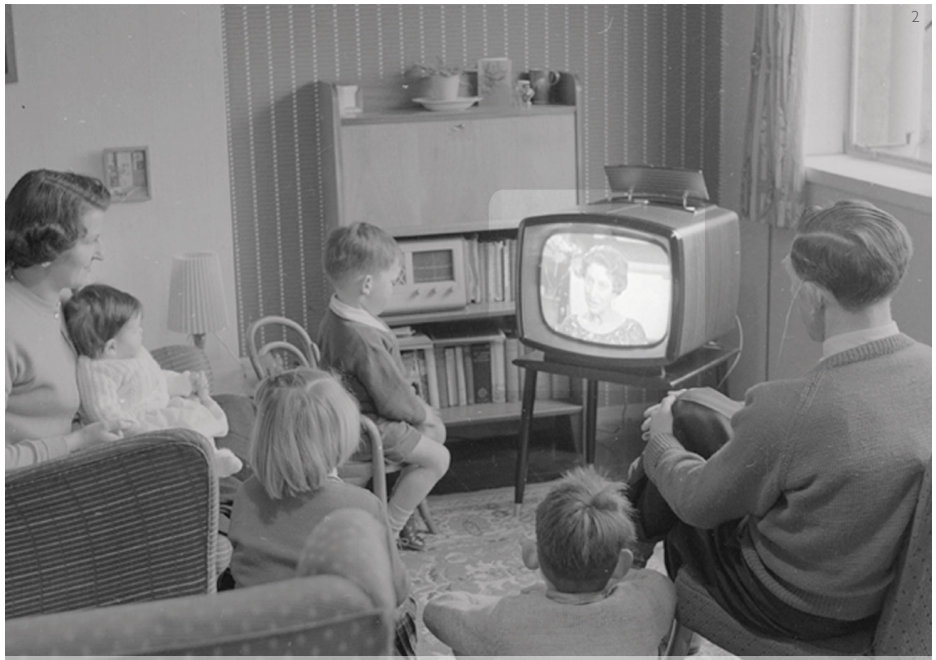
Interactive Television & Online Video

Course: *Current Topics in Media Computing and Human-Computer Interaction*

Lecturer: Christian Corsten, M.Sc.

RWTH AACHEN UNIVERSITY



Watching Television in the 1950s

Watching TV Today

http://www.youtube.com/watch?v=u5TdRhNLOPk

Interactive TV in the 1950s

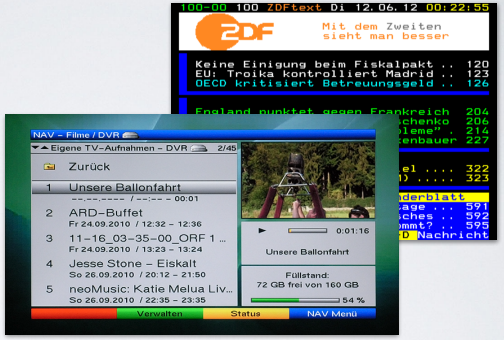
Interactive TV in the 1950s

From TV to Interactive TV (iTV)

1. Conventional TV
   Watching
2. Enhanced TV
   Teletext

From TV to Interactive TV (iTV)

1. Conventional TV
   Watching
2. Enhanced TV
   Teletext
3. Personalized TV
   Recordings,
   Content navigation



From TV to Interactive TV (iTV)

1. Conventional TV
   Watching
2. Enhanced TV
   Teletext
3. Personalized TV
   Recordings,
   Content navigation
4. Interactive TV
   Return Channel

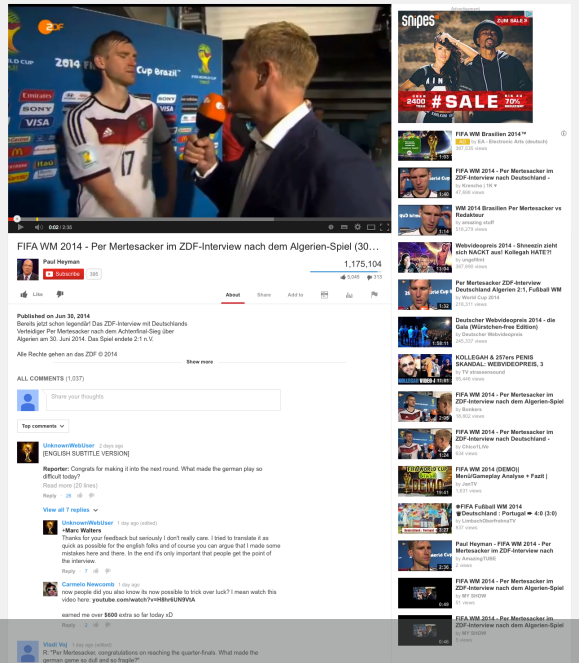
Online Video

Individual Choice

User Participation

↓

A Power Shift?



