

A Comparative Analysis of Time-lag Type-in Advertisements

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Abstract— Advances in Web-based services provide rich opportunities for a diverse set of advertising methods. In this paper, a time-lag type-in advertising method is proposed. In order to measure the effectiveness, the authors perform a comparative study. The current study examines the impact on recollection rate of the type-in advertisements that include a waiting time. Input-based advertising methods were compared both with and without a waiting time. The proposed input-based advertising method provides a 26.7 % better recollection scores with a 30- seconds wait time.

Keywords— Time-lag; Advertisement; Web-based services; recollection; comparative study;

I. INTRODUCTION

Internet services have penetrated into everyday life. The advanced capabilities of smartphones, which are now widespread, provide increasing opportunities for Web 2.0, where everyone can be an information provider in any place and at any time. This trend is accelerating the emergence of a new advertising industry landscape where there is abundance of advertising opportunities. Unfortunately, the variety of content provides a challenge for Internet advertising. There is a gap between paid content and low-value content that can only accommodate cheap banner advertisements.

In order to fill the gap, the authors propose a time-lag input-based advertising method. In this paper, the authors conduct an evaluation study that examines the effectiveness of the proposed method.

II. BACKGROUND

A. Purpose of Research

The aim of this research is to identify the effectiveness of time-lag input-based advertisements.

B. Related Work

CAPTCHA is now widely used on the Internet. The term CAPTCHA was coined by Luis von Ahn, et al. of Carnegie Mellon University [1]. It has been used for blocking nonhuman (HTML scrapers, searchbots, etc.) access to Web content. Research into CAPTCHA covers three areas: (a) the implementation and security of CAPTCHA, (b) variations of



Fig. 1. An example of CAPTCHA (“T7GApS5”).

CAPTCHA (c) advertisement effect of CAPTCHA. Regarding the implementation, usability and security of CAPTCHA, Huang et al. discussed an efficient algorithm for CAPTCHA [2]. Ross et al. discussed CAPTCHA-based line drawing based on 3D models [3]. Lang et al. discussed the visual decryption of CAPTCHA [4]. Bursztein compared the strength of 15 CAPTCHA systems [5]. Pshaidis et al. discussed distortion from the viewpoints of security and usability [6]. Egele et al. discussed CAPTCHA smuggling [7]. Lin et al. discussed CAPTCHA design for mobile devices [8]. Ho et al. discussed a usability design tool game, called DevilTyper [9]. Motoyama discussed the economic aspects of CAPTCHA [10]. Chen et al. discussed the combination of CAPTCHA with visual secret sharing for additional authentication security [11].

Regarding the variations of CAPTCHA, Soupionis et al. discussed audio CAPTCHA [12]. Goswami et al. discussed face-based CAPTCHA [13]. Hernandez-Castro et al. discussed Match CAPTCHA [14]. Hwang discussed the combination of text-based CAPTCHA and image-based CAPTCHA [15].

And, with regard to CAPTCHA advertising, Pierson et al. discussed the advertising effectiveness of type-in advertisements [16]. Aggarwal evaluated animated advertising with Captchas [17]. de Sa et al. discussed the advertising effectiveness of CAPTCHA animation [18]. There are even monetization efforts being made using CAPTCHA advertisements [19] [20] [21] [22].

The originality of this paper lies in its evaluation of the type-in advertisements that include wait time.

III. TIME-LAG TYPE-IN ADVERTISEMENTS

A. Definition

The definitions used in this study are depicted in Table I. The display of a skewed text and input of the exact matching

TABLE I DEFINITIONS

Term	Definition
CAPTCHA	Completely Automated Public Turing test to Tell Computers and Humans Apart. A test for identifying human visitors to a website. One popular example is a test that shows a graphical image of text and then requests a human to enter the same text. It is used for filtering out automatic computer programs when entering a protected area of services on the
Web. Type-in advertisement	An advertisement scheme that requires a human to enter the displayed text into a CAPTCHA form. It is used to increase the pure recollection of commercial brands.
Time-lag type-in advertisement	An advertisement scheme for type-in advertisements that include an additional wait time. It is used to amplify the effect of type-in advertisement.

