CULTURAL DIFFERENCE AND WEBLOG INTERFACE DESIGN: COMPARING THE USABILITY OF TEXT-BASED AND ICON-BASED COMMANDS

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ABSTRACT

Unlike the early days of computering, our contemporary virtual lives are filled with rich graphics. However examination of many weblog sites revealed that most buttons (commands) were text based. Why so?

This paper compared (quantitatively and qualitatively) the differences in usability between text-based interface and icon-based interface in weblog environment. In addition, this paper intended to explore how cultural diversity factor affected the interface usability.

Test was conducted on two weblog prototypes with sixteen participants (half were Korean and half were French). Finally, icon-based interface was found not having a higher efficiency in

performance compared to conventional text-based interface. Despite that, the result suggested that the icon-based interface had much potential in application. Korean and French also showed different preferences in using the two interfaces. Korean claimed the favor of icon-based interface while French did not feel comfortable with "graphically complex" interface.

Keywords: weblog interface, learning effect, cultural difference

1. BACKGROUND

Ever since computer was invented in the l980s, computer users have experienced tremendous progress in human–computer interaction. Unlike the early days, our contemporary virtual lives are filled with rich graphics. Interactive animations swap with essay-long explanations, iconic buttons replace unmemorable text commands, and emoticons are inserted instead of exclamatory sentences. We are living in the era of semantics.

However when we examined the interface of many weblog sites, the foremost expanding components of Web 2.0 generation, it revealed that most buttons (commands) were text based. The unexpected result arose some questions: why icon-based buttons had not been widely used in weblog sites? What would be the trade-off attribute(s)? If the text-based buttons were replaced by the iconic buttons, how would that influence the efficiency of usage?

2. FOUNDATION OF THEORY

Over time, icons have been praised and criticized by many scholars. Among the experts in using icons, Horton (Horton 1994) insisted on the advantages of iconic information including the speedy search, immediately recognizable, and easy to learn (learnability). The biggest advantage of icon-based interfaces was said universal usability, conveying through the language-free characteristic of icons (Horton 1994, Haramundanis 1999).

However, to some extent, icons could not completely replace text in interface design due to their limitations. According to Jef Raskin (Raskin 2000) icons were criticized for possibly conveying misleading message due to obscured meaning. To overcome this matter, designers could seek the use of concrete icons – icons representing the objects directly, and/or with the aid of labeling. According to study of Kim and Lee (Kim and Lee 2005) Korean users reacted (more) efficiently to concrete icons (in compared with American users). This important finding put a foundation for this study experimental instrument design.

3. RESEARCH AIMS & QUESTIONS

This paper compared (quantitatively and qualitatively) the differences in usability between text-based interface and icon-based interface in weblog environment. The implementation of this study would contribute to the development of weblog interface design.

In addition, cultural diversity had been identified as the cause of differences in perceiving, searching and analyzing information; this paper also intended to explore how this factor affected the interface usability.

The research questions included:

[1] In which extent do text-based interface and icon-based interface's efficiency of use differ (under users' first experience)?

[2] Taking icon's easy-to-learn characteristic into consideration, how would 'learnability' influence each interface type's efficiency of use (after learning period)?

[3] Picking two distinguish sample groups of Asian users (Korean) and Western users (French), how would the cultural difference make users perform differently and whether that would make a preference of interface style?

4. METHODOLOGY

4. 1. EXPERIMENTAL DESIGN

In order to investigate all interlaced aspects, the experiment was planned as a mix of between-subjects design and within-subjects design.

In the dimension of between-subjects, we observed two groups of samples: one used the text-based interface weblog (control group) and the other used the icon-based interface weblog (treatment group).

On the within-subjects level, each sample was asked to perform two tests. The first test was to measure the efficiency of each interface type under user's first experience. The second test was to observe each interface type's 'learnability' and how that would affect the efficiency.

Each test was designed with a series of 11 frequently performed tasks in weblog. In task number 8, 9, 10, and 11, difficulties were intentionally included, in order to observe the learning effect. The series of tasks used in two tests are identical.

4. 2. EXPERIMENTAL INSTRUMENT

All tasks were performed on a weblog prototype, built after Naver blog model, a Korean local popular blog site. The prototype was made into two versions: text version and icon version (Fig. 1).

Figure 1: Weblog prototype (text version and icon version).

In the text version, most functional buttons were kept similar to the original site. All text including instruction and interface were translated into participants' native languages.

