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How Do Software Users Read Software Installation Agreements? An Eye-Tracking Experiment

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Introduction

As the number of computer users has increased, so has the demand for the use of application software, although, as noted above, users often seek to do so illegally [1]. Since 2003, Taiwan has been the only country in Asia with increased piracy rates, and according to estimates, such behaviors cause approximately 52.2 billion USD commercial value in losses to the software industry each year, on a global basis [2]. Moreover, college students are the largest group using the Internet, and also the group with the most potential for infringing software copyright [3]. From the infringement point of view, around 60% of people surveyed said they would not refuse to use pirated software, noting that it is very easy to obtain, mostly through mutual exchanges among relatives and friends, and it can also be downloaded from Internet [4]. The software most computer users download from the Internet is application-related software [5], which allows users to complete tasks using different software functionalities, such as word processing software, graphics and video software, and web browsing software. Another survey found that the top three most downloaded application software included that for music (41.2%), video (40.6%), and games (35.8%), and these are also the types of software that users are most willing to pay for [5]. Such software is subject to intellectual property rights, and protected by copyright. However, the problem of software piracy exists in the globe and among Taiwanese computer users, and especially college students.

Prior studies indicated that college students usually offer reasonable excuses for using pirated software, and feel that their behavior does not have any significant negative effects [6, 7]. In fact, before installing any software, users are required to read legal disclaimers. In the United States, software piracy carried out for profit or commercial purposes is subject to criminal liability [1]. Also, not only unauthorized uploads, but also the provision of software to others to download from another computer is also a copyright violation [8]. Taiwan's government has passed laws to control unauthorized software copying. Section 85 of the Copyright Law, on moral rights violations, makes users responsible for any damage caused due to piracy, not only with regard to non-pecuniary damage, but also with the aim of achieving rapid victim compensation. Software users are required to carefully read the license agreements and the related statutes before downloading software, thereby reducing subsequent legal problems that could be caused by neglecting this information. Moreover, users can better understand their rights related to using software if they read such agreements. However, even though users know that the copyrighted application software can only be downloaded after having been purchased, many users prefer not to pay anything, and thus engage in software piracy. The purpose of this study is thus to explore application software users' reading behavior before installing software. It is expected to find an effective way to present copyright content on the software installation interface (i.e., InstallShield), so that software users' reading behavior can be enhanced before they start to download software.

Methodologies

In this study, the eye-tracking device, EyeLink II, was employed to carry out a randomly-displayed three-scenario experiment, with the aid of experimental design experts to establish the validity of the all experimental materials and study procedures. Different experimental scenarios were designed to determine which one best increases participants' intention to read the related software agreements. Three experimental scenarios, i.e., general/control, keyword (Fig.1), and force-read modes (Fig.2), randomly appeared on the computer screen for the participants to view. Each scenario consisted of ten pictures developed for the purposes of this study that were based on various software installation agreement display interfaces found on the Internet. The AOI (area of interest) was drawn on each picture to make it easier to target these areas, thus achieving this study's purpose (Fig.3). The font style in all scenarios was controlled as MingLiU. Chinese text was also determined to be appropriate for this study, since this meant that the participants could use their native language in the experiment. According to the literature, no differences in eye-movement modes had been found when participants were given Chinese or English texts to read [9, 11].

A pilot study was first conducted with eight undergraduate volunteers who were asked to read the agreements by viewing a computer screen to determine the average time duration required to read one page of agreements, and five participants were invited to participate in order to determine the location of eye fixation related to one or more areas of the display interface of the experimental materials in each scenario for the purpose of the eye-tracking experiment.

In the formal experiment, 30 voluntary participants were recruited. Before and after the experiment, a computer-based pre- and a post-test related to the cognition of intellectual property was separately given to the participants who enter their answers by directly watching the computer screen. Each test contained the same 20 questions validated by the experimental experts. All eye-tracking data retrieved from the AOI included total fixation time (TFT) and fixation count (FC). The VA data viewer was used to gather and then analyze the data. Data for the initial fixation point was also collected in order to determine the first position that the users paid attention to in every experimental picture.