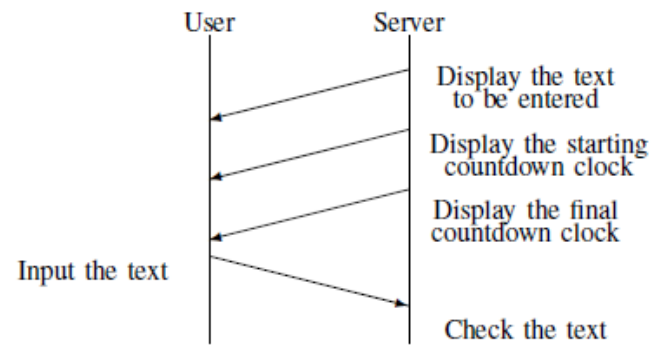


Fig. 2. Sequence of a time-lag type-in advertisement.

TABLE II EXAMPLES OF GAME DESIGN USING A WAIT TIME IN SOCIAL GAMES.

Example	Description
Regeneration	The game session is timed and the play energy required to play decreases over time. When the energy is drained, the user needs to wait for a certain period of time (10 minutes, 2 hours, 1 day, et al.) The user can purchase a regeneration premium item in order to skip this wait time.
Daily bonus	Some bonus items are presented to the user for logging in everyday. When a user obtains the day's bonus, he/she needs to wait for a day until receiving another bonus. This increases the mindset for daily visit to the game, creating a certain mind-share for a game.
Fever hours	Fever hours give extra bonuses for the player's game play. For example, from 21:00-22:00, he/she can earn double game points. This creates an attitude of waiting behavior, and provides a timed clue for the next game play: during the designated fever hours.

text can confirm that an action is being performed by a human. An example of CAPTCHA is depicted in Fig. 1.

B. Time-dimensional Management

Time-dimensional management is effective in increasing the mind-share of a user toward a service. Examples of time-dimensional management in mobile social games are depicted in Table II.

C. Time-lag Type-in Advertising

CAPTCHA requires human input in order to prevent automatic computer programs (so-called bots) from entering a protected area. One motivation of CAPTCHA is to block automated content copying by bots. This scheme was naturally extended to make use of human interaction for advertising purposes. Solve Media proposed TYPE-IN ads so that the user's text input would facilitate brand recollection.

Yamakami, one of the authors, proposed the social servicenics theory to facilitate service engineering. Social servicenics principles include time-dimensional management which increases the influence of user mind-share. Using this principle, Yamakami proposes a time-lag type-in advertising method. In the proposed method, a wait time is added to a type-in advertisement. The wait time is intended to increase the user's memory of the displayed brand name(s).

In this paper, the authors evaluate the impact of this wait time in the proposed time-lag input advertising method. The

TABLE III TWO WORD GROUPS CHOSEN FOR THE EXPERIMENT [23]

Word Group	Words	Meaningfulness-score
A	ri-wa, to-nu, mi-hi, mo-se	50, 60, 60, 60 = 230
B	he-yo, wa-so, ru-ko, na-ne	50, 60, 80, 60 = 260
C	su-yu, tsu-ni, mo-ta, ho-hi	50, 80, 150, 60 = 340
D	mu-u, e-ni, se-te, nu-ke	40, 70, 80, 120 = 310

sequence of a time-lag type-in advertisement is depicted in Fig. 2.

IV. EXPERIMENT

A. Method

The author takes the following steps:

- Create an unbiased group of words that are difficult to remember;
- Split words into two groups;
- and then Split experiment participants into two groups, one with and without a wait time, and the other: for the reverse order experiment;
- Perform a preparatory test and discard the result; _ Perform the recollection tests for each group;
- Analyze the recollection rates and impact of the order of experiments.

The experiment uses the two word groups depicted in Table III. These nonsense words are extracted from a 1955 study of Japanese words that are difficult to recollect. The original study defines a non-association value for words, which describes the difficulty of recollection. They are widely used for Japanese recollection studies.

