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Personal computer wallpaper user segmentation based on Sasang typology



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ABSTRACT

Background: As human-computer interaction (HCI) is becoming a significant part of all human life, the user's emotional satisfaction is an important factor to consider. These changes have been pointed out by several researchers who claim that a user's personality may become the most important factor in the design. The objective of this study is to examine Sasang typology as a user segmentation method in the area of HCI design. To test HCI usage patterns in terms of the user's personality and temperament, this study focuses on personal computer (PC) or lap-top wallpaper settings.

Methods: One hundred and four Facebook friends completed a QSCC II survey assessing Sasang typology type and sent a captured image of their personal PC or lap-top wallpaper. To classify the computer usage pattern, folder organization and wallpaper setting were investigated.

Results: The research showed that So-Yang type organized folders and icons in an orderly manner, whereas So-Eum type did not organize folders and icons at all. With regard to wallpaper settings, So-Yang type used the default wallpaper provided by the PC but So-Eum type used landscape images. Because So-Yang type was reported to be emotionally stable and extrovert, they tended to be highly concerned with online privacy compared with So-Eum type. So-Eum type use a lot of images of landscapes as the background image, which demonstrates So-Eum's low emotional stability, anxiety, and the desire to obtain analogy throughout the computer screen. Also, So-Yang's wallpapers display family or peripheral figures and this is due to the sociability that extrovert So-Yang types possess.

Conclusion: By proposing the Sasang typology as a factor in influencing an HCI usage pattern in this study, it can be used to predict the user's HCI experience, or suggest a native design methodology that can actively cope with the user's psychological environment.

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1. Introduction

English psychologist Donna Dawson claims that an individual's personality can be judged by the wallpaper and

organization of icons of that individual's computer background. According to Dawson, all elements of an individual's surroundings allow interpretation of that individual's personality, and similarly, unconscious patterns of computer usage

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shed light on the nature of the user.¹ This may explain variations in aspects of human-centered design that are present in theories of human-computer interaction (HCI), which have dealt with users as information processing systems and cognitive psychology since the information age.²

In the information age, there are three main ways of categorizing computer users: (1) users may be categorized according to their skill in the use of computers to access information regarding the demography and socio-cultural status of others; (2) user behavior modeling may be used to analyze the degree to which users seek benefits, innovation, and acceptance; and (3) users may be categorized according to types of cognitive activity, such as using information in context. Shin and Kim³ claim that these methods of categorization are designed to assess types of use that are relevant for the purposes of marketing. Because these methods of categorization were developed from the perspective of marketing products, current approaches to HCI design, which are focused on the individual characteristics of the user's perception and action, the limits are occurred within this situation.

Recently, to overcome these limitations, research focusing on media usage has proposed that media usage patterns and behaviors need to be understood within the context of individual psychological characteristics such as personality. Additionally, in the field of HCI research, user personality has begun to attract attention as a major influence on design. In North America and Europe, traits such as those described by the five factor model (FFM) have been widely used to explain the relationship between media usage behavior and personality factors. Research based on this model has focused on areas including internet usage,⁴⁻⁶ consumer generated media (CGM),⁷ mobile usage,⁸ mouse and keyboard usage,⁹ and character and avatar design.^{10,11} The FFM has recently begun to be incorporated into research methodology in Korea.

Research methodology designed to examine media usage and behavior for the purposes of user-centered design is constantly changing; nevertheless the methods mentioned above are focused on Western users, and do not sufficiently address each culture's unique tendencies and characteristics. Yoon and Park¹² emphasize the importance of design that is native to a given country, and based on that country's characteristic traits and tendencies. Previous research focusing on Korean design characteristics has aimed to formulate principles of visual design based on intangible Korean social and spiritual values.¹³⁻¹⁶

This may seem to suggest that the overall aim of this study is to establish a native design methodology influenced by Korean *Sasang* constitution theory. This study not only proposes *Sasang* typology as a design methodology reflecting Korean idea/thought theory, but also proposes *Sasang* typology is able to supplant other approaches to typology due to its ability to give more consistent and reproducible results.¹⁷ By combining *Sasang* typology's approach to user temperament and personality with the HCI-focused approach to user segmentation given in this study, it may be possible to present a Korean design methodology that can actively manage the psychological environment of the user.

