Universal Usability: CHILDREN

Gerwin Damberg, January 29th 2012

20 minutes of CHILDREN in HCI

1 **3** **8** **18** **21**

BREADTH **DEPTH**

HCI Research involving children

How to bring children into the design process

Conclusions

Introduction

Q&A
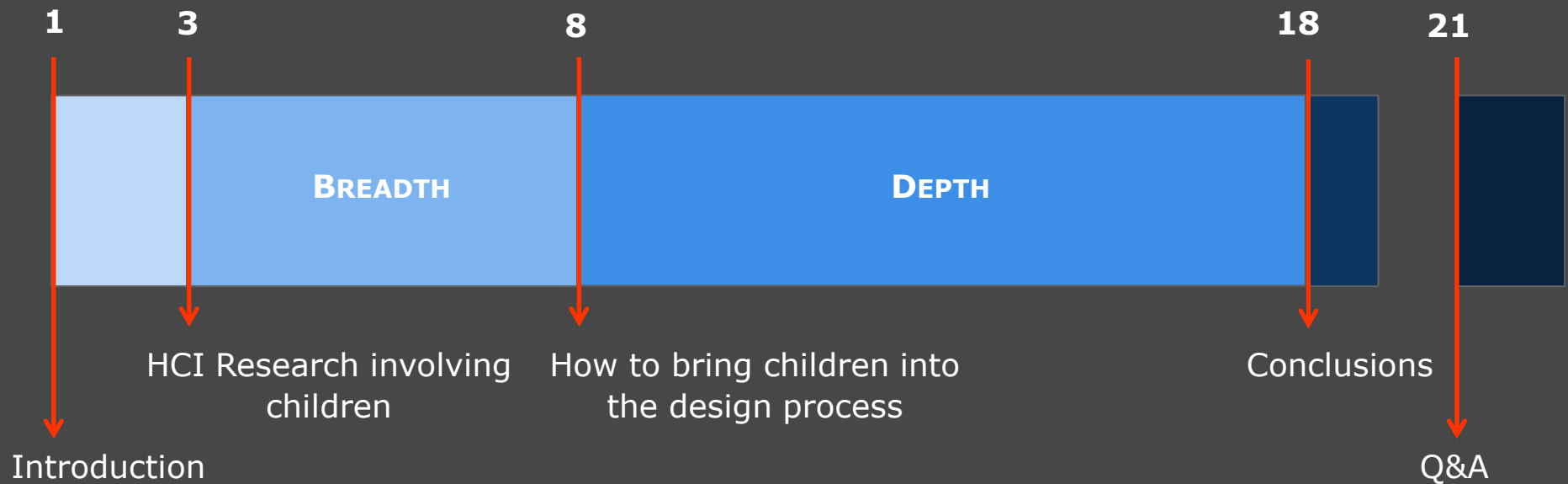
Motivation

- iPad (or similar) user groups in the US [R1]
  - 39% of children age 2-4
  - 52% of children age 5-8
- Opportunities
  - More engaging than TV
  - Can help children learn
- Concerns
  - Attention problems at later ages
  - Often, the application decides when task is complete
  - Little data from controlled HCI studies

© ZDNet, Jason D. O'Grady

HCI research topics involving children

- Information seeking / Search & Select tasks

- Motor Skills: Differences between Children and Adults

- Visualization Technologies for Children

- Design process

Information Seeking / Browsing [R2]

- Papers on digital library / encyclopedia projects

- Comparing hierarchical vs. keywords

- Example: Long-term (3 years) study with children on the Science Library Catalog Project)

- Results
  - Need to support explorative behavior of kids
  - Avoid need for typing, correct spelling, Boolean logic
  - If hierarchy, then keep levels to a minimum

Information Seeking / Browsing [R2]

Children's Motor Skills [R3, R4]

- Impact of age on point task performance

- Example: study mouse control ability
  - Differences in accuracy, efficiency, target re-entry, drag and drop.

- Reaction time well documented (Psychology)

- Recommendation:
  - Need custom interfaces for children
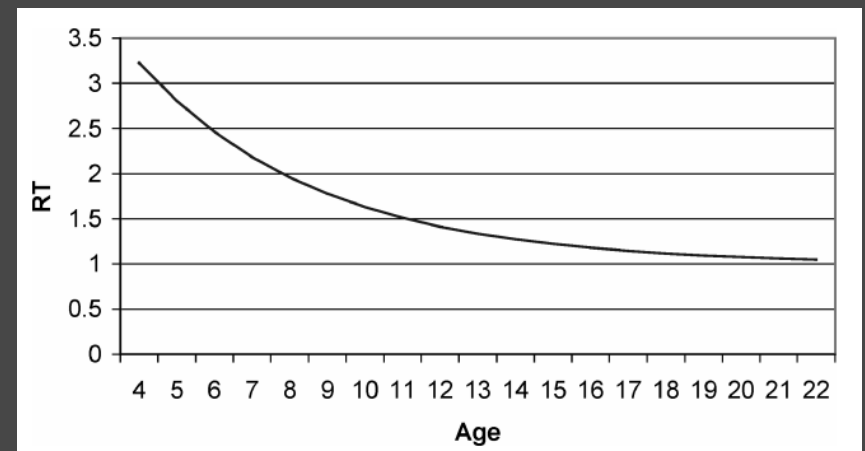
Visualization Techniques for Children [R5]