In the icon version, most command buttons were replaced by icon buttons, text contents and URL links were reserved as original. Icons used in prototype were concrete icons collected from Naver blogs and relative sites. These icons were reproduced in Adobe Illustrator for a clearer presentation then screened through a questionnaire (with 5 participants different from the group above) before being finally applied in the prototype.

Figure 2: Examples of some icons produced to be used in weblog prototype (unscreened)

4. 3. MEASUREMENT & ANALYSIS FRAMEWORK

For measurement, task performance of each participant was recorded by screen capturing software. At the same time, we tracked their eye movement and matched with the screen record.

The quantitative analysis and assessment of efficiency were based on error frequency (number of incorrect hits), error rate (proportion of tasks in which errors occurred over total number of tasks), and completion time of each task. Statistical data were analyzed by Independent sample T-test.

The qualitative analysis was based on interpretation of eye tracking results, and was aided by short debriefing sessions conducted with participants upon finishing their experiments.

Figure 3: Examples of eye moving paths of 7 samples in task #10 using icon-based interface (under inexperience condition and after learning condition)
(One sample from each group were removed due to data corruption)

4. 4. SAMPLING

Sixteen participants were recruited in total, from different departments of Korean Advanced Institute of Science and Technology (KAIST). Most participants were novice in blogging or had little experience with the local Naver blog. To observe the effects of cultural diversity, we chose Korean for half of the participants and the other half were French. Within each group, two groups of four were randomly selected to form 'control group' and 'treatment group'.

5. RESULTS AND DISCUSSION

5. 1. TEXT-BASED INTERFACE VS. ICON-BASED INTERFACE

Statistically, it is significantly different between text-group and icon-group, with the text-based interface having higher efficiency. After going through the learning effect, the gap between the results from two groups is shorten considerably. However, in the second test (after learning test) icon-group did not show superior results compared to text-group.

MISTAKING AND REASONS

Under inexperience condition, icon-group shows significant high error frequency as well as long time (Fig. 4). The participants in this group made mistakes mostly in task number 8, 9, 10, and 11, where difficulties were introduced. In the first 2 tasks, however, participants used most incorrect hits and time to probe the unfamiliar interface and unfamiliar icons; low performance was the outcome of trials-and-errors. Text-group, on the other hand, made mistakes mostly due to the trials of seeking for more diverse solutions even though the tasks were quite straight forward and set as "single choice".
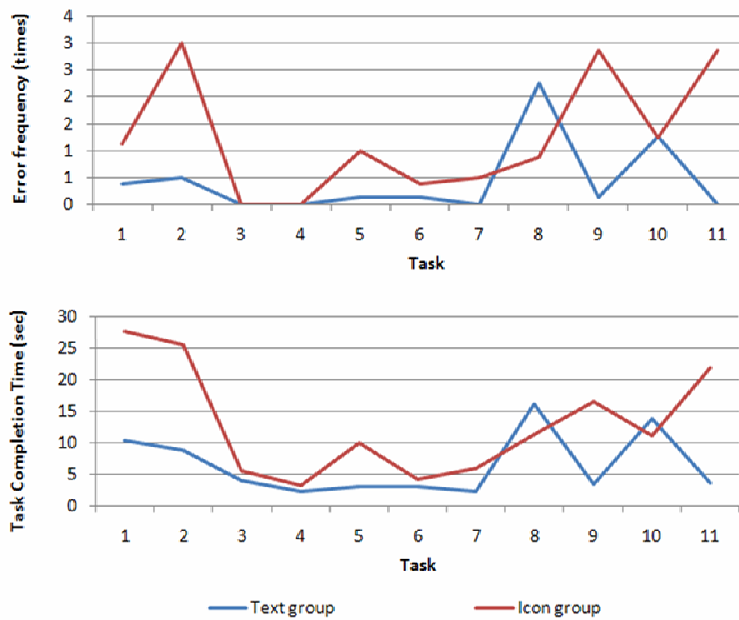
Figure 4: Performance of Text group and Icon group in each task (under inexperienced condition)

Interestingly in certain task (task 8 and 10), under inexperienced condition icon-based interface even showed better results compared to text-based interface. This finding put some potential to icon-based interface to gain superior results if being observed further.

