# Interaction Design for the Media PC

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**ABSTRACT**
In this paper, we report on a usability experiment conducted to investigate the use of two pointing devices, a mouse and a remote controller, in a Media PC user interface that supports both devices. Differences in selection paradigm and the discoverability of user interface actions are examples of problems with such combined design approach. Unified appearance, target correspondence, as well as designing for user experience, are guidelines that we have suggested to improve the design of user interfaces that work to the advantages of both devices.

**Keywords**
Remote control, mouse, Media PC, interaction design, user studies, 10 foot user interface, user interface design

**INTRODUCTION**
Various studies [1-4] have shown that the computer mouse is a simple to use and efficient input method for the desktop graphical user interface (GUI). On the other hand, the remote controller is most commonly used with consumer electronic devices that require simple input such as televisions. As computer technology becomes more advanced and their multimedia capabilities increase, we see an increasing number of computers making their way from the desk into the living room. The current desktop GUI loses effectiveness when viewed from a 10 foot distance.

Manufacturers have attempted to address this problem in two ways. The dedicated device approach focused on making specialty devices specifically for handling media with a custom user interface designed for a 10' operation via a remote control. The Media PC approach kept the desktop user interface for most tasks but add specific software, with a dedicated user interface, to handle the media related tasks. Unlike dedicated devices, Media PCs can be used in both the traditional desktop setting as well as the living room setting. This presents a unique challenge for the interaction design team, as they must come up with a design that works in the mouse-operated desktop setting and in the remote-operated 10' UI setting.


*UIST '04*, October 24–27, 2004, Santa Fe, New Mexico, USA
ACM 1-58113-962-4/04/0010

Media PC UI designed to accommodate both devices has not been studied before. We therefore conducted a usability experiment to investigate the use of these two pointing devices in such design. Being the only UI that supports both devices, Microsoft Windows XP Media Center Edition represents the state-of-the-art design and was used in our experiment. The goal of this experiment was not only to compare the two devices, but also to investigate the differences, in terms of interaction design.

**USER STUDY**
Our study tested the usability of the mouse and the remote control on a Media PC focusing on photo browsing. It was set up in a living room environment and subjects were asked to perform a series of tasks as if they were at home – listening to some music while browsing their photos. We hypothesize that the mouse may be faster for tasks involving multiple selections while the remote may be quicker for tasks that only require simple selections.

**Apparatus**
The input devices used were Microsoft Media Center remote control, Microsoft Wireless Optical Mouse and Microsoft Wireless MultiMedia Keyboard. They were connected to a PC running Microsoft Windows XP Media Center Edition 2004 and displayed on a 42" LG Plasma Display Panel at a resolution of 800x600. Subjects were approximately 2.5 meters (8.2 feet) away from the display while sitting.

**Participants**
Eighteen volunteers working or studying in a non-technical field with average computer experience were recruited to control for possible bias or expertise effects. None had used a Media PC UI before. All had experience with remote controls and with navigating a DVD type menu structure. Soft drinks were provided and a logo item given as a gratuity. All sessions were video taped.

**Procedure and Design**
Participants practiced the use of the remote control and the user interface to reduce learning effect. The study was a within-subject study so that each of the subjects had to complete task 1 to 6 with half starting with the mouse and the other with the remote counter-balancing order effect. All tasks were timed except 1 and 6. Task 1 required

turning on a piece of specified music to provide a relaxing environment. Tasks 2 involved simply finding a specified photo from the visible photos. Task 3 required scrolling to find the target photo. Task 4 tested the efficiency of the interface for multiple directories requiring large amount of repetitive movements (moving in and out of folders) uncovering problems and inconvenience with each device. Tasks 5 tested the interaction with standard UI widgets such as dropdown menus. Task 6 tested for fatigue requiring multiple clicks to find a photo. The tasks were repeated with the other device. Two different sets of photos were used and randomised to reduce bias. Finally, users were asked to complete a questionnaire.

### Results

The average overall task time for the mouse (mean = 134 seconds) was faster than for the remote (mean = 152 seconds) but it was not statistically significant at the 0.05. level, $t(14) = 1.84$, $p = 0.09$. In task 2 and 4, the differences between the devices were not significant. In task 3, the remote was significantly faster than the mouse, while in task 5, the mouse was significantly faster than the remote. Gender effect, experience with remote and presentation order were not factors in our study.

### Questionnaire

Participants were asked to compare the devices with respect to different attributes. Subjects felt that more control could be exerted over the mouse and that it was faster and more accurate comparatively. However, the remote was reported to be more comfortable. Interestingly enough, when asked which device was preferred overall, all participants were able to reach a preference (i.e. no preference for neutral) even though the mean respond was neutral. We can conclude that although subjects agreed on preferring the mouse for its control, speed and accuracy, and preferred the remote for its comfort, there was no consensus on which device they preferred overall.

## DISCUSSION and OBSERVATIONS

The mouse is a general purpose input device. Familiarity with its functionality from one application allows the user to be competent with other PC based applications. The remote control, on the other hand, is typically designed for a single user interface. Each action in the user interface has a dedicated button on the remote. Whereas in mouse driven application only screen interface will determine usability. With remotes, both screen and remote interfaces will need to be learned in some way by new users.

One of the primary user confusions with switching between these devices is the difference in selection paradigms. Specifically, mouse UI supports states where no object is selected, but with the remote control UI at least one object is selected at all times. Another came from the discoverability of possible user interface actions. On a remote control, the user can quickly see all possible actions, whereas the mouse UI must be explored by the user in order to discover command targets. In general, users found the mouse to be more direct but restrictive, while the remote was more comfortable and enjoyable but slow to learn.

## RECOMMENDATIONS

*Unified Selection* – The mouse should function more like a remote. The UI targets should be larger and adjacent to minimize targeting, as well as having obvious highlighting to indicate that they are targeted when the mouse is over them. Many problems were the result of the differences in selection modality between the two devices.

*Keyboard / Remote Equivalence* - Users draw a natural correspondence between the buttons on the remote control and the buttons on the keyboard. Therefore, those buttons that are shared between these devices should have the same effect in the UI.

*Action Target / Remote Correspondence* - Often users who are familiar with the user interface for one device have difficulty transferring that knowledge to operate the other device. Action targets in the GUI and the action buttons on the remote should correspond as closely as possible, in both graphical appearance and relative spatial layout.

*Software solutions* – Novel hardware devices combining both mouse and remote have not proven to be more efficient as presented in [1] with the Gyration mouse. The remote is more accurate because of its constrained movements compare to the mouse. It might be possible to allow the mouse to have as much accuracy as the remote by constraining the mouse as well.

*Design for User Experience* - Although the results show that based on time and user feedback the mouse was faster and had better control, users still felt that the comfort and convenience of the less precise device made it equal to using the mouse by preference. Future UI and interaction design should aim to address users' satisfaction with at least the same priority as quantitative performance, if not higher priority.


## ACKNOWLEDGMENTS

We would like to thank Wang Shuo and Weiru Cai for moderating the user experiment and Dong Jingbo for designing the poster.


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