These words are chosen from low-association, voiceless, two-syllable words. There are voiced consonants and voiceless ones in Japanese. In order to remove the influence of voices, voiceless consonants are used in this experiment. The total meaningfulness-score is set between 200 and 350. When it is less than equals to 150, it is too easy to make recollection. When it is equals to or more than 350, it is too difficult to make recollection.

The demographics of the participants are depicted in Table IV.

Two comparison tests are depicted in Table V.

TABLE IV DEMOGRAPHICS OF PARTICIPANTS

Characteristic	Description
Number	20
Gender	Male: 10, Female: 10
Age	20-24
Motivation	Student volunteers. No reward.

TABLE V TWO COMPARISON TESTS.

Test	Description
α	First, perform four sets of text input without a wait time. Each test involves watching a card for 5 seconds; then typing the word into the PC (initial test); then performing an intermediate action (hearing music); then performing a recollection test.
β	First, perform four sets of text input with a wait time. Each test involves watching a card for 5 seconds; then typing the word into the PC after a wait time (initial test); then performing an intermediate action (hearing music); then performing a recollection test.

TABLE VI TWO COMPARISON GROUPS.

Group	Description
G1	First, perform test A with a wait time. Second, perform test B without a wait time. Third, perform test C with a wait time. Fourth, perform test D without a wait time.
G2	First, perform test A without a wait time. Second, perform test B with a wait time, perform test C without a wait time. Fourth, perform test D with a wait time.

TABLE VII TIME-DIMENSIONAL CONTROL PARAMETERS.

Parameter	Description
Wait time	30 seconds.
Interval before recollection	180 seconds (hearing preset music)

The two groups being compared are depicted in Table VI. Half of the experiment participants are assigned to G1, and the other half are assigned to G2. 5 male and 5 female participants are assigned to each group.

The time-dimensional control parameters are depicted in Table VII.

The recollection score is defined as the total number of correctly recollected words. "Correctly" means the position and the content are correct. When a participant recollets all the words correctly, the score is 8.

B. Results

The initial test results for the 20 research participants are shown in Table VIII. The recollection test results are shown in Table IX.

The comparison of scores between with a wait time and without a wait time is depicted in Table X.

The cases with a wait time show 26.7 % better scores compared to ones without a wait time. The t-test value (p value) for final tests calculated in Excel for the one-sided test without assuming the same variance is 0.003999 (< 0.05). Therefore, we can say that the recollection rate is statistically significant and that cases with a wait time provide statistically better results.

TABLE VIII INITIAL TEST RESULTS.

Group Average	Average score of α	Average score of β
A	7.6	7.6 *
B	6.8 *	6.8
C	4.8	4.8 *
D	8.0 *	8.0

*: with a wait time

TABLE IX RECOLLECTION TEST RESULTS.

Group Average	Average score of α	Average score of β
A	6.0	6.2 *
B	6.8 *	3.2
C	4.4	5.6 *
D	7.0 *	6.6

*: with a wait time

TABLE X COMPARISON BETWEEN WITH A WAIT TIME AND WITHOUT A WAIT TIME.

	Sum of Scores (without a wait time)	Sum of scores (with a wait time)
Initial tests	27.2	27.2
Final tests	20.2	25.6

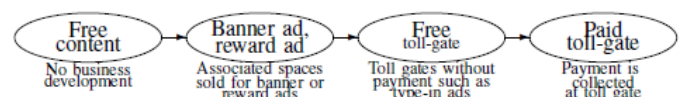


Fig. 3. Four stages of revenue generation

V. DISCUSSION

A. Advantages of the Proposed Method

We propose a novel advertising method: a type-in advertisement with a wait time. With the 30-second wait time, we show that a type-in advertisement that includes a wait time provides statistically significant better results compared to a type-in advertisement without a wait time. We perform an experiment with 9 students and show that the proposed method results in a 26.7 % better scores.

This improvement is significant considering the fact that Solve Media claims in its whitepaper that the type-in advertisements provides 12-times better recollection rate compared to banner advertisements.

The proposed method can be applied to a wide range of content on the Internet to provide a replacement for tollgates that collect payment. Without payment, it can attract more users that have a better recollection of the entered brands.

