personal creativity modes of P-02 and P-10 who used their palms to support the paper are given in Figure 14. They showed stronger inclination in judgment domain than perception domain, and they were introvert in both domains. They rather passively performed T-2 without actively searching for affordance features in the space. They used their own body features to

hold bags or a beverage cup while sketching. They might have not perceived affordance features from the environment, but made their own judgment.

On the other hand, P-16's activity was somewhat different. Although he showed the similar posture to sketch with the cases of P-02 and P-10, he leaned on the column feature. P-16's personal creativity mode showed much stronger inclination in perception domain. This characteristic might let him find the column feature to lean while sketching. Therefore, his different personal creativity mode could let him show the different activity. It may be the case that leaning affordance was stronger for his perception preference than any other affordances. Thus, P-02 and P-10 are the only two who did not perceive any other affordance features reflecting their very low perception preferences.

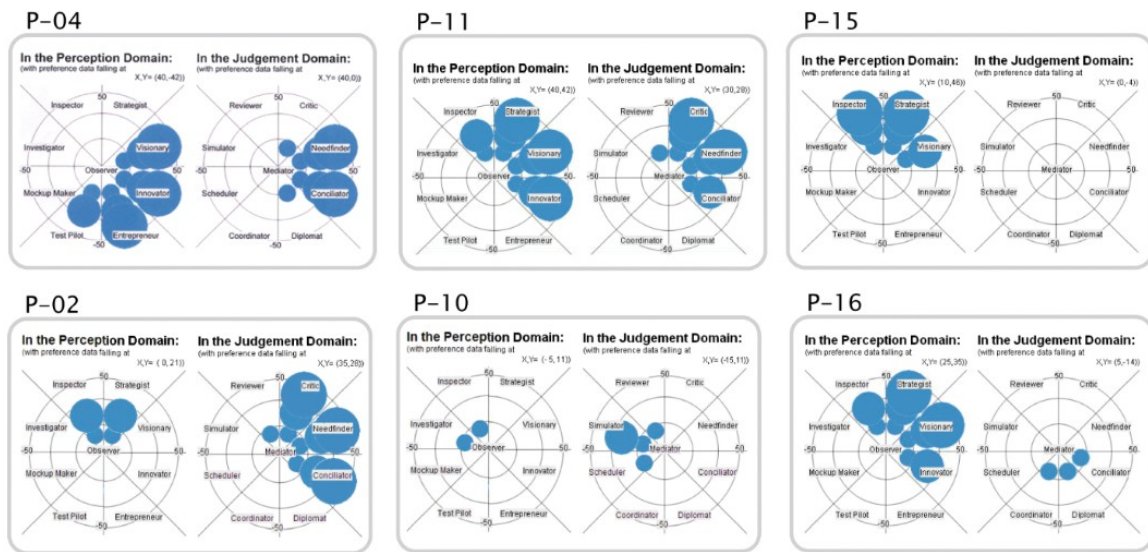


Figure 14: Personal creativity modes of P-04, P-11, P-15 / P-02, P-10, P-16.

4.3 Task: Tying shoelaces and Shaking sand out (T-3)

Task T-3 was tying shoelaces and shaking sand out in space A and space C. Detailed view of space C is given in Figure 15. There are two zones such as SC-ZA and SC-ZB. The SC-ZB was the exterior one.

Six out of a total of 14 participants performed T-3 while they were sitting on their heels on the floor as shown in Figure 16. The affordances they perceived were tie-ability and tap-ability. Five participants of minor group A were tying shoelaces and shaking sand out while they were sitting on the stool, bench or bollard as shown in Figure 17. P-01, P-03, P-05 and P-18 tied shoelaces with their backs bent over while they were sitting. On the other hand, P-09 tied his

shoelaces by raising one leg and putting it on other leg without his backs bent over. The affordances they perceived were tie-ability, tap-ability and place-ability.



Figure 15: Detailed composition of space C.

In addition, P-07, P-14 and P-15 of minor group B raised and put their legs on the bench or the bollard and tied shoelaces with their backs bent over in Figure 18. P-07 used the bench to put her leg and tie the shoelaces in SA-ZF of the space A, and P-14 and P-15 put their legs on the bollard and tied their shoelaces in SC-ZB of the space C. The affordances perceived by those three participants were tie-ability, tap-ability and support-ability.

P-14 and P-15 who put their legs on the bollard to tie shoelaces showed similar personal characteristics as shown in Figure 19. They had stronger inclination in perception than judgment. They also had introvertedness. When they conducted T-3, it is believed that they perceived the bollard as the affordance feature to support their activities by using both the intuitive sensing and factual information. On the other hand, P-07 showed similar activities to carry out T-3 with the cases of P-14 and P-15. However, she had more extrovertedness in her personal characteristics. This characteristic may let her find public zone such as SA-ZF while searching for the affordance feature to support her activity, which is different from the case of P-14 and P-15 who used the SC-ZB.



Figure 16: Activities of T-3(Tying shoelaces and Shaking sand out): major group.



Figure 17: Activities of T-3: minor group A.



Figure 18: Activities of T-3: minor group B.