YouTube

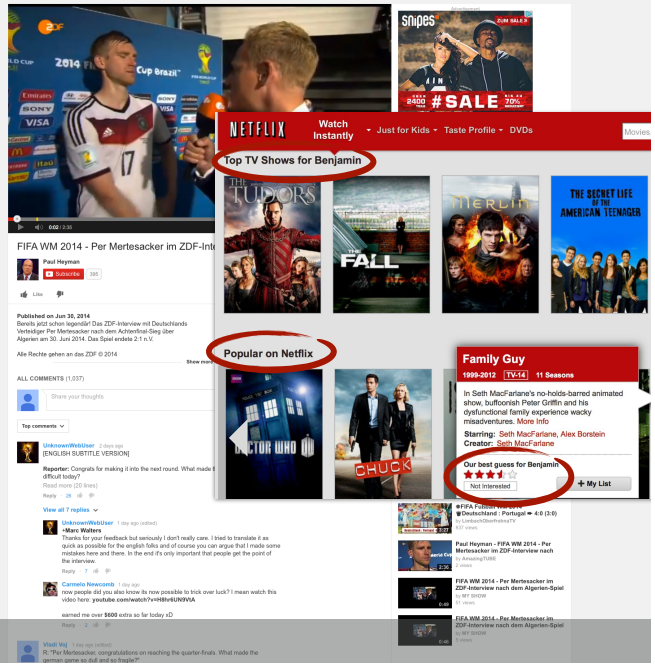
Online Video

Individual Choice

User Participation

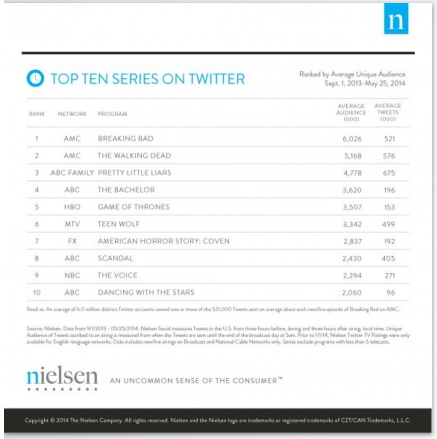
↓

A Power Shift?



YouTube

Trends in iTV: *Social TV*



TOP TEN SERIES ON TWITTER

Ranked by Average Unique Audience
Sept. 1, 2013-May 25, 2014

RANK	NETWORK	PROGRAM	AVERAGE AUDIENCE (000)	AVERAGE TWEETS (000)
1	AMC	BREAKING BAD	6,026	521
2	AMC	THE WALKING DEAD	5,168	576
3	ABC FAMILY	PRETTY LITTLE LIARS	4,778	675
4	ABC	THE BACHELOR	3,620	196
5	HBO	GAME OF THRONES	3,507	153
6	MTV	TEEN WOLF	3,342	499
7	FX	AMERICAN HORROR STORY: COVEN	2,837	192
8	ABC	SCANDAL	2,430	405
9	NBC	THE VOICE	2,294	271
10	ABC	DANCING WITH THE STARS	2,060	96

Read as: An average of 6.0 million distinct Twitter accounts viewed one or more of the 521,000 Tweets sent on average about each new/live episode of Breaking Bad on AMC.

Source: Nielsen. Data from 9/1/2013 - 05/25/2014. Nielsen Social measures Tweets in the U.S. from three hours before, during and three hours after airing, local time. Unique Audience of Tweets ascribed to an airing is measured from when the Tweets are sent until the end of the broadcast day at 5am. Prior to 11/14, Nielsen Twitter TV Ratings were only available for English-language networks. Data includes new/live airings on Broadcast and National Cable Networks only. Series exclude programs with less than 5 telecasts.

nielsen AN UNCOMMON SENSE OF THE CONSUMER™

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Trends in iTV: *Social TV*

TOP TEN SPORTS EVENTS ON TWITTER

Ranked by Unique Audience
Sept. 1, 2013-May 25, 2014

RANK	NETWORK	PROGRAM	DATE	AUDIENCE (000)	TWEETS (000)
1	FOX	SUPER BOWL XLVIII	2/2/14	15,318	25,328
2	FOX	NFL FOOTBALL: NFC CHAMPIONSHIP	1/19/14	11,383	4,957
3	CBS	NFL FOOTBALL: AFC CHAMPIONSHIP	1/19/14	10,863	2,492
4	ESPN	2014 VIZIO BCS NATIONAL CHAMPIONSHIP	1/6/14	10,404	4,392
5	CBS	2014 NCAA BASKETBALL TOURNAMENT: FINAL	4/7/14	9,953	2,613
6	NBC	XXII WINTER OLYMPICS	2/7/14	9,597	1,101
7	FOX	NFL FOOTBALL: NFC WILD CARD	1/5/14	9,192	1,391
8	TNT	2014 NBA ALL-STAR GAME	2/16/14	9,026	2,264
9	CBS	COLLEGE FOOTBALL	11/30/13	8,970	2,032
10	FOX	NFL FOOTBALL: NFC DIVISIONAL PLAYOFF	1/12/14	8,873	1,501

Read as: Over 15.3 million distinct Twitter accounts viewed one or more of the 25.3 million Tweets sent about Super Bowl XLVIII on FOX.

Source: Nielsen. Data from 9/1/2013 - 05/25/2014. Nielsen Social measures Tweets in the U.S. from three hours before, during and three hours after airing, local time. Unique Audience of Tweets ascribed to an airing is measured from when the Tweets are sent until the end of the broadcast day at 5am. Prior to 11/14, Nielsen Twitter TV Ratings were only available for English-language networks. Data includes new/live airings on Broadcast and National Cable Networks only.

