Factors Influencing Modality Choice in Multimodal Applications

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Introduction

- **Multimodal interfaces** are assumed to be **more natural, flexible, efficient**, and **robust** (Kallinen & Ravaja, 2005; Hedicke, 2000; Oviatt, 1999).
- However: **multimodality** may **increase** the **workload**
  - Selection of the appropriate modality requires additional cognitive resources (Schomaker et al., 1995)
  - Different **modalities** may **interfere** with each other (Schomaker et al., 1995)
- Studies up to now indicate that potential benefit of multimodality depends on
  - The **task**,
  - The **situation** and
  - The **modalities offered**
- The current study aims to investigate
  - Whether **users make use of multimodality** if it is offered
  - **Under which circumstances** they do so
  - If **modality preferences stated** by users **match the actual use** of these modalities

Method

Participants

- 21 German-speaking individuals aged between 19 and 69 years (M = 31.24)
- 11 male, 10 female
- 11 experienced, 9 inexperienced, missing data for one case

Application

- Media recommender system (MediaScout)

Devices

- PDA and Tablet PC, controllable via
  - Graphical user interface (GUI) with touch screen
  - Voice control
  - Motion control (PDA only)
- Conventional PC (control condition), controllable via
  - Mouse
  - Keyboard

Tasks

- Navigation (7 tasks)
- Entering phone number (1 tasks)
- Pressing button (3 tasks)
- (Un-)marking checkboxes (6 tasks)
- Selecting option from a drop-down list (4 tasks)

Tests

- Different questionnaires, among others **System Usability Measurement Inventory** (SUMI, Kirakowski & Corbett 1993)
- **Log-data**
- Analysis of preferred modality in test block „free choice"
- Annotation of modality used first to perform the task
- Computation of percentages of modality usage per task type
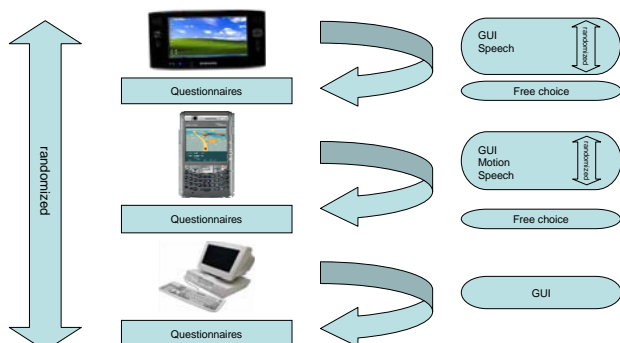
Results

Modality usage

- **Most frequently used modality** over all tasks: **GUI** (Touchscreen)
- Solely **for phone number voice control** and GUI were **used equally frequently**
  - **Only task** which **could be solved more efficiently via voice control** than via GUI
- **Differences between user groups** only observed for PDA's **motion control**
  - Inexperienced > experienced
  - Women > men
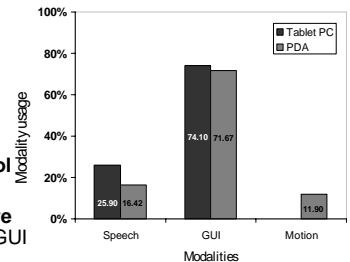
Modality preferences

- Assessed via final questionnaire at the end of the experiment
- Participants could choose between
  - All individual modalities
  - Combinations of modalities
  - No preference
- **Tablet PC:** GUI > combination > voice control
- **PDA:** GUI > combinationen > no preference
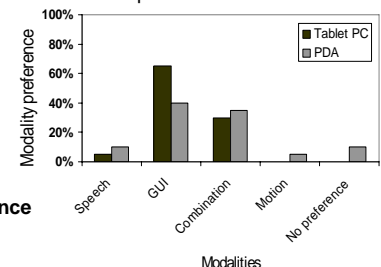
Subjective ratings

- Assessed via **SUMI** global scale
- **Best** rated: **PDA**
- **Worst** rated: **Desktop PC**

Discussion

- **Task characteristics** (e.g. efficiency) have a **strong influence**
  - **Most efficient modality was used**
  - Phone number task could be solved more efficiently via voice control than via GUI
    - Only task for which GUI and voice usage was approximately equally frequently
- **Stated preferences** are **consistent** to actual usage **behavior**
  - Majority of tasks were performed with the GUI
  - Also GUI was stated as preferred modality
- But **offered modalities**, **even if** they are **rarely used**, **affected** the **subjective ratings**:
  - PDA (= device with the most modalities) was rated best on SUMI global scale
- **Next step**: analysis of discrepance between usage behaviour and subjective ratings on SUMI

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