PERFORMANCE AND IMPROVEMENT

Under inexperienced condition, text-based interface showed significantly better results thanks to non-obscured characteristic. After learning period, icon-based interface improved much better performance and nearly caught up with text-based interface in task completion time (Fig. 5).
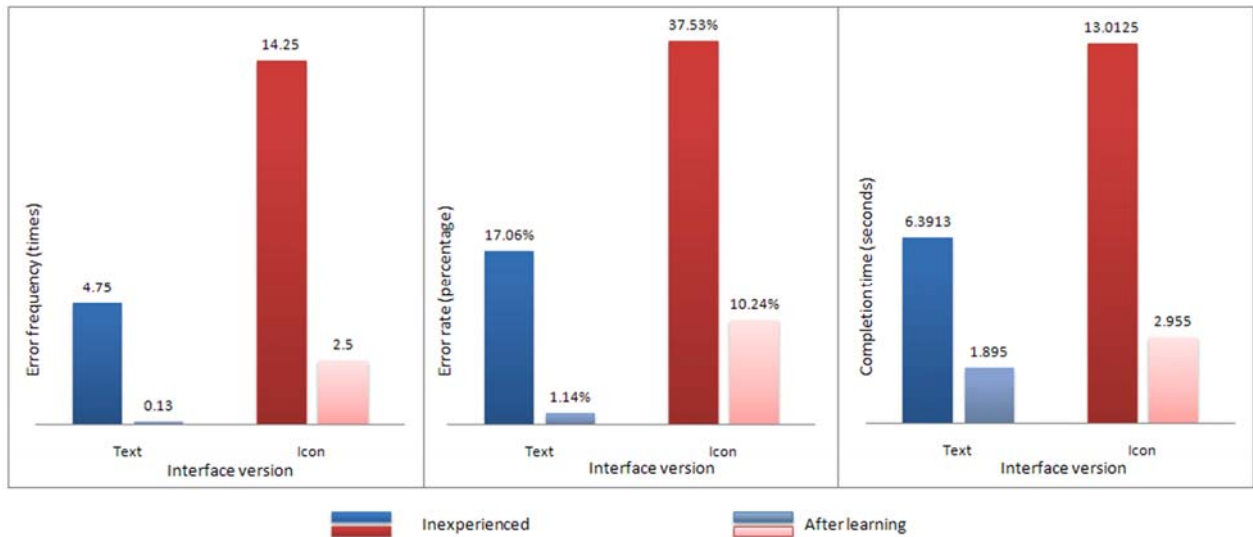
Figure 5: Comparing performance of Text group and Icon group under two conditions (inexperienced and after learning)
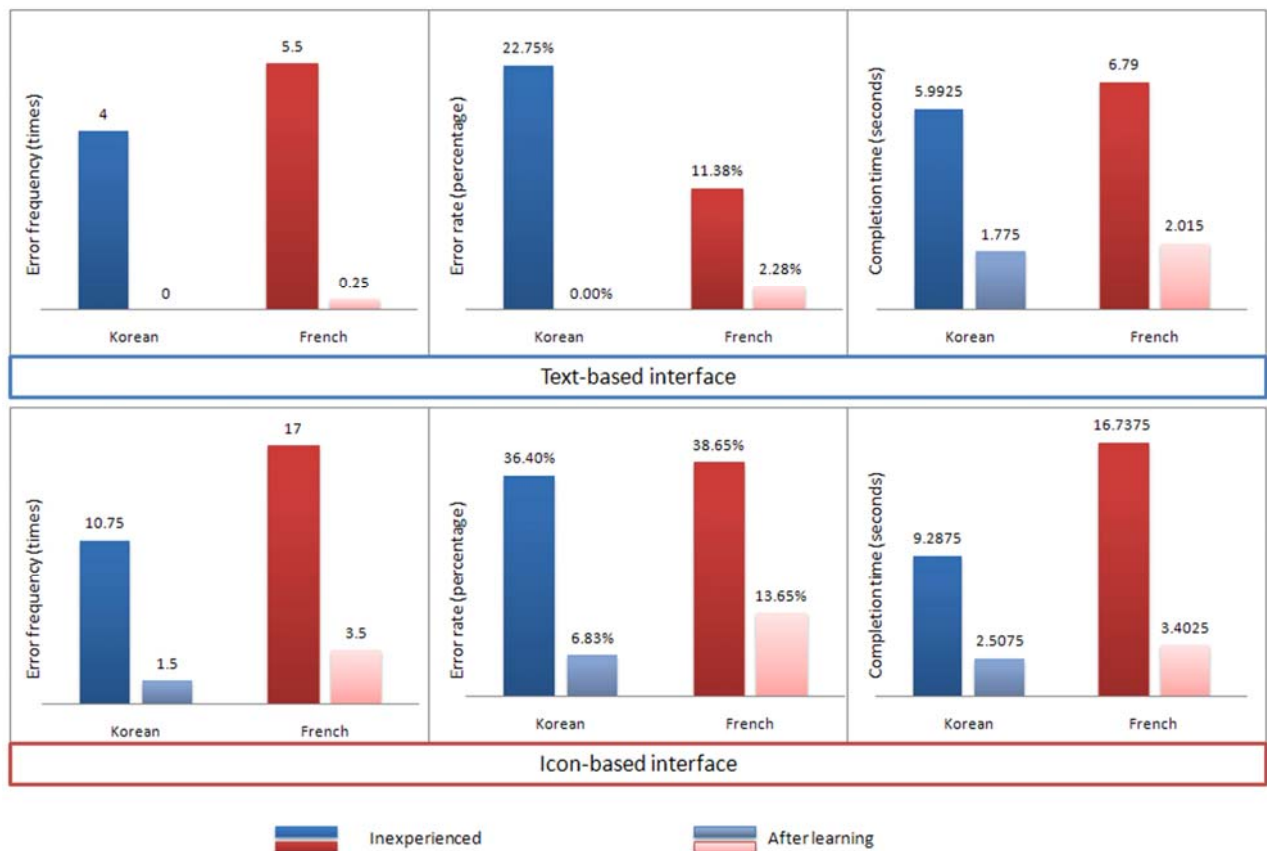