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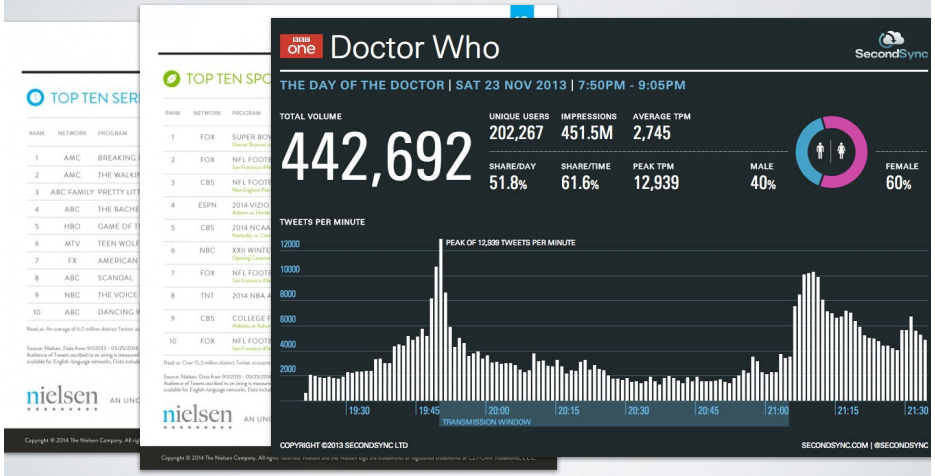
Trends in iTV: *Social TV*



Trends in iTV: *Social TV*

Trends in iTV: *2nd Screen Apps*

Trends in iTV: *2nd Screen Apps*

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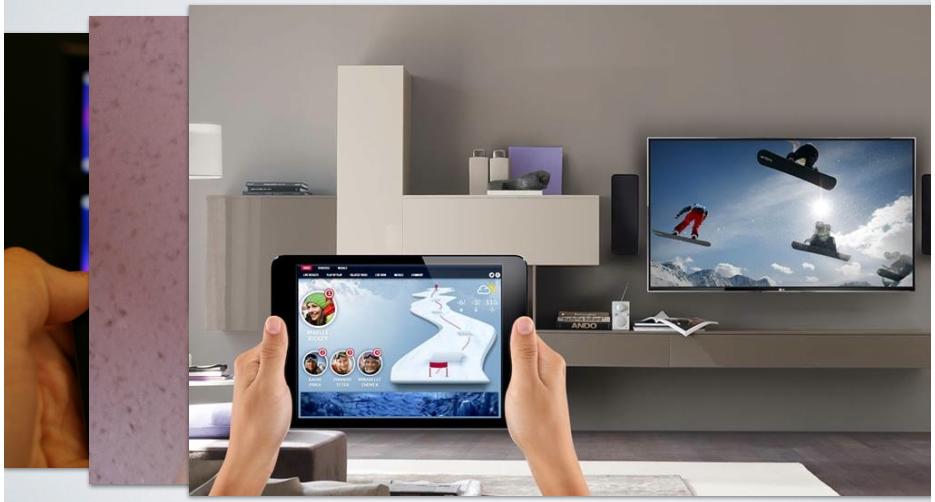


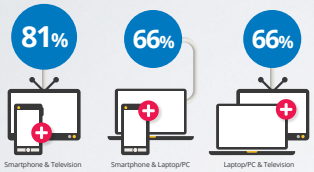
The New Multi-Screen World

(Survey by Google, 2012)

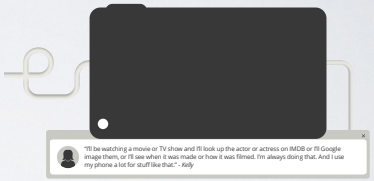
Purpose: understanding cross-platform consumer behavior

We also multi-screen by using more than one device simultaneously

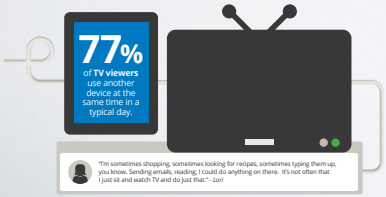
We use an average of three different screen combinations every day



Consumers search for things they see on TV

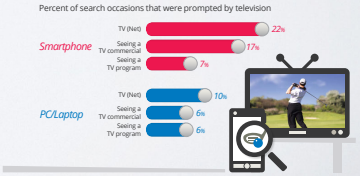


TV no longer commands our full attention



TV is a major catalyst for search

Percent of search occasions that were prompted by television



Cross-Screen Engagement

Device	Role within Pathway
TV & Streaming Console Content	• Used at home and in the evening, often with others present • Likely shows normal TV content, often as background noise—it's often a secondary device to other activities on the partner screen • The TV's purest 'everyman' and 'jester' performance, simply providing some entertainment and little else
Laptop	• More likely to be chosen if alone—and sometimes in the morning, when more pragmatic and time-sensitive tasks are carried out • Brings control and efficiency—the TV is there to soften the task and ensure there is some enjoyment involved • A workhorse in this situation, often used for investigation and understanding as it relates to decision-making
Mobile	• More likely to be used if others are present • Distracts less from company and from the other device being used • One-to-one communication is the key task here, important emails or texts • Brings a social aspect to the activity; it's less of an intimate 'lover' and more of a 'caregiver' and 'everyman' • Can also help with information if required, however
Tablet	• Slightly more likely than the phone to be used when alone, partly because it takes a bit more attention away from the moment • Often used for involved activities such as gaming or video viewing, distracting from what's on the other screen • A demanding 'ruler', but can also deepen the enjoyment of the entire situation—tablet + TV is often more enjoyable than TV alone, even among separate multi-screening scenarios

Television: The Everyman

Television, our most established screen, has fully grown into "The Everyman"; it's the most popular device for multi-screening behavior. TV delivers passive entertainment, enjoyment, familiarity and comfort. It's best positioned to provide emotional brand experiences that are intuitive and easy to understand, but more and more consumers are using a second device while watching television: seven out of 10 consumers use a second device while watching TV. Marketers will likely find deeper engagement when driving consumers from the TV to alternate screens, such as the tablet.