- Children as 'series of cognitive communities'

- Pre-operational stage (2-7 years)
  - 'cannot reason'
  - 'can only hold one item in memory at a time'
  - 'brief attention span'

- Concrete operational stage (7-11 years)
  - 'Humans are kept Children by their slowness of physical development'
  - Motor skills are getting better

Visualization Techniques for Children [R5], cont.

- Focus on adapting adult design to disabilities rather than develop new technology to abilities of children.

- Results
  - Visualization strategies for adults can be adapted to children
  - Problem 1: children software designed to be sold to adults
  - Problem 2: institutional software designed by teachers with focus on formal learning rather than exploring
 - Suggests graphs using fisheye view and removal of some vertices

Role of Children in Design of New Technology [R6]

- Research by Allison Druin, U of Maryland in 1999

- Led to Children's Digital Library

The Child as …

USER

TESTER

INFORMANT

DESIGN PARTNER
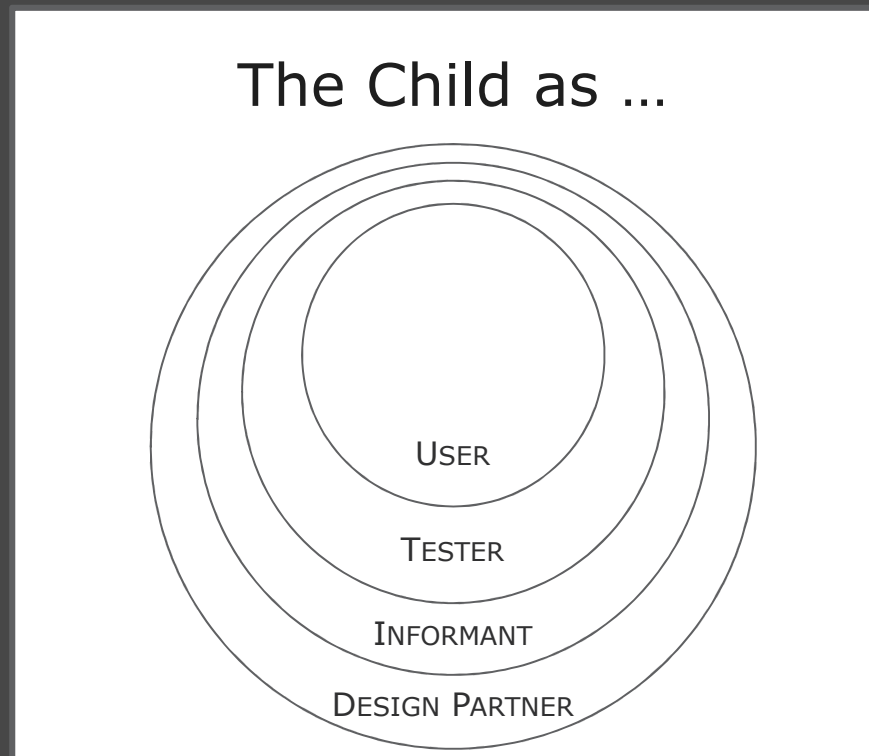
The Child as USER

- Definition
  - Technology has been created
  - Child is **user** of technology
  - Adults observe to understand the impact technology **has had** on child's learning experience
- Methods
  - Observation (direct, live video, recorded video, …)
 - Recognize patterns in activities
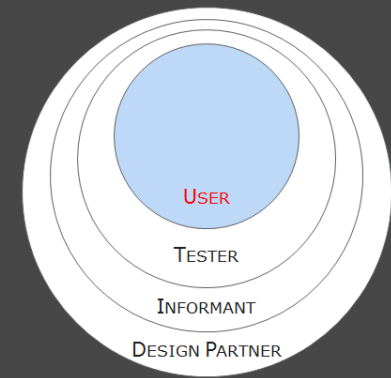
The Child as USER, cont.

