

Designing Personalized User Interfaces as a Human-Computer Partnership

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THE UNIVERSITY OF BRITISH COLUMBIA



DESIGNING
for PEOPLE



Interfaces are ^{still} designed for the average user

But does this make sense?



Research Goal

To characterize user diversity and
accommodate diversity through
personalized adaptation

Why should we care?

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accommodate diversity through
personalized adaptation

Research challenges

- How to capture and characterize diversity?
- How to design for diversity?
- How to incorporate diversity in system evaluations?

Research challenges

- **How to capture and characterize diversity?**
- How to design for diversity?
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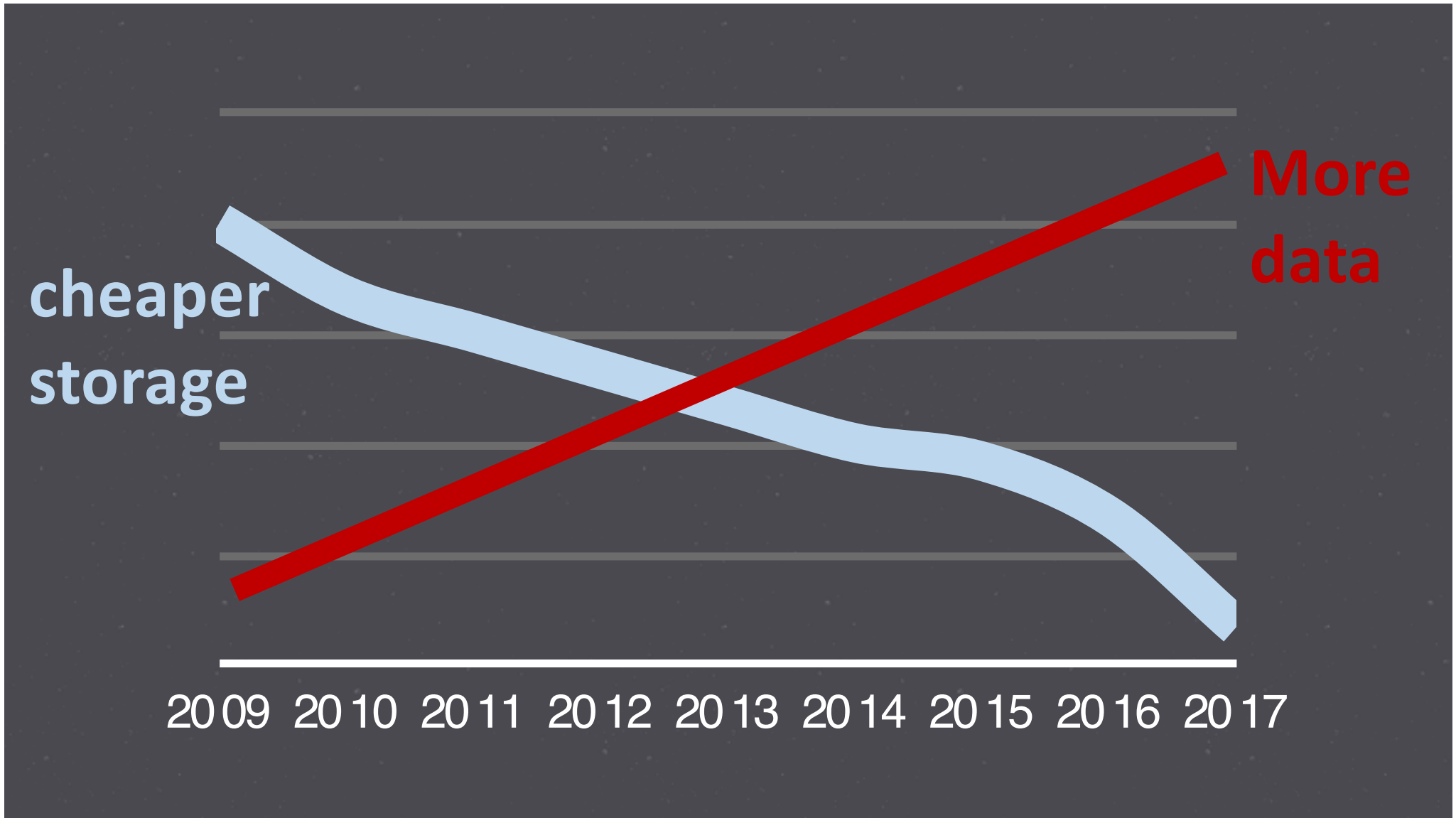
Tendencies in Digital Data Preservation

**How do people decide
what data to keep or
discard?**

**cheaper
storage**

**More
data**

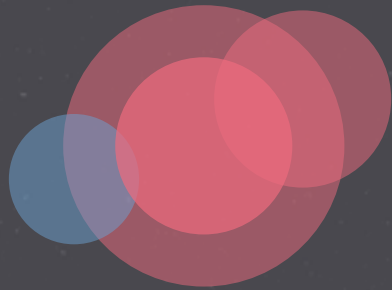
2009 2010 2011 2012 2013 2014 2015 2016 2017



- **Semi-structured interviews**
- **23 participants**
- **Thematic analysis**

hoarding

minimalism



stronger
hoarding
tendencies



a **mix** of
tendencies



stronger
minimalist
tendencies

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How to design for diversity?