"Something about a giant TV makes you feel less lonely. I'm a student living alone, and having the TV on as background noise as I'm folding laundry or doing other menial tasks makes me feel less like a crazy cat lady."

Nicolette, US

(Survey by Microsoft, 2013)

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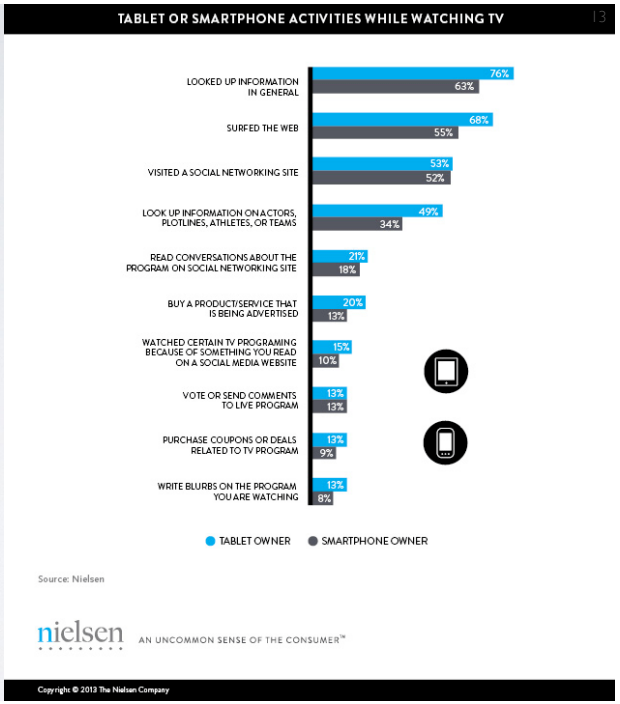
(Survey by Microsoft, 2013)

What are we doing with the 2nd screen?



Industry

iTV on the 1st Screen mhp

- Multimedia Home Platform
  First specification: 2000
- Interactive Java applications
- Backchannel support
  - Home shopping,
    Interactive quizzes,
    Information retrieval
- Discontinued in Germany

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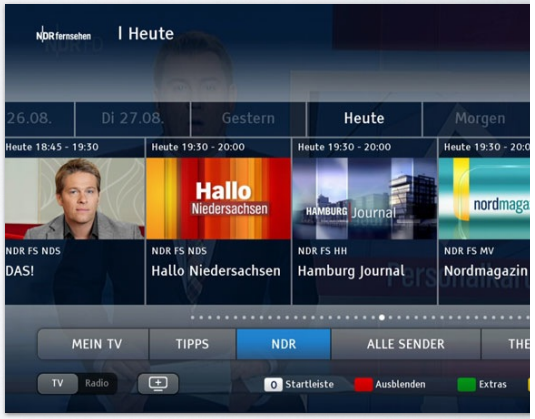
Industry

iTV on the 1st Screen HbbTV

- Hybrid Broadcast
  Broadband TV
- "Red button"
- HTML5-based
- Better graphics
- Catch-up services
  Polls
  High definition video text



Industry

iTV on the 1st Screen HbbTV

- Hybrid Broadcast
  Broadband TV
- "Red button"
- HTML5-based
- Better graphics
- Catch-up services
  Polls
  High definition video text

DEMO | arte +7 HbbTV Portal

iTV on the 1st Screen

Various broadcasters, various applications

How to interact?
navigate, select

How to ensure consistency?

Research

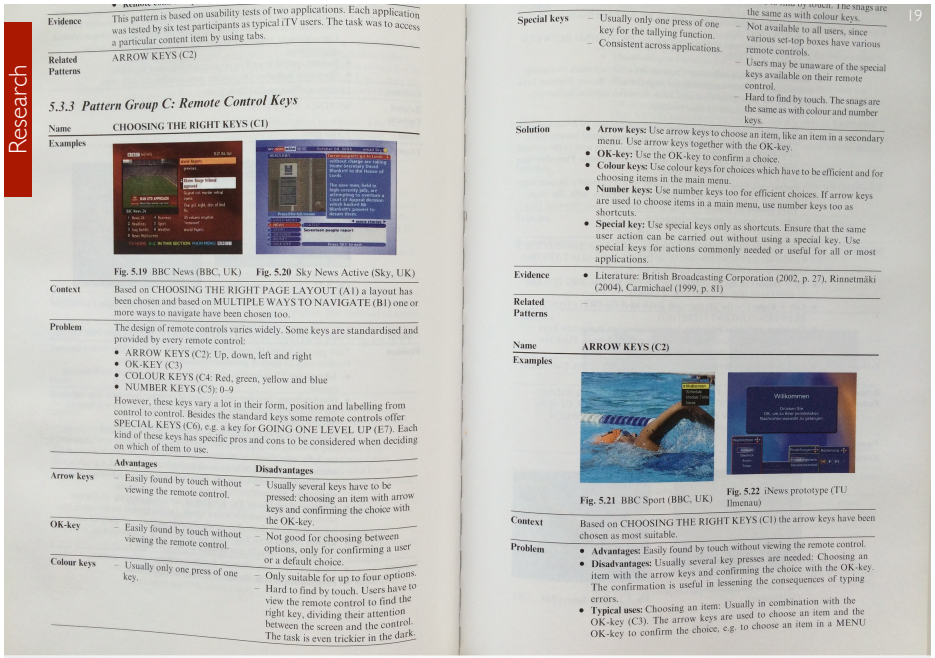
Design Patterns for iTV Applications

T. Kunert, 2009

Pattern Language (42 patterns):

