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TRITA-NA-D0205 • CID-164 • ISSN 1403-0721 • Department of Numerical Analysis and Computer Science

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**CID, CENTRE FOR USER ORIENTED IT DESIGN**

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**Report number:** TRITA-NA-D0205, CID-164

**ISSN number:** ISSN 1403 - 0721 (print) 1403 - 073 X (Web/PDF)

**Publication date:** January 2002

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# Place Metaphor in Digital Television

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## ABSTRACT

We present results from a user study of interactive television (DTV) which evaluated a place-metaphor based interface. Problems occurred with the layout of the DTV-remote buttons (conflicting mappings) and with using basic multimedia-interaction techniques.

## Keywords

Digital television, interactive television, metaphors.

## INTRODUCTION

The study was undertaken to help Teracom, a Swedish broadcasting network operator, evaluate a prototype DTV application (proof of concept). The interface was a place-like environment simulated with a series of photographs. The digital TV package permitted users to "drive" down a road using a Nokia DTV-remote control (fig 1) and reach interactive stations (movie clips, texts, and still images).

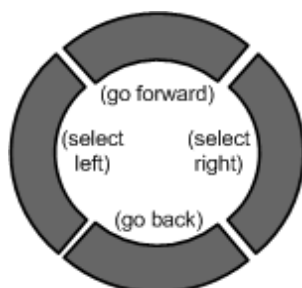


Fig 1 Navigation buttons on DTV-remote control  
(With functional mappings as used in the DTV application)

A Digital TV Package (DTP) is here seen as consisting of three parts: the Digital Television Equipment (DTE) which includes a set-top box with remote control, the Digital TV show (DTV show), and the Digital TV Application (DTA): interactive services. The DTA is, in turn, composed of content and user interface.

## STUDY SET-UP

### Equipment

A prototype DTV application developed with Macromedia Director™, running on a standard PC, and displayed on a TV through a Nokia set-top box was used in the study. The trials took place in a furnished living room (with e.g., a couch, framed paintings, and green plants).

### Subjects

20 subjects, age range 25-60, 12 female, and 8 male took part in the study. Each person participated with a friend, i.e., they formed a pair with someone they knew and felt comfortable with.

### Procedure and scenario

Each pair was asked to imagine themselves as being part of a study group on digital media. The scenario was that a group met weekly to discuss digital media applications. Next week they were to discuss the application presented to them in the trial. The subjects were given minimal operating instructions and asked to explore the "digital-TV service" so that they could report on it at the study group meeting. The experimenters then left the room to allow the subjects to explore the simulated DTP on their own and discuss their experiences more freely. The relaxed user explorations and rich conversations were video taped. The camera captured users and what they saw on the TV.

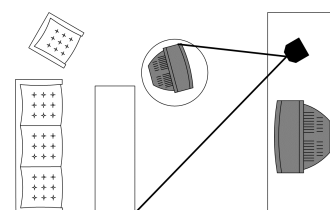


Fig 2 Camera capturing users & what they see on the TV  
(The signal to the large TV is split to the small TV)

This was accomplished using a split TV signal to an additional TV facing the camera (fig 2) and the subjects were asked to fill out a questionnaire after the trial was over. Lastly, the pairs were interviewed. Each trial lasted for about one hour (including 15-20 minutes for the interview).

## LANGUAGE ANALYSIS

One person transcribed and coded the videotapes using four codes: *language-game*, *place deixis*, *artefact*, and *other*. References to driving were coded as *language game*: drawing on the spatial metaphor, e.g., “Drive to the woods! We have seen this, drive forward!”. Evidence of the spatial metaphor being adopted was also found in expressions involving *place deixis*, e.g., “Hey you, try backwards! What was to the left and to the right?”. Place deixis involve referring expressions that are relative to the location of the speaker [1]. The expression “The house on 112 Oak Street” is not deictic, while “This house to the right” is deictic. Utterances having to do with how the interface worked were coded as *artefact*, e.g., “Select! Or maybe it shows automatically! Did not anything happen?” Sentences that fell outside of the three categories were coded as *other*, e.g., “You don’t know what you are after! So what would we like to do?” Language game analysis have earlier been applied to human-computer interaction [4], and participatory design [2].

## RESULTS AND DISCUSSION

### Quantitative Results From Language Analysis

Most sentences (fig 3) involved problems using the interface (*artefact*). Subjects talked as if they were driving a car down a village road (*language game*). Pointing and referring to locations within the place-like environment was also frequent (*place deixis*).

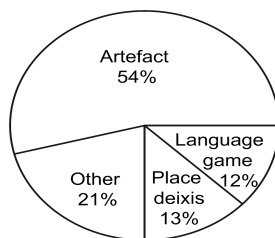


Fig 3 Summarized code percentages for all transcriptions (Sentences are classified as occurring in one or more categories)

The responses from the questionnaire indicated two problematic areas that contributed to the problems using the DTA interface: navigation, and overall organization.

### Quantitative Results From Questionnaire

Table 1 Selected results from questionnaire

	Disagree completely	Disagree partly	Agree partly	Agree completely
Easy to navigate	6	2	6	6
Clear organization	10	4	5	1
Engaging	9	7	2	2

In table 1 selected results from the questionnaire are shown, pertaining to navigation, organization, and engagement. Evidently, most subjects did not find the organization of the DTV-service easy to understand. Moreover, the DTA interface was not perceived as engaging. The video recordings and interviews indicate that the problems with navigation and organization of the DTA interface had to do with the mappings of the buttons on the remote control.

### Qualitative Results From Tapes, And Interviews

Many subjects were frequently “stuck” and found themselves staring at the remote control. While users could go forward and back with the top and bottom buttons, it was impossible to go left and right with the left and right buttons. These latter buttons were used for content selection. Thus the buttons were mapped according to a *cognitively dissonant schema*. Cognitive dissonance [3] occurs when one must choose between incompatible beliefs or actions. Great dissonance is created when alternatives are equally viable as in the case of the DTV-navigation, i.e., seeing the DTV-navigation as spatially mapped to movement or seeing it as functionally mapped to content selection. Also, some subjects were oblivious to basic multimedia interaction techniques used in the interface, e.g., “highlighting” to show selection.

## CONCLUSION

When using place-like interfaces for DTV, the buttons on DTE remotes should be mapped carefully to avoid cognitive dissonance between, e.g., user beliefs about navigation and item selection. However, DTE remotes have limited sets of universally usable buttons (across hardware) and designers may be tempted or even forced to design cognitively dissonant use schemas. Furthermore, it is unsafe to rely on basic multimedia interface techniques in DTV interfaces as many users seem to have considerably difficulty with them.

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