Figure 6: Comparing performance of Text group and Icon group with detail by nationalities (under inexperienced and after learning condition)

Figure 5 and 6 indicated the dramatic drop of error frequency and error rate after learning in icon-based interface. Comparison of the amount of change between the columns confirmed that icon-based interface had high learnability, matching the theory of Horton (1994). However, it had not proved that the learnability of icon-based interface was higher than text-based interface, since the performance of text-group was already high in both conditions. Because this study only observed one time learning experience, of which results could not prove which interface would perform better through user daily using experience.

In term of completion time, despite that icon-group did not have shorter time than text-group; the means of two groups came very close under after learning condition. Assuming that it was possible to exclude the time for making incorrect hits, the time for only hitting the button in icon-based interface had probably been lower than in text-based interface. This supposition fitted Horton's theory that icon is faster for searching and can be recognized nearly immediately. This assumption, however, was not observed in deep and not statistical proved in this study. But it has the potential to be studied further and in a more throughout research.

5. 2. KOREAN GROUP VS.FRENCH GROUP

INFORMATION SCANNING

While analyzing the eye-movement paths, we observed the difference in information scanning path and strategy between the two nationalities.

Korean participants tended to focus on what they were sure about and dag into those areas. They often scanned information only in the area that they expected for the information. Only when they encountered mistake, they would start to broaden scanning area. If not so, their scanning pattern was unclear and simply jumping across the page.

French participants showed a clear scanning pattern, in which they tended to divide the page to areas according to density of data display, from that they expected the amount of information they could get, and scanned them in order. They normally started at the left side, then cross the top menu to the right side. Middle part normally was last read. For each area, they scanned more slowly and even read the contents sometimes (while Korean participants did not). The scanning

patterns were quite organized until they lost track of what to do and frantically looked back and forth the page, taking much more time in searching.

A minor detail we found was French participants tended to fix their view at the corners while Korean's path was more flexible. However, this might not due to the cultural difference. For more concrete confirmation, it needs to be proved with a more detail test with larger samples.

During observation, Korean participants claimed that the icon-based interface was quite comfortable to them to look at, once they understood the meaning of each icon. French participants, on the other hand, said the icon-based interface had too many graphical elements and was confusing to them.

MISTAKING AND REASONS

Figure 7 showed that French participants had problem with text-based interface in task 8 under inexperienced condition. It mainly was due to misunderstanding the instruction and meaning of command button. Korean participants at the same time had problem in task 10, due to expectation from previous experience with real Naver blog (the implanted difficulty was swapping the positions of panels, making them different than original Naver blog). After learning, both groups made nearly-to-none mistakes.
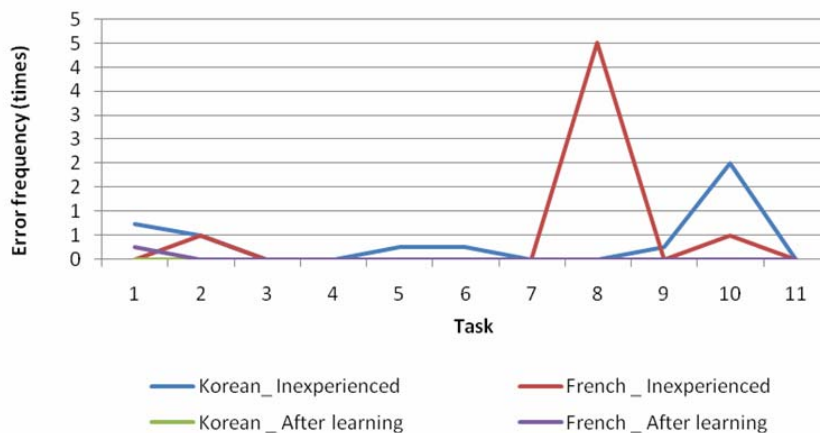