A. Page Layout
B. Navigation
C. Remote Control Keys
D. Basic Functions
E. Content Presentation
F. User Participation
G. Text Input
H. Help
I. Accessibility & Personalization
J. Specific User Groups

Research



Evidence	This pattern is based on usability tests of two applications. Each application was tested by six test participants as typical iTV users. The task was to access a particular content item by using tabs.
Related Patterns	ARROW KEYS (C2)

5.3.3 Pattern Group C: Remote Control Keys

Name	CHOOSING THE RIGHT KEYS (C1)
Examples	

Fig. 5.19 BBC News (BBC, UK) Fig. 5.20 Sky News Active (Sky, UK)

Context	Based on CHOOSING THE RIGHT PAGE LAYOUT (A1) a layout has been chosen and based on MULTIPLE WAYS TO NAVIGATE (B1) one or more ways to navigate have been chosen too.
Problem	The design of remote controls varies widely. Some keys are standardised and provided by every remote control: • ARROW KEYS (C2): Up, down, left and right • OK-KEY (C3) • COLOUR KEYS (C4: Red, green, yellow and blue • NUMBER KEYS (C5): 0–9 However, these keys vary a lot in their form, position and labelling from control to control. Besides the standard keys some remote controls offer SPECIAL KEYS (C6), e.g. a key for GOING ONE LEVEL UP (E7). Each kind of these keys has specific pros and cons to be considered when deciding on which of them to use.

	Advantages	Disadvantages
Arrow keys	– Easily found by touch without viewing the remote control.	– Usually several keys have to be pressed: choosing an item with arrow keys and confirming the choice with the OK-key.
OK-key	– Easily found by touch without viewing the remote control.	– Not good for choosing between options, only for confirming a user or a default choice.
Colour keys	– Usually only one press of one key.	– Only suitable for up to four options. – Hard to find by touch. Users have to view the remote control to find the right key, dividing their attention between the screen and the control. The task is even trickier in the dark.
Special keys	– Usually only one press of one key for the tallying function. – Consistent across applications.	– Not available to all users, since various set-top boxes have various remote controls. – Users may be unaware of the special keys available on their remote control. – Hard to find by touch. The snags are the same as with colour and number keys.

Solution	• **Arrow keys:** Use arrow keys to choose an item, like an item in a secondary menu. Use arrow keys together with the OK-key. • **OK-key:** Use the OK-key to confirm a choice. • **Colour keys:** Use colour keys for choices which have to be efficient and for choosing items in the main menu. • **Number keys:** Use number keys too for efficient choices. If arrow keys are used to choose items in a main menu, use number keys too as shortcuts. • **Special key:** Use special keys only as shortcuts. Ensure that the same user action can be carried out without using a special key. Use special keys for actions commonly needed or useful for all or most applications.
Evidence	• Literature: British Broadcasting Corporation (2002, p. 27), Rinnetmäki (2004), Carmichael (1999, p. 81)
Related Patterns	–
Name	ARROW KEYS (C2)
Examples	

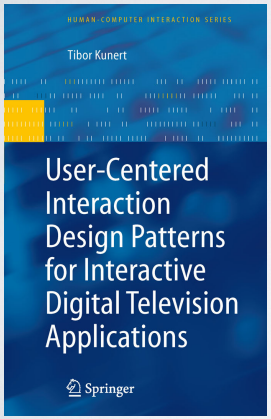
Fig. 5.21 BBC Sport (BBC, UK) Fig. 5.22 iNews prototype (TU Ilmenau)

Context	Based on CHOOSING THE RIGHT KEYS (C1) the arrow keys have been chosen as most suitable.
Problem	• **Advantages:** Easily found by touch without viewing the remote control. • **Disadvantages:** Usually several key presses are needed: Choosing an item with the arrow keys and confirming the choice with the OK-key. The confirmation is useful in lessening the consequences of typing errors. • **Typical uses:** Choosing an item: Usually in combination with the OK-key (C3). The arrow keys are used to choose an item and the OK-key to confirm the choice, e.g. to choose an item in a MENU

Pattern Example, taken from T. Kunert, 2009

Research

In-Class Exercise



T. Kunert, 2009

Pattern G1: Multiple Ways to Input Text

Task: Roughly sketch

- ~~Examples~~
- Problem
- Solution
- ~~Evidence~~

for this pattern!

Research

TNT – A Numeric Keypad Based Text Input Method

1	2	3
4	5	6
7	8	9

a	b	c	j	k	l	s	t	u
d	e	f	m	n	o	v	w	x
g	h	i	p	q	r	y	z	å
ä	ö	½	/	(	)	1	2	3
!	"	#	.		?	4	5	6
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Ingmarsson et al., CHI 2004

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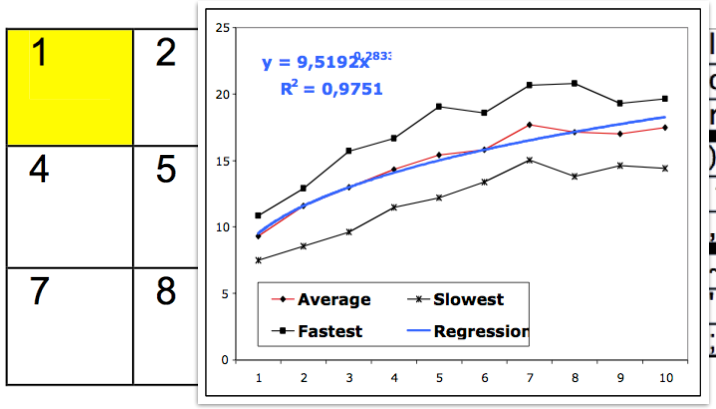
Research

TNT – A Numeric Keypad Based Text Input Method



Ingmarsson et al., CHI 2004

Industry

Industry Demands

- Conformity to standards, legacy
- Advertisement is important (e.g., CI+ standard: no ad skipping)
- Broadcaster dependency
- Interactivity vs. attention
- Creeping featurism sells better (e.g., "Smart" TVs with a browser)

In-class exercise:

How about research?