Due to the lack of previous studies examining the relationship between *Sasang* constitution's personality factors

and psychologically dependent patterns of computer use, the relationship between *Sasang* personality factors and Western concepts of personality, and the relationship between personality factors and social media usage, have been used. From this relation, one is able to establish and test hypotheses regarding the relationship between *Sasang* personality factors and Korean media usage.

2. Literature review

2.1. User personality traits and usage patterns

Personality is defined as an individual's characteristic psychological state that affects his or her reaction to his or her surroundings. Methods of describing personality are generally type- or trait-based. Typological approaches to personality are descended from Jung's typological methods of classifying psychological types. These approaches generally distinguish between a number of personality types based on commonalities between individuals possessing that type, and are focused on understanding the differences between types. The Meyers-Briggs type indicator (MBTI) is characteristic of typological approaches to personality. Historically, it has been criticized as unscientific and nonsystematic. However, with the current increased acceptance of experience and observational data as components of valid scientific methodology, the MBTI has been adopted by many new studies.

Allport¹⁸ considered personality trait theory in an aim to explain behavioral consistency in terms of the integration of responses to various stimuli. In other words, whereas typological personality characteristics are generally considered to be clearly distinguishable noncontiguous categories, people are commonly assumed to differ from each other according to continuous variables or dimensions. Research focusing on personality traits has long aimed to discover the minimum elements necessary to describe personality. McCrae¹⁹ is a good example of this approach as it applies to the five-factor model (FFM).

The FFM is composed of extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. The FFM is often used in connection with education and consumer behavior analysis, primarily because of its ability to predict attitudes, cognitions, and behavior. Recently, various fields of HCI research have used the FFM to predict the main task of users based on the relative strength of factors among users (Table 1).

The research cited above provides a large amount of evidence that levels of extroversion and neuroticism affect HCI usage. Extroverted user's behavior on social media is as follows: (1) users with low extraversion have lower self-esteem, and tend to express their identity online. Alternatively, extroverted people prefer to express themselves in offline environments,^{4,24,27} (2) extroverted people use social media as much as or less than offline interactions to maintain friendships;²⁵ and (3) extroverted people tend to post photos of friends rather than photos taken alone, attending to show his/her relationships.²³

Neuroticism describes, among other things, an individual's degree of sensitivity to anxiety. Neuroticism's characteristic

Table 1 – Five-factor model (FFM) personality traits in media research

Media type	Personality traits
Graphic user interface (GUI)	Extraversion ²⁰
Mouse/keyboard	Extraversion ⁹
Internet	Extraversion, neuroticism ⁴ Neuroticism ⁵ Extraversion, agreeableness, consciousness ⁶
Avatar	Extraversion, neuroticism ¹¹
Social media	Extraversion, openness to experience ^{21,22} Extraversion, consciousness ²³ Extraversion, neuroticism ^{24,25} Agreeableness, consciousness, neuroticism ²⁶

influence on HCI design can be summarized as follows: (1) individuals with high neuroticism use social media to create a sense of belonging, and to alleviate feelings of loneliness caused by emotional instability;^{4,8} (2) individuals with high neuroticism find it difficult to communicate offline, and want to manage this difficulty through use of online applications, especially social media;²⁵ and (3) individuals with high neuroticism tend to turn on online privacy settings, but expose themselves to risk by accurately listing personal information.^{4,24,27}

2.2. Sasang typology and design application

Sasang typology explains the dynamics of an individual in terms of that individual's innate natural temperament, and analyzes the temperament of the individual in terms of variances in the intensity of basic characteristics. Thus, this theory claims that differences in physiological constitution, instances of pathology, and individual personality traits demonstrate the relevance of the personality to physical phenomena understood in terms of Sasang typology; individuals are born with a particular temperament which serves as a foundation for personality and temperament, the individual's characteristic manner of relating to others.

Sasang medical theory, which is based on the Sasang constitution, is considered by many to be a 21st-century alternative integrative approach to medicine, due to its unusual approach to physiology and psychology. The historical absence of comparative studies assessing Eastern and Western physiological psychology has led to the devaluation of Sasang medical theory.²⁸ In order to reverse this devaluation, a large number of comparative studies focusing on the psychological perspective of Sasang typology and Western personality traits have been carried out.