- Example
  - Mainframe computers in the early 70s
  - 'Drill and practice' learning exercises
- Challenges
  - Limited input to tech development process
  - Frustration with lack of control or uninterested in activities
  - Less timely feedback for development process
- Strengths
  - Scheduling relatively easy
  - Researchers accomplish goals fast

USER

TESTER

INFORMANT

DESIGN PARTNER
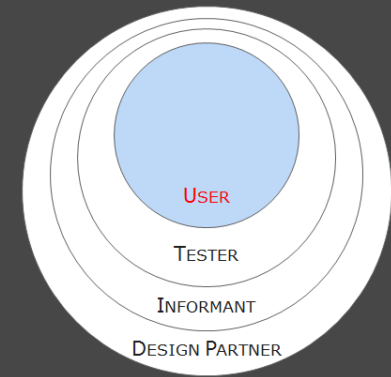
The Child as TESTER
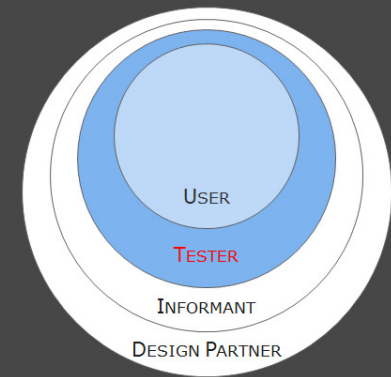
- Definition
  - Children help shape technologies **before** commercial products released
  - 'What did you like / find interesting / find too hard?'
  - Initial brainstorming and design phase by adults
- Methods
  - Similar to child as user, but with focus on immediate issues and design goals (bugs, likes, dislikes, confusion in interfaces, learning goals accomplished, …)
  - Interviews more than video recording

The Child as TESTER, cont.

- (Early) Example
  - LOGO programming language in the 70s
 - Child told computer what to do in ways that the child chose
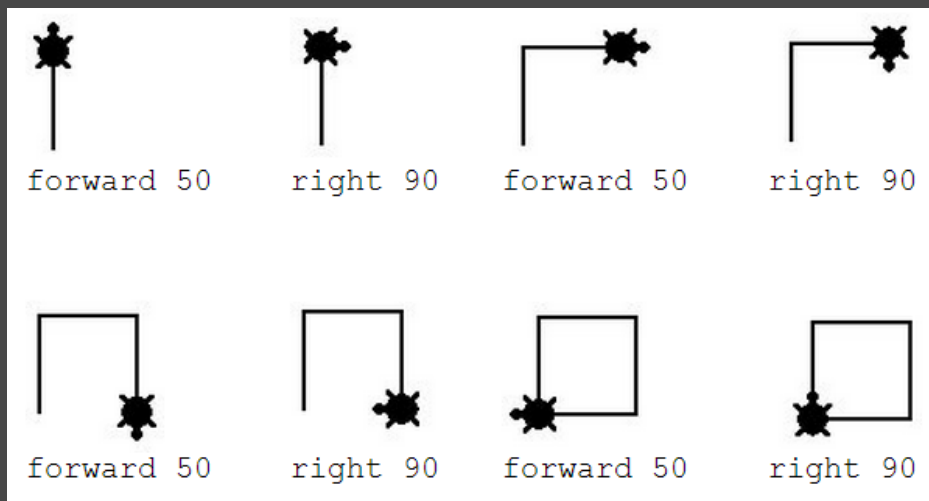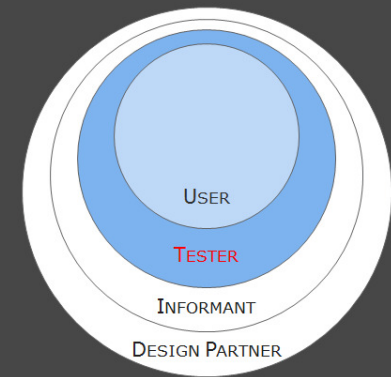

```
repeat 4 [forward 50 right 90]


to square
repeat 4 [forward 50 right 90]
end


to CPSC554M
repeat 36 [right 10 square]
end
```

The Child as TESTER, cont. 2

- Challenges
  - Children's impact still limited
  - Initial design made by adults
- Strengths
  - Children feel empowered
  - Few special skills required (users of technology)
 - Can result in more usable technologies for children
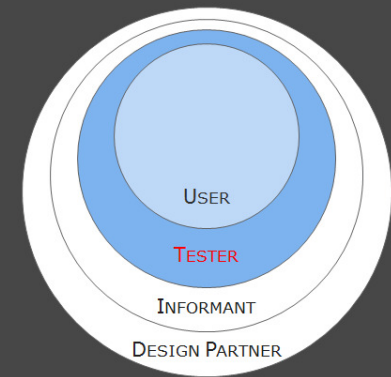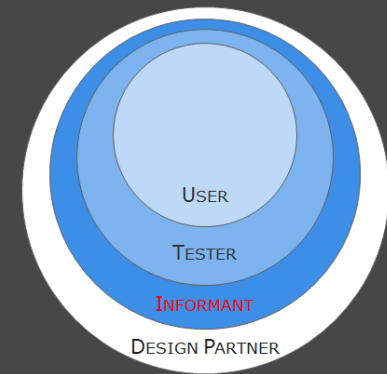
The Child as INFORMANT