B. Applications

The proposed method provides a new opportunity for business development of the content on the Internet, such as Web 2.0 content. The four different stages of revenue generation are depicted in Fig. 3.

When the Internet was born, it was a research network for which expenses were covered by research budgets. Much research content was provided for free, in particular

government-funded research content was encouraged to provide free-access. When the Internet was commercialized, some content was provided via tollgates that required a payment. When the quality of Internet content was relatively low and unstable, much content was provided for free. In order to cover operating expenses, banner advertisements became popular on the Internet. This trend continues today. The proposed method provides a bridge between banner content and paid content. Users have a strong resistance to payment, however, they willingly use their time in order to bypass payment tollgates. The proposed method provides better advertisement effectiveness with a better recollection rate. This new filler provides a flexible revenue generation scheme for content without tollgates.

During the wait time, experiment participants were not exposed to the original text. Therefore, the time available for visual recognition was not different. The difference comes down to the difference in mental holding time before inputting the text.

There is an increasing amount of Web 2.0 content that consists of user-generated content that is generated by nonprofessional users all over the world. The Web 2.0 wave is also prevailing in the video world. It is expensive to generate high quality content, even in the case of user-generated content. This massive wave of Web 2.0 content requires an evolutionary revenue generating engine for this purpose. The proposed method is a promising one that can generate additional revenue for non-paid content. This will improve the incentive for user-generated content, including content in the emerging Internet video world.

There are many free-to-read electronic magazines in the publishing industry. Many publishers struggle to seek new revenue generating opportunities in this free-to-read domain of the Internet. The proposed method provides a new option for Internet publishers to provide a spectrum of payment for their currently free-to-read content.

C. Limitations

This work is limited to a small number of participants and based on volunteer participation. The number of experiment participants is limited. There is a gender bias in the experiment. Hard statistical investigation remains for future studies.

The cognitive structure that contributes to the better recollection rate was not analyzed in this paper. Detailed explanation from the viewpoint of brain science is beyond the scope of this paper.

The experiment was done using a wait time of 30 seconds. Results for longer durations, like hours or days are not covered in this paper.

The words used in the experiment come from a 1955 Japanese psychological study. These are tested words with little association to ordinary words that afford easy recollection. However, the original study dated back to 1955, therefore, the index of low association may be obsolete. Experiments with different choices of words require future studies.

For the hard-core evaluation of human interaction factors, it is necessary to include rigid management of multiple control variables.

Cross-regional and cross-cultural studies require future studies.

D. Future Work

This work is a starting point for type-in advertisements with additional features. First, we would like to evaluate the effects of the proposed method in a statistically-significant manner. The current study accommodates a limited number of participants through voluntary participation. A large number of participants, and a more rigid condition control will provide hard evidence for the effectiveness of the proposed method.

Second, future work will include real-world applications of type-in advertisements that include a wait time. The Internet advertising business requires hard-core facts of conversion ratios. A real-world field study will help us provide this hardcore data for business development.

Third, application-aware and culture-aware analysis of the proposed study can explore the important engineering aspects of the proposed method.

VI. CONCLUSION

As the Internet has become more and more prevalent, there is an increasingly vast amount of professional and nonprofessional free content generated on this planet. Internet advertisement technologies are constantly pursuing emerging new opportunities.

The authors propose the time-dimensional engineering of a toll-gate control for free content on the Internet. The proposed method includes a wait time for CAPTCHA text input.

The authors perform an evaluation study of comparison between CAPTCHA with and without a wait time. The authors use recollection rate for the comparison. With a 30-secondswait time, cases where there is a wait time provide 26.7 % better recollection scores. The proposed method is a promising one that provides a new revenue-generating engine for Internet user-generated content.

It is important to provide a spectrum of payment depending upon the users' preferences. The proposed method provides a new option in the wide spectrum of revenue generation using Internet content. It provides the flexibility of revenue generation without asking for direct payment while they navigate content on the Internet. It can also provide a new revenue-generating opportunity for emerging user-generated video on the Internet.

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