Previous research^{28–31} indicates that the traits of extraversion and neuroticism are correlated with types of individuals described by Sasang typology. Chae et al^{29–31} claimed that the So-Yang type is more extroverted than the Tae-Eum type, which in turn is more extroverted than the So-Eum type. They further claimed that the So-Eum type is more introverted and has higher neuroticism than the So-Yang type. The Te-Eum type shows both the So-Eum and So-Yang type personalities. Its moderation is in contrast with the stark conflict between So-Yang and So-Eum, which are extraverted and

neurotic, respectively. Therefore, Te-Eum type was excluded in this study.

Despite the fact that Sasang typology can identify a user's psychological type, study design for example, spatial design,³² fashion and beauty design,³³ character design,³⁵ cell phone material selection,³⁶ and the appearance of robots³⁷ have been mainly limited to the physical component of Sasang typology.³⁴

Ji³⁸ used Sasang typology as a means of establishing a brand. The Sasang typology describes a greater range of factors relevant to an individual (similarly to MBTI personality theory) than Western approaches to personality. In contrast to Western approaches, the Sasang constitutional conception of personality is of an innate natural temperament that relies critically on situation and context. In terms of the connection between the Sasang conception of personality and design, the specific nature of the object being designed and the complementary use of objectification open up an infinite range of design possibilities.

2.3. Research on user personality traits and media usage patterns

Choi³⁹ pointed out that despite the rapid progress of research focused on Korea's media usage, most studies carried out were biased towards a Westernized point of view. In response to the literature's heavy reliance on US-based journalism theory, Choi introduced Sasang typology as an alternative to Western audience theory. Choi introduced significant differences in communication and media usage patterns using different Sasang types.

Lee et al^{40,41} suggested a relationship between HCI user segmentation methodology and users' personality traits of Sasang typology. Based on this exploratory research, Lee et al⁴² and Lee⁴³ examined social media usage, and concluded that the So-Eum and So-Yang types show distinctive patterns of self-disclosure and motivation. According to these findings, the So-Eum type tends to use Facebook for self-expression and self-disclosure of individuality due to that type's characteristically low extraversion in offline situations. Alternatively, the So-Yang type uses social media for purposes related to communication.

2.4. Research on personal computer wallpaper usage pattern

Apart from a single study of file management behavior, research examining desktop personal computer (PC) and laptop organization patterns is extremely limited. Ryu and Yeon⁴⁴ argued that individuals aged from 20 years to 29 years express a strong desire for individuality, and their proficiency in computer usage includes familiarity with the customization of the desktop environment and folder management systems. Noh⁴⁵ conducted a similar study, focusing on individual differences in semantic and functional website usage patterns.

As a method for analyzing desktops in this study, Donna Dawson's six desktop personality indicators (Table 2) have been used.

According to this set of indicators, personality types are divided depending on the type of icon, folder organization and

Table 2 – Personal computer wallpaper usage pattern and personality

Usage pattern	Personality
Desktop with scattered icons Even icons on each side	The owner is disorganized and tends to lose focus easily. The owner values balance and proportion and tends to keep a cool head in tricky situations. Likely to be organized and dislike clutter.
Desktop with many rows of icons	The owner needs everything to hand, likes to feel in control and on top of their life, while at the same time tends to be slightly disorganized
Personal photos as wallpaper	Indicates the kind of person the owner is and what priorities he or she has. Often a parent will have a photograph of their child, or a keen traveler will have a photo of an exotic location. Photos of friends show sociability, which is useful in work environments where good people skills are beneficial.
Plain blue wallpaper	Suggests an owner who likes to keep their personal life private.

type of background image an individual chooses. It assumes that the user has chosen and set these parameters him- or herself, according to his or her own preferences.

In addition, four personality types of computer users identified by professional information technology (IT) journalist Stuart Mitchell were included in the framework of the analysis.⁴⁶ Psychologists, usability experts, and economists synthesize these types as Tiny Tim, Free Radical, Methodical Minimalist, and Socialite. These four personality types have characteristic ways of organizing folders and characteristic desktop settings. Analysis of these parameters indicates the personality type of the computer's user.

2.5. Research questions

Correlations between usage behavior and *Sasang* constitution, in accordance with the five-factor model of HCI, and based on desktop setup behavior, were analyzed in order to test the following hypotheses:

Hypothesis 1. So-Eum and So-Yang will organize desktop folders differently;

Hypothesis 2. So-Eum and So-Yang will set different types of background images; and Hypothesis 3: the content of background images set by So-Yang and So-Eum will be different.