Research

Selected Research Papers from TVX 2014

tvx 2014
ACM INTERNATIONAL CONFERENCE ON INTERACTIVE EXPERIENCES FOR TELEVISION AND ONLINE VIDEO

- ACM SIGCHI conference
- Former *EuroITV* conference
- 2014: 140 attendees, 20 papers
- Industry track

Who are the users?

- iTV consumers (i.e., viewers)
- iTV producers (e.g., content editing)

Research

Input Devices for iTV (1)

Bobeth et al.: Tablet, Gestures, Remote Control? Influence of Age on Performance and User Experience with iTV Applications, TVX 2014

RQ1: How does the performance of older and younger adults differ when controlling iTV applications with different input modalities?

RQ2: Is there a difference in the UX of older and younger adults when using different input modalities, in terms of usability, effectiveness, satisfaction, and efficiency?

Nutrition Tracker

x

Photo Browser

Research

Input Devices for iTV (1)

Bobeth et al.: Tablet, Gestures, Remote Control? Influence of Age on Performance and User Experience with iTV Applications, TVX 2014

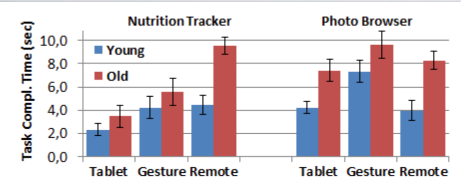


Figure 3: Task completion times for all experimental conditions. Error bars show 95% CI.

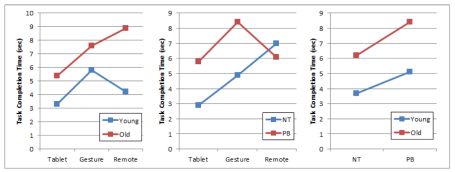


Figure 4: Interaction graph for Interaction Modality x Age (left), Interaction Modality x Application (middle) and Application x Age (right).

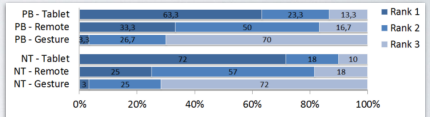


Figure 5: Ranking of the input modalities in percentage for Photo Browser (PB) and Nutrition Tracker (NT).

- Usability, effectiveness, satisfaction, efficiency:
  G rated lower than ***T***, ***R*** (sig.)
- Mirrored ***T*** works best
- ***G*** were not accurate and robust
- ***R*** works well for linear tasks

Research

Input Devices for iTV (2)

Vatavu et al.: Leap Gestures for TV: Insights from an Elicitation Study, TVX 2014

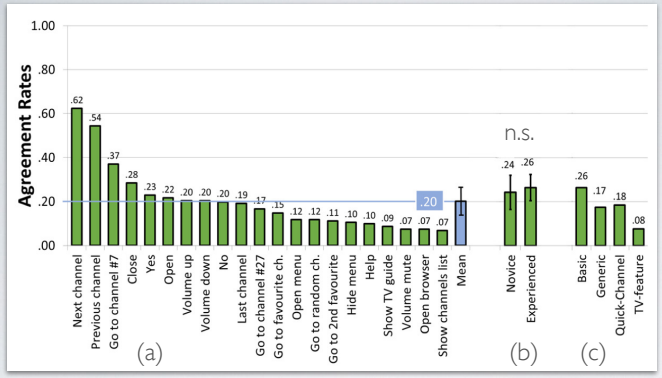
RQ: What are users' preferences for interacting with iTV using free-hand gestures?

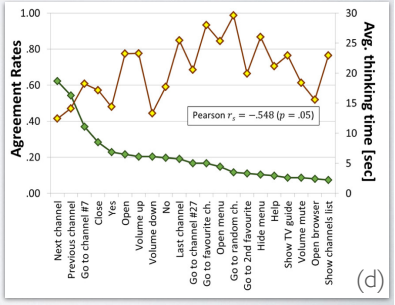
(*) Reading Assignment
Wobbrock et al.: Maximizing the Guessability of Symbolic Input, CHI '05

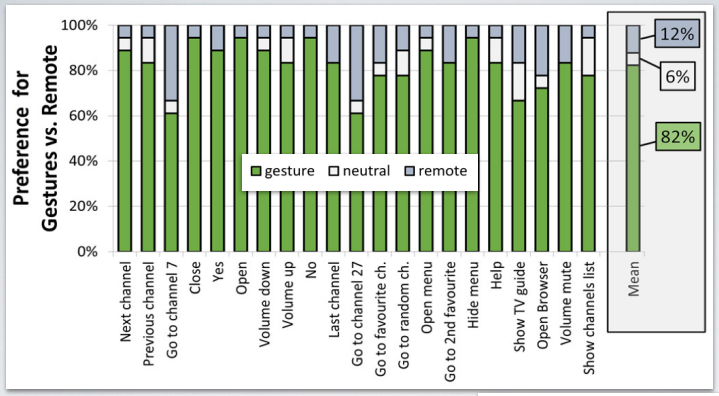
Experiment

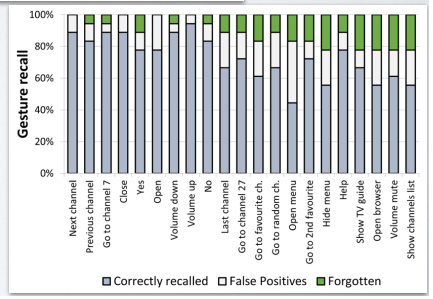
- Based on elicitation study (*)
- 18 participants
- TV + Leap Motion Controller
- 21 referents (effect of a gesture) based on 4 categories:
  - Basic, generic, channel, feature
- Task: perform a gesture for a referent (show as text)