- Definition
  - Child plays some part in informing design process (e.g. using existing tech, input on paper sketches)
  - Interaction at different design stages

- Methods
  - Observing children using existing technologies or role play
  - Different from 'users' or 'testers' in that observations affect design directly
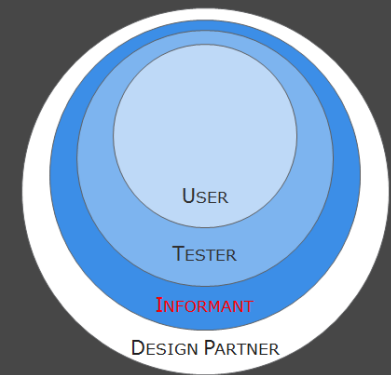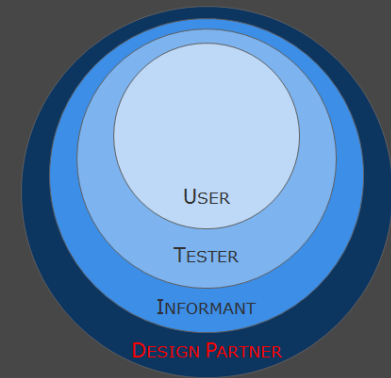
The Child as INFORMANT, cont.

- Example
  - Can children program their own interactive simulations?
  - Led to Stagecast Creator (kids make games, simulations, …)

- Challenges
  - Ultimately adults are still in charge
  - Decide when to work with children on what

- Strengths
  - Can lead to technologies that are less frustrating to use for many

The Child as DESIGN PARTNER

- Definition
  - Child is an equal partner throughout the entire design process

- Methods
  - Semi-weekly meetings with children
  - Try to image 'messiness' of a child's world into the design process (e.g. many parallel tasks by team, rather than sequential)
  - Change many existing methods (interviews, note taking, power structure)

The Child as DESIGN PARTNER, cont.

- Example
  - International Children's Digital Library in 2001
  - More recently: Kori Inkpen, VideoPal 2012 [R7]

- Challenges
  - Adults are not in charge, neither are children (required role changes)
  - Very long term process, scheduling issues, small pool of researchers, many iterations

- Strengths
  - Children as inventors can create innovative technology
  - Instant feedback from children at every moment

USER
TESTER
INFORMANT
DESIGN PARTNER
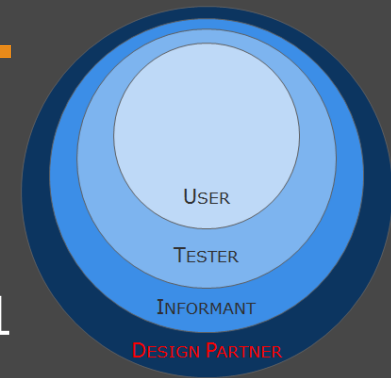
Conclusions

- Adults can learn a lot from children in the design process of new technology.

- The entire design process can benefit from children's input, but can also lead to a lengthy process.

- Technology might advance faster than studies can be executed.

References

[R1]   Common Sense Media, San Francisco 2012 (http://www.commonsensemedia.org/)

[R2]   Borgman, C., Hirsh, S., et al. (1995). Children's Searching Behavior on Browsing and Keyword Online Catalogs: The Science Library Catalog Project. JASIST, 46 (9), 663-684

[R3]   Hourcade, J., Bederson, B., et al. (2004). Differences in Pointing Task Performance between Preschool Children and Adults Using Mice. ACM Transactions on Computer-Human Interaction, 11 (4), 357-386.

[R4]   Thomas, J. (1980). Acquisition of Motor Skills: Information Processing Differences Between Children and Adults. Research Quarterly for Exercise and Sport, 51 (1), 158-173.

[R5]   Schneider, K. (1996). Children and Information Visualization Technologies. Interactions, 3 (5), 68-74.

[R6]   Druin, A. (1999). The Role of Children in the Design of New Technology. Behaviour and Information Technology, 21 (1), 1-25.

[R7]   Kori Inkpen, Honglu Du, Asta Roseway, Aaron Hoff, and Paul Johns, Video Kids: Augmenting Close Friendships with Asynchronous Video Conversations, in *CHI 2012*, ACM, May 2012

Discussion and questions

- How can HCI keep up with increasing speed of change in technology?

- Opinions on computers for very young kids (e.g. toddlers)?