3. Materials and methods

The aim of this study was to explore differences in wallpaper usage patterns depending on the *Sasang* constitution and the possibility of HCI user categorization according to the *Sasang* constitutional type.

Table 3 – Personal computer wallpaper usage pattern and personality

Folder and icon arrangement	Icons arranged using no specific criteria (<i>img1</i>) Desktop full or a few rows of icons (<i>img2</i>) Icons arranged in every corner of the desktop (<i>img3</i>)
Wallpaper image setting	Operating system provided image or monochrome setting (<i>img4</i>) Scenery images (<i>img5</i>) Personal photos (<i>img6</i>)

3.1. Participants and procedure

Data were collected over 2 weeks in early August, 2013. The participants included 102 people aged from 20 years to 40 years, and were recruited through distribution of a Facebook event. The event distributed the questionnaire for *Sasang* constitutional classification (QSCC) II survey; the results of the survey and a screen capture of participants' desktops were then collected.

3.2. Measures

Desktop personalization and file management behavior was analyzed according to two measures. Dawson's and Mitchell's methods of classification were utilized as shown in Table 3.

3.3. Statistical analysis

Demographic data were as follows: 27.5% of participants were aged from 20 years to 25 years, 37.3% of participants were aged from 25 years to 30 years, 19.6% of participants were aged from 30 years to 35 years, and 15.7% were aged 35 years or older; 58.8% of participants were male, 41.2% were female; a total of 43.1% of participants had majored or were majoring in the humanities, 31.4% had majored or were majoring in professional subjects such as engineering and accounting, 23.5% had majored or were majoring in other subjects. Regarding the *Sasang* constitution of participants, 33.3% were Tae-Eum, 43.1% were So-Yang, 23.5% were So-Eum; and Tae-Yang was not investigated.

4. Results

Of the total 102 collected desktops, 46 belonged to participants classified as Tae-Eum, 68 to participants classified as So-Yang, and 24 to participants classified as So-Eum.

4.1. PC wallpaper folder customizing

Regarding analysis of the behavior in the desktop folder cleanup, participants were classified into three types: those

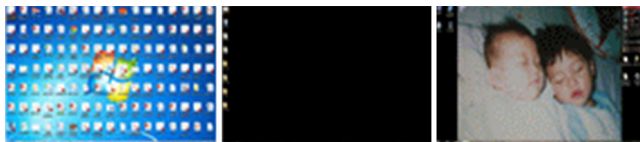


Fig. 1 – Folder customization types.

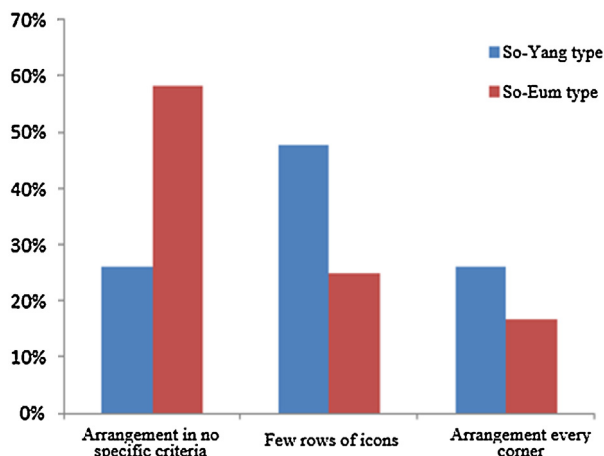


Fig. 2 – Folder customization type percent.

who made no attempt to organize their desktop icons (Fig. 1, left), those who organized their desktop icons by type (Fig. 1, center), and those who organized their desktop icons by type and location (Fig. 1, right).

Regarding the division of organization among *Sasang* constitutional types, 26% of participants fully organized their desktop (i.e., icons were organized by type and location), and 48% of participants organized their icons only by type. In contrast to So-Eum participants, those participants who did not fully organize their icons were classified as So-Yang and represented 58% of the total. The layout of folders with respect to location and type accounted for 25% and 17%, respectively. Finally, 26% of participants organized their desktop by layout and overall utilization. These data support Hypothesis 1, that desktop icon organization varies according to *Sasang* constitutional type (Fig. 2)

4.2. Manner of desktop wallpaper expression

Regarding analysis of the manner of desktop wallpaper expression, participants were classified into three types: operating system (OS) provided image or monochrome setting (Fig. 3, center), scenery or emotional image (Fig. 3, left), and personal image which expresses his/her individuality (Fig. 3, right).