Research









Gesture set

- Look at the paper! (appendix)
- Based on highest agreement
- Goal: inspire designers

Volume up	**Move hand upward**, hand in pinch pose expanding fingers, thumbs-up with moving to the right, thumbs up moving upwards twice, move hand upward, rotate imaginary button to the right, draw "+", opening hand from thumb-index pinch, draw triangle pointing up, open palm, draw circle clockwise, hand performing the "go away" cultural gesture
Volume down	**Move hand downward**, from open palm to index-thumb pinch, thumbs-up with moving to the left, thumbs up moving downwards twice, rotate imaginary button to the left, move hand from left to right, draw triangle pointing down, closing into a pinch all (all finger tips touching), draw circle counter-clockwise, hand performing "come closer" cultural gesture
Volume mute	**Closing fingers into pinch**, fist followed by extending little finger, open palm, thumbs-down to thumbs-up, draw "X", close fist, open palm to index-thumb pinch, thumb-little finger pinch, open palm facing down move left to right, draw crossed zero, draw circle counter-clockwise, move hand downward, move hand left to right, move hand right to left, move palm away from body

Design implications (selected)

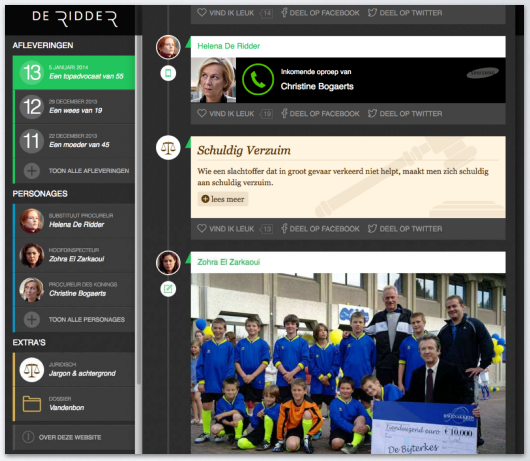
1. Finger and hand pose gestures are preferred to remotes, but there is low agreement between users.
2. Users fall back on previously acquired gesture interaction models.
3. Preference for 2-D gestures.
4. Users prefer either motion or hand pose gestures, and combinations of these two are less likely.
9. Users show preference for drawing letters in mid-air to execute tasks whose names start with those letters.

Vatavu et al.: Leap Gestures for TV: Insights from an Elicitation Study, TVX 2014

Designing 2nd Screen Apps

Geerts et al.: In Front of and Behind the Second Screen: Viewer and Producer Perspectives on a Companion App, TVX 2014

- **RQ:** How to design companion apps?
- **How?** Interviews with professionals, recordings at home, analytics on 2nd screen app usage
- **Criteria:**
  - Ease of use
  - Timing
  - Social interaction
  - Attention
  - Added value



Designing 2nd Screen Apps

Geerts et al.: In Front of and Behind the Second Screen: Viewer and Producer Perspectives on a Companion App, TVX 2014

- **Ease of use**
  - No accounts!
  - Single app per broadcaster!
- **Social interaction**
  - App is catalyst for conversation (e.g., polls)
  - Use app as personal remote, promote results on 1st screen
- **Timing**
  - **Live viewing**
    - Text messages
    - Polls
    - Broadcasters sync by hand
  - **Delayed viewing**
    - App not in sync, unusable
    - But: recordings more important than app

Research

Designing 2nd Screen Apps

Geerts et al.: In Front of and Behind the Second Screen: Viewer and Producer Perspectives on a Companion App, TVX 2014

- **Usage**

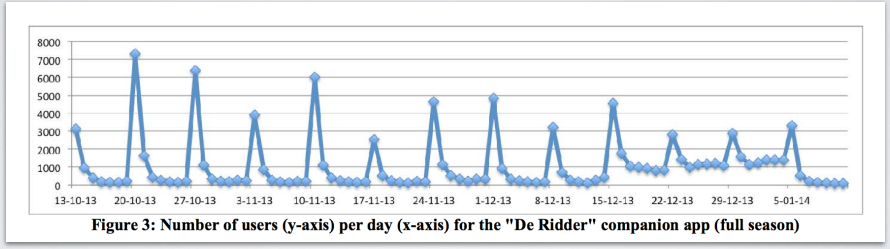


Figure 3: Number of users (y-axis) per day (x-axis) for the "De Ridder" companion app (full season)

  - Users look back at info updates
  - Provide update history!
  - App mostly used only when show is being aired
    - *Against broadcasters interests*

Research

Designing 2nd Screen Apps

Geerts et al.: In Front of and Behind the Second Screen: Viewer and Producer Perspectives on a Companion App, TVX 2014

- **Attention**
  - Use timer to indicate when next update is due!
  - Users expect updates on certain events (e.g., actors text messaging)
  - If no updates for a while: users will switch to other apps
  - If an update contains too much content: not consumed, content might be missed

Research

Designing 2nd Screen Apps

Geerts et al.: In Front of and Behind the Second Screen: Viewer and Producer Perspectives on a Companion App, TVX 2014

- **Added value**
  - Character quotes: only funny quotes
  - Polls: answer must not be obvious
  - Diegetic content (e.g., text messages, newspaper articles, pictures)
    - very much appreciated because it's additional content
  - Non-diegetic content (meta information)
    - appreciated but must be concise/short

- Broadcasters fear distraction from 1st screen
  - *Challenge*: right balance between engagement and distraction
- Producers fear effort of designing 2nd screen app does not pay off

Research

Evaluation

What to evaluate?

