

# Expanding targets vs. Delphian desktop

## Experiments Results

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### ABSTRACT

This paper is an evaluation of two interaction techniques – expanding targets [1] and delphian desktop [2]. The assignment is carried out in a group of two CMPT 811 students – Svetlana Slavova and Karolina Zurowska.

### INTRODUCTION

Expanding targets [1] is a dynamic interaction technique that is used to facilitate target selection, taking into account the current focus of the user. The icons expand when the mouse moves towards them.

Delphian desktop [2] is another dynamic interaction technique, which predicts the movement of the user in the graphical user interface. The method takes into account that the user reaches the target by a straight line and the target is on a particular distance from the starting point.

### EXPERIMENT DESIGN

The testing environment consists of 30 distracters and 6 folders, which are potential targets. At a given trial, one of the folders is highlighted, which represents that this folder is the target.

Both interaction techniques – expanding targets and delphian desktop, are tested by 6 subjects of the class under the same conditions:

- *Distance.* Three distances from the starting point to the target are taken into account – 240, 480, and 720 pixels;
- *Target size.* Two target sizes are considered – 20x20 and 40x40 pixels;
- *Trials.* Each condition is tested 10 times. The total number of trials per experiment is 60.

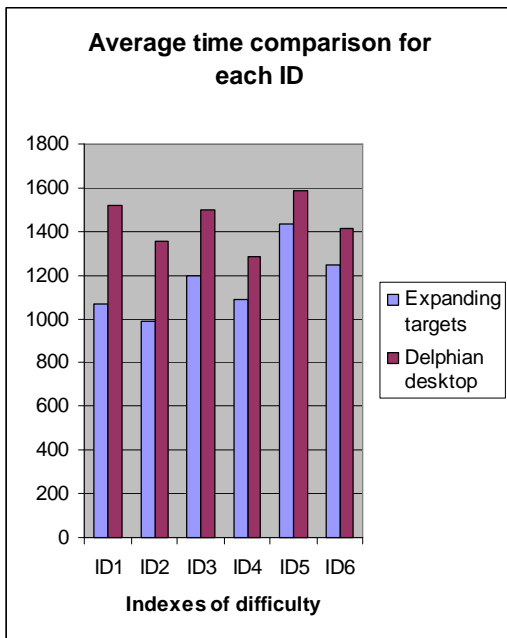
The experiment results are saved in log-files, containing the following information: applied interaction technique, subject id, distance from the starting point to the target, target size, trial number, and time for target selection. The time is measured in milliseconds and represents the time that is needed to (i) move the mouse from the starting point to the target and to (ii) select the target, by clicking on it.

### EXPERIMENT RESULTS

The obtained results are presented in table 1. Six indexes of difficulties (ID), depending on particular distance and target, are considered – from ID1 to ID6, where ID 1 and ID 4 have the same value. Every technique is tested 60 times (6 participants \* 10 trials per condition) for the given index of difficulty. A comparison between the interaction techniques for each ID is presented in figure 1.

**Table 1. Experiments Results**

Technique	Distance	Target size	ID	Average time, ms	Repetition
Expanding targets	240	20	ID1	1,069	60
Delphian desktop	240	20		1,520	60
Expanding targets	240	40	ID2	991	60
Delphian desktop	240	40		1,357	60
Expanding targets	480	20	ID3	1,200	60
Delphian desktop	480	20		1,497	60
Expanding targets	480	40	ID4	1,089	60
Delphian desktop	480	40		1,287	60
Expanding targets	720	20	ID5	1,434	60
Delphian desktop	720	20		1,588	60
Expanding targets	720	40	ID6	1,251	60
Delphian desktop	720	40		1,411	60



**Figure 1. Average time comparison for each index of difficulty**

The results show that the obtained time for target selection is smaller in case of expanding targets. This means that it is faster to acquire an item using expanding targets, rather than delphian desktop.

In addition, two-tailed T-Tests are conducted as follows:

- *T-Test 1.* It compares the two techniques for each index of difficulty. The obtained p-value is 0.002765;
- *T-Test 2.* It compares the two techniques for the low values of the indexes of difficulty and the high values of indexes of difficulty. For indexes ID1, ID2, and ID 4, the p-value is 0.045034, whereas for indexes ID3, ID5, and ID6 the obtained p-value is 0.048761.

Our null hypothesis is that the two interaction techniques do not differ. However, since the calculated p-values are below the threshold chosen for statistical significance (level 0.05), the null hypothesis is rejected. It means that there is a significant difference between the techniques. In addition, we can conclude that expanding targets is significantly faster than delphian desktop.

**CONCLUSIONS**

The conducted experiment shows that expanding targets is a significantly faster technique than delphian desktop.

**REFERENCES**

1. McGuffin, M., Balakrishnan, R. Acquisition of Expanding Targets. *CHI'02*, Minneapolis, USA, 20-25 April, 2002.
2. Asano, T., Sharlin, E., Kitamura, Y., Takashima, K., Kishino, F. Predictive interaction using the delphian desktop. *UIST'05*, Seattle, USA, 133-141.