Fig. 3 – Wallpaper expression type.

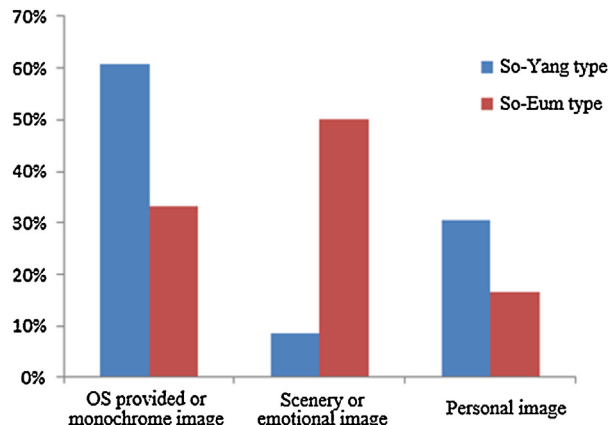


Fig. 4 – Manner of desktop background image.

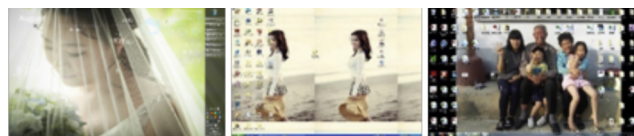


Fig. 5 – So-Yang’s desktop background.



Fig. 6 – So-Eum’s scenery images.

Analyzing desktop images according to *Sasang* constitution, the So-Yang type typically set the desktop image to a preexisting OS image or solid color, and was most common accounting for 61% of the total. Landscape images accounted for 9% and images of individuals accounted for 30% (Fig. 4).

Figure 5 illustrates how So-Yang participants would typically use pictures of individuals as their desktop background.

However, regarding So-Eum participants, 33% used an existing OS image or single color as their desktop background, and 50% used landscape images (Fig. 6).

So-Yang participants tended to use images of individuals, or images including text, rather than emotive images. So-Eum participants tended to use images they had created themselves, or images of personally desired objects, to fulfill their desire. Characteristic types of desktop images used by So-Eum and So-Yang participants support the hypothesis that different typology will use different types of images as desktop backgrounds.

5. Discussion

This study investigated *Sasang* typology by analyzing computer user’s desktop organization behavior. The difference between the So-Yang and So-Eum types was most apparent,

and allowed the study of differences in desktop organizational behavior according to constitutional type.

Regarding desktop folder and icon organization, the So-Yang type tends not to organize folders and icons, whereas the So-Eum type tends to organize folders and icons as much as possible. When constitutional types were analyzed according to the criteria given by Dawson, the extroverted nature of the So-Yang type is managed by the individual's self-control. By contrast, the So-Eum type's high neuroticism tends to lead to thorough organization and classification of items on the desktop. Individuals desire to create separate identities in the real world and in social media^{4,24} and to express themselves in social media in ways they are not able to in the real world.²¹

Regarding desktop images, the So-Yang type characteristically used the default image or a monochrome background; the So-Eum type used mostly landscape images. The So-Yang type has characteristically high emotional stability and high extraversion; the So-Eum type tends to prioritize online privacy.^{24,25} So-Eum type individuals often used landscape images as their desktop background, which can be seen to represent a desire to manage the impatient and uneasy mood characteristic of the So-Eum type. So-Yang type individuals tended to use family portraits or images related to important relationships, in part due to the outward-oriented and sociable characteristics of the So-Yang type.

This study has the following limitations. First, the sample studies were relatively small ($n = 102$). Additionally, according to Che-Ma Yi's description of the *Sasang* constitutional types as proportions of the total population, Tae-Eum accounts for 50%, So-Yang for 30%, and So-Eum for 20%. By contrast, this study found the So-Yang type to account for 43% of participants, whereas the Tae-Eum type accounted for 33%.

The results of this study imply that a user's personality traits of *Sasang* typology, incorporating innate factors, and with higher reproducibility than the Western five-factor model of personality, can be used to facilitate the design of HCI-related tasks that are customized to the user's personality. For example, social functions catering to the So-Yang type may offer privacy enhancements, or provide So-Eum type users with images that increase emotional stability or facilitate self-exposure and self-expression. Studies focusing on *Sasang* typology may facilitate visual design that reflects the personality and psychology of users.

Conflicts of interest

The author has no conflicts of interest to declare.

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