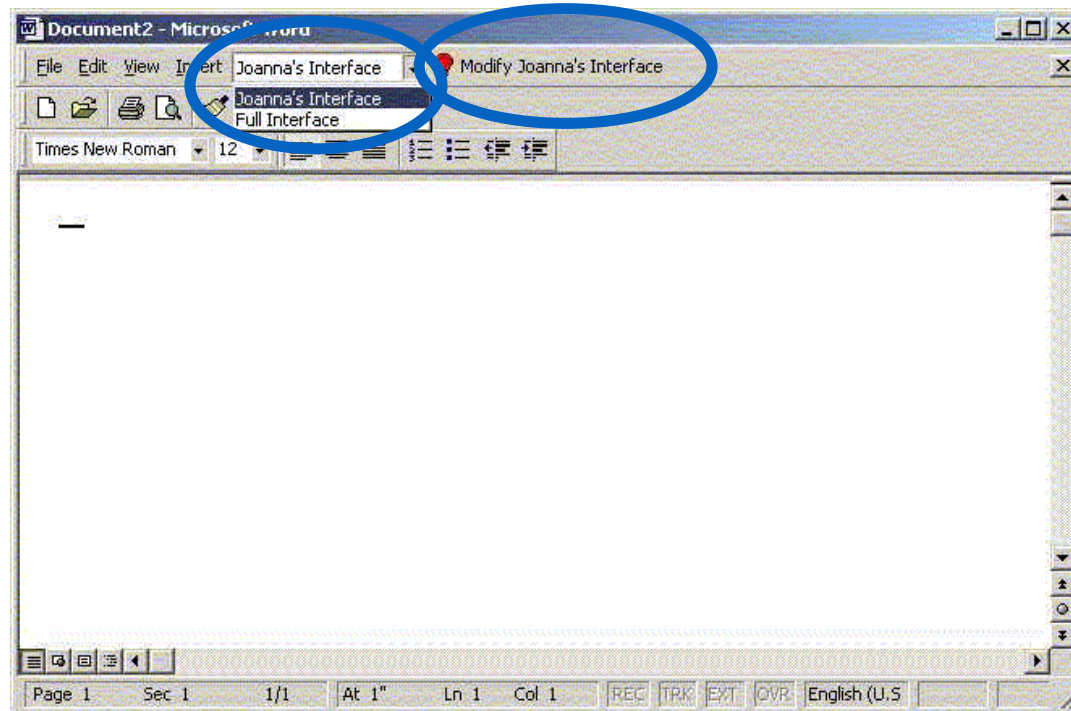
- Adaptable
- Adaptive
- Mixed-initiative -> Human-Computer Partnership

Pros and cons?

Adaptable

Are there designs that can encourage adaptable personalization (user customization) and mitigate its costs?

Multiple: Word Personal



[McGrenere and Moore, GI 2002; McGrenere, Baecker, and Booth CHI 2002]

Some results

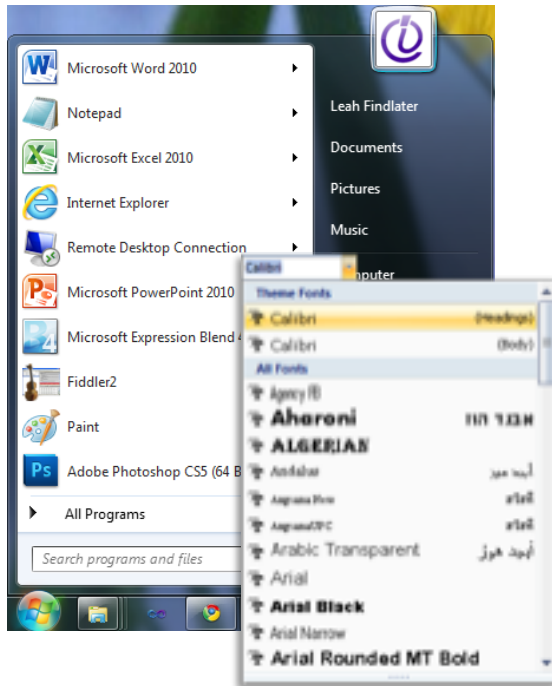
- Compared