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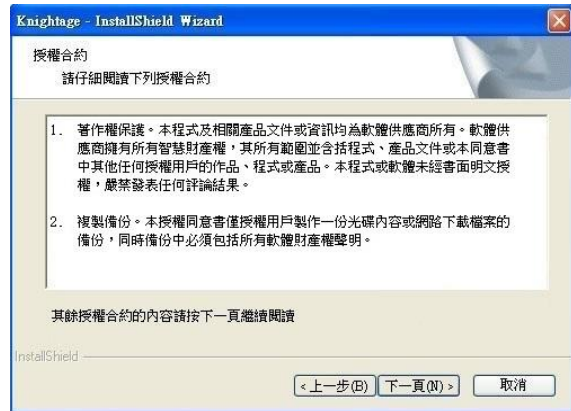

Figure 1. Keyword mode – an example picture

Figure 2. Force-read mode – an example picture

Figure 3. Analysis of AOI - an example in one picture

Results

This study excluded two participants due to technical problems in eye-tracking and incomplete measures, and thus the data analysis includes 28 valid results. All participants were aged between 21 and 25, except two at the age ranging from 26-30. In the pre- and post-cognition tests, it was found that the participants on average correctly answered more questions in keyword mode than other two modes after the experiment (general: 3.4; keyword: 4.4; force-read: 2.4).

The AOI results for the remind title, total contents, I accept button, and next button indicated that only the TFT for the remind title and total content were significant (Table 1). A comparative analysis was then done to further compare the TFT and FC for the key content in the three scenarios each including ten pictures, in order to learn more about the users' reading behaviors as well as to understand the level of attention users gave to the key content. Comparisons of the results with regard to the key content in all scenarios including all thirty pictures indicated that in the keyword mode the users had the greatest fixation duration and fixation count.

The results also indicate that most users started reading from the top left (87.5% in general mode and 63.9% in force-read modes). Differently, 63.9% of users in the keyword mode first noted some of the keywords. The keyword mode attracts user attention effectively, and thus changes their original reading mode, causing users to note the key sections.

AOI	Index	p-value	Significant
Remind Title	TFT	0.317	No
	FC	**0.007**	**Yes**
Total contents	TFT	0.645	No
	FC	**0.000**	**Yes**
I accept	TFT	0.667	No
	FC	0.108	No
Next	TFT	0.725	No
	FC	0.378	No

Discussions and Conclusions

This study shows that in the keyword mode users' attention could be diverted to the key content, thus changing their reading habits. Because the directional gaze of the eye represents user attention in a specific direction [11], the results of the eye-tracking analysis reflect the impact of the keyword mode quite clearly. This study can also lead to a better understanding of user of reading habits, and how changing the color of the text and the design of a layout can impact these. Prior studies found that, compared to black and white text, the use of color attracts more attention [12]. According to the results of the eye-tracking experiment, this study verified that the red text color can enhance user attention and also increase focus on the key content of the agreement by increasing total fixation duration and fixation count. Moreover, this study shows that even though college students did not want to read the agreement, by changing the design layout they developed different feelings about the agreement, and thus changed their reading behaviors.

Recently, there have been many software vendors who have tried to change the presentation of software agreements, like setting a fixed time that users need to wait before able to download the software, as it is hoped that this will encourage users to read the contents of the agreement. This study suggested that software vendors highlight those parts of the agreement that users tend to violate, by using color to attract their attention. This would reduce the possibility that users would violate software copyright, and thus reduce piracy.

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Call for Items: AIS SIGHCI Newsletter Volume 16, Issue 1

You are invited to offer items to the coming issue of AIS SIGHCI newsletter (Volume 16, Issue 1), to be published in July 2017. All items will be editorial reviewed. If you are interested, please send your pieces to the newsletter editors Mina Shojaei Zadeh (minashojaei@wpi.edu) and Upasna Bhandari (upasna.bhandari@u.nus.edu) by June 15, 2015. Possible topics include, but are not limited to, the following:

1. Short essay/opinion/research study (800 – 1700 words)
2. HCI book review (800 – 1700 words). Please feel free to contact the editor beforehand if you intend to review a book or if you wish your own book to be reviewed.
3. Teaching HCI (up to 1700 words): teaching ideas or cases, sample syllabus, etc.
4. Industry voice (800 – 1700 words). We welcome HCI related essays from industry professionals.
5. Brief introduction of HCI research tools (up to 300 words).
6. Brief introduction of interesting HCI journals and/or special issues, including citation information, brief description, table of content (for special issues), etc.
7. CFP for HCI related journals or conferences.
8. News about SIGHCI members (up to 300 words for each item): honors and awards, professional activities, new appointments, interesting projects, new books or publications, etc.
9. Any other announcements (up to 300 words for each item).

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