- Usability

  Is the system/application easy to use?

- Sociability

  Is the social interaction supported well?

- Sociability testing requires good usability
  - Do not combine usability and sociability testing!

Research

Evaluation

What's different for TV?

- Physical characteristics of interaction
- Social characteristics
- Time-related aspects
- Broadcast-related aspects
- Watching TV is optional/additional task

Pemberton et al., HCI International 2003

Research

Evaluation

Users

- Single vs. group interaction
- For groups: users must know each other!

Content

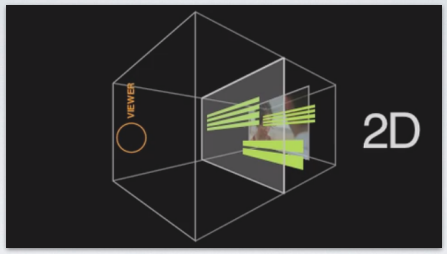
- Must match the users' preferences!
- Genres must be sociable
- Pre-recorded: content might be known
- Live: difficult to control

Research

Evaluation

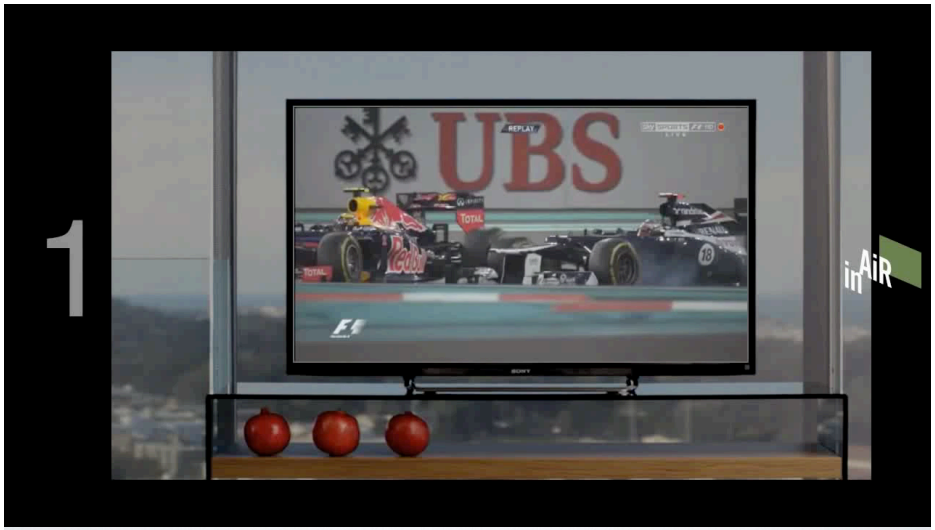
Where?

- In the field (~ at home)
  - \+ Natural environment
  - \+ Suitable for long-term studies
  - – Technical set up complexity
  - – Observation difficult
    - Diary studies, logs, video recordings (?)
- In the lab
  - More or less the opposite of in the field



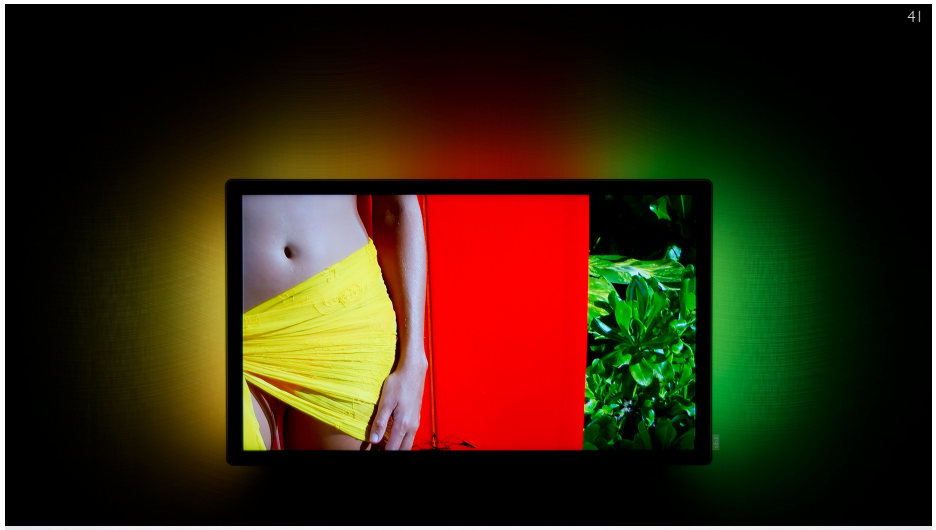
inAiR

WHAT'S NEXT? | Beyond a limited, flat screen?



http://inair.tv

VIDEO | inAiR



http://www.ambilightplayer.philips.com

DEMO | Philips Ambilight

http://www.youtube.com/watch?v=re1EatGRV0w

VIDEO | IllumiRoom, Microsoft Research CHI/SIGGRAPH 2013