Figure 7: Error frequency of Korean group and French group under two conditions (Text-based interface).

With icon-based interface blog, French participants spent lot of time in task 1 and 2 since they were so confused about the meaning of the icons (unfamiliar graphic concepts, in notion that Korean style icons are different to French ones). They also had difficulty in task 11 since they were not used to the Korean blog structure and did not expect the same information as the prototype blog (model after Naver blog) showed (Fig. 8). In task 9, both groups had problem due to the (intentional) confusion of the icons (3 options were given for single function).
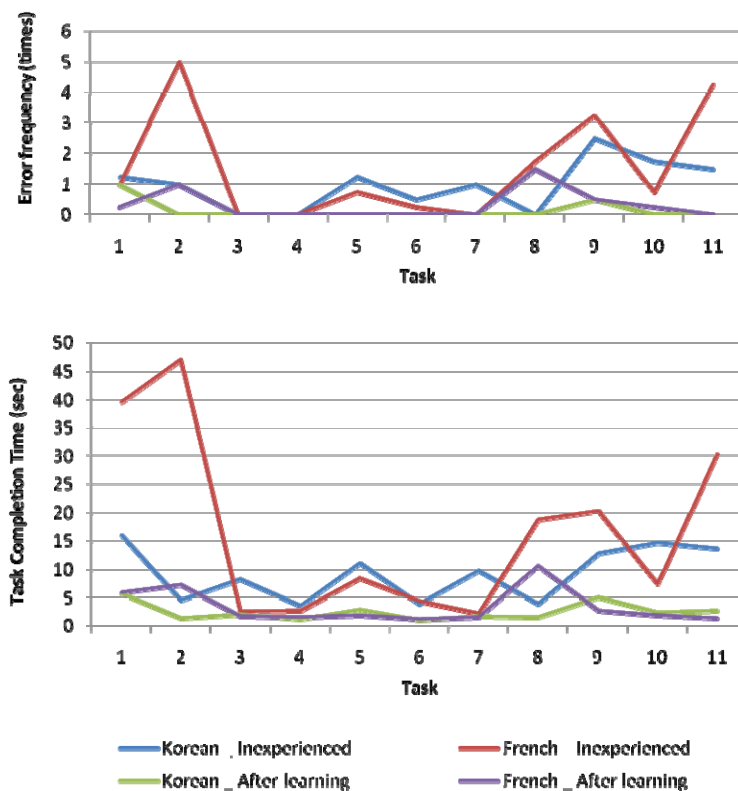

Figure 8: Performance of Korean group and French group under two conditions (Icon-based interface).