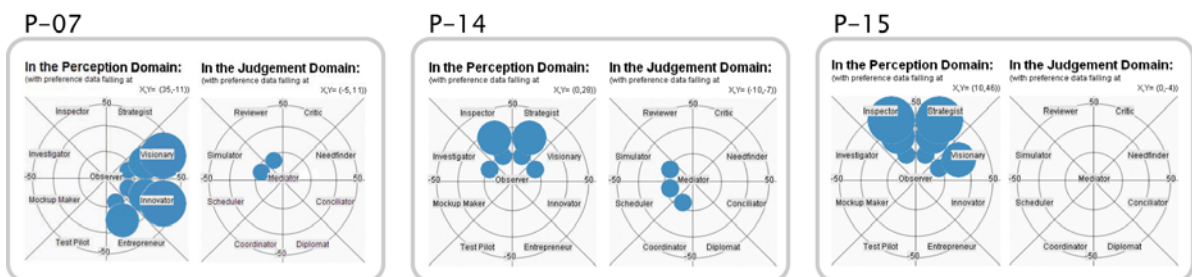


Figure 19: Personal creativity modes of P-07, P-14 and P-15.

4.4 Discussions

As discussed in the previous sections, humans perceive diverse features in different ways based on their personal characteristics. In other words, humans do not think and act equally although they look at same features. In addition, humans perceive different emotional affordances based on their personal characteristics, resulting in their different activities for the same tasks done in the same environment.

In this research, affordances were extracted by observing the participants' actual activities. Those affordances could or couldn't be perceived according to the participants' personal characteristics. User of the lobby space could perceive the affordances which the designers may not originally consider. In particular, when participants perceived different affordances, their activities and behaviors varied. Those participants who behaved similarly, but in less common manners compared with the majority of the participants, had similar personal creativity modes.

Therefore, it may be necessary for designers to consider various users' activities. For example, when designers are to provide the affordance of sit-ability for the lobby space, they may have to provide various features to afford the sit-ability considering diverse users. In addition, they also need to expect the users to perceive unintended affordances.

5. Conclusions

An analysis on user activities and perceived affordances reflecting personal characteristics was conducted through the case study in the public space – building lobby. The user activities and behaviors were monitored and analyzed under several tasks. The user activities in performing given tasks were classified and then related with their personal creativity modes. It was observed that the personal cognitive characteristics could be related to diverse perceptions of affordances. This research would help in developing design methods of various affordance features so that diverse users with different emotional and personal characteristics are all led to proper activities.

References

- Evans, G.W. and Mitchell McCoy, J. (1998). "When buildings don't work: The role of architecture in human health." *Journal of Experimental Psychology* 18, 85-94.
- Galvao, A.B. and Sato, K. (2005). "Affordances in Product Architecture: Linking Technical Functions and Users' Tasks." *ASME Int'l Conf. on Design Theory and Methodology*, Long Beach.
- Gibson, J.J. (1979). "The Theory of Affordances." *The Ecological Approach to Visual Perception*, Houghton Mifflin.
- Kanis, H., and Rooden, M.J., (2005). "Observation as Design Tool." *Faculty of Industrial Design Engineering, Delft University of Technology*.

Kim, M.K., Jeong, J.Y., Kim, Y.S., Lee, S.W. and Lim, J.S. (2008). "Identifying Affordance Features from User Activity Study." Design Computing and Cognition Conf., Atlanta.

Kim, Y.S., Kim, M.K., Lee, S.W., Lee, C.S., Lee, C.H. and Lim, J.S. (2007). "Affordances in Interior Design: A Case Study of Affordances in Interior Design of Conference Room Using Enhanced Function and Task Interaction." ASME Int'l. Conf. on Design Theory and Methodology, Las Vegas.

Kim, Y.S., Jin, S.T., and Lee S.W. (2006). "Design Activity and Personal Creativity Characteristics: A Case Study of Dual Protocol Analysis Using Design Information and Process." ASME Int'l. Conf. on Design Theory and Methodology, Philadelphia.

Levesque, L.C. (2001) "Breakthrough creativity: Achieving top performance using the eight creative talents." Davies-Black.

Maier, J.R.A., Ezhilan, T. and Fadel, G.M. (2007). "The Affordance Structure Matrix - A Concept Exploration and Attention Directing Tool for Affordance Based Design." ASME Int'l. Conf. on Design Theory and Methodology, Las Vegas.

Maier, J.R.A. and Fadel G.M. (2005). "A Case Study Contrasting German Systematic Engineering Design with Affordance Based Design." ASME Int'l Conf. on Design Theory and Methodology, Long Beach.

Maier, J.R.A. and Fadel G.M. (2003). "Affordance-Based Methods for Design." ASME Int'l Conf. on Design Theory and Methodology, Chicago.

Norman, D.A. (2004). "Emotional Design." Basic Books, New York, NY.

Norman, D.A. and Ortony, A. (2003). "Designers and Users: Two Perspectives on Emotion and Design." Symposium on Foundations of Interaction Design, Ivrea, Italy.

Norman, D.A. (2002). "The Design of Everyday Things." Basic Books, New York, NY.

Visser, F. S., Stappers, P. J., Derlugt, R. V., and Sanders, E. B.-N. (2005), "Contextmapping: Experiences from Practice." Int'l. Journal of CoCreation in Design and the Arts, Vol. 1, No. 2, Taylor and Francis.

Wilde, D.J. and Labno, D.B. (2001) "Personality and the Creative Impulse." Unpublished Manuscript.

Wilde, D.J. (1999) "Design Team Role." ASME Int'l. Conf. on Design Theory and Methodology, Las Vegas.