PERFORMANCE

During the first experience test, Korean group showed better results due to their familiarity with the weblog structure (some participants have viewed the Naver blogs before). In the second test, the gaps were shortened. French even performed more direct selection with the icon blog compared to Korean in some tasks. However, Korean group still was faster and made fewer mistakes in general (Fig. 9).
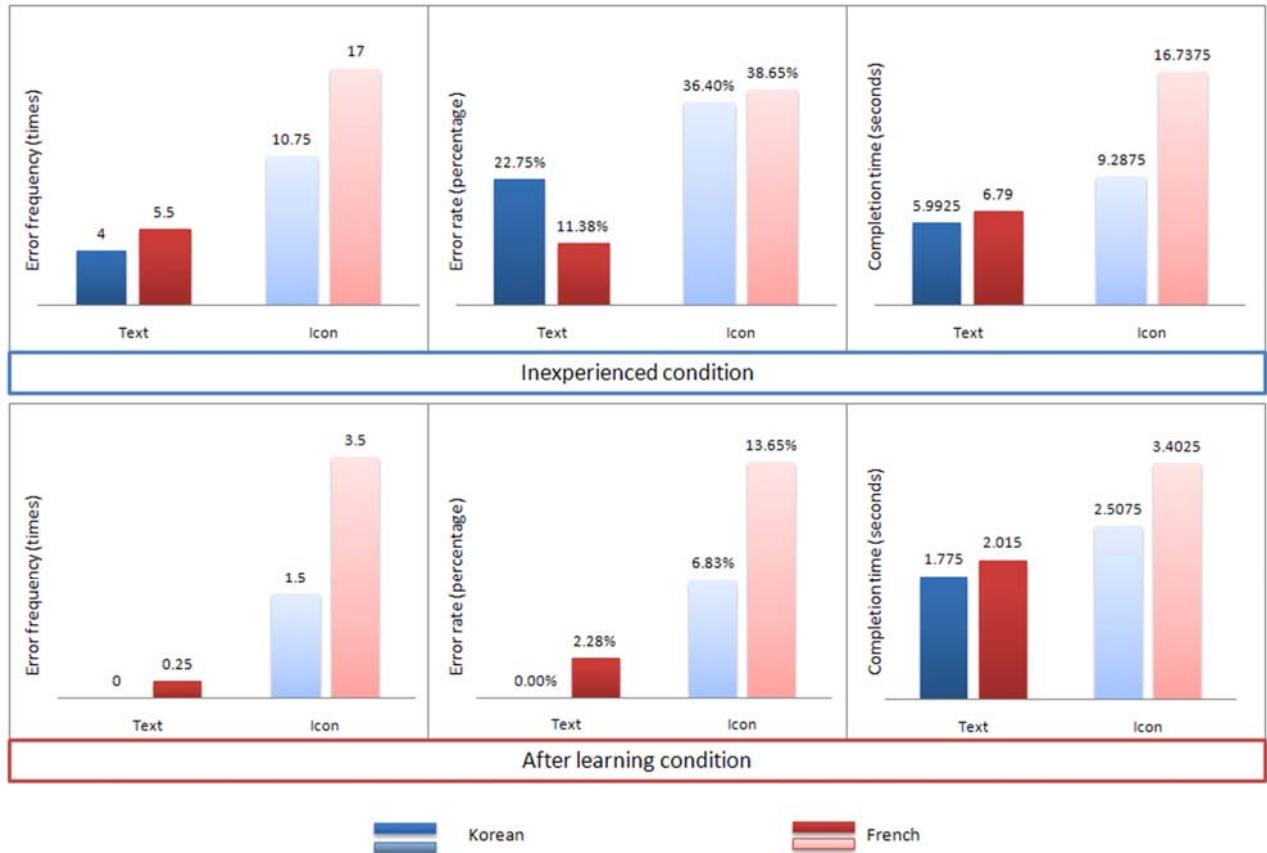
Figure 9: Comparing performance between two nationalities before and after learning (text-based interface and icon-based interface).

The superior performance of Korean group was concluded due to the familiar of graphic concept. In other words, the ways Korean and French scan and perceive information, understand the symbolic meanings of icon buttons are very different. According to previous study of Kim and Lee (2005), Korean (representing Asian) respond efficiently to concrete icons while Western group respond less efficiently with concrete icons. Since the prototype was built after a Korean local blog, the structure and graphic style (overall and of icons) is suspected to aid advantages to Korean group in having better performance.

6. LIMITATIONS

The present study confirmed some theories and possibility in applying icon-based interface in weblog. However, it contained several problems that biased the result. Firstly the level of familiarity to blog prototype of participants was not completely controlled. Since the prototype was model after a local weblog, some participants claimed that although they had not used the particular site but had seen them regularly. Therefore the 'inexperience' condition was not exhaustive in some cases. Secondly, due to the time constraint the study was not designed with a time-series design, instead the treatment (learning experience) was only observed once. From the results, it suggested that if the treatment was repeated and observed several times, the results might draw out a different conclusion.

7. CONCLUSION

Icon-based interface was found not having a higher efficiency in performance compared to conventional text-based interface. Despite that, the result suggested that the icon-based interface had potential to be fast learnt and used, on top of its language-free advantage compared to text-based. This study only evaluated the usability of icon-based interface yet not considered other aspects such as emotional effect, developing and maintenance, customization, etc. Among those, emotional effect, where icon may have much advantage, is very important attribute. Since weblog is highly personal space, it is promising to be the compromise for icon's subjacent performance in usability.

In this study, only the icons and weblog structure of a local blog site were prototyped and studied, the results only apply for this particular model and should be considered as a pilot study. Further studies on various blog models and icon styles should be covered in order to draw a more thorough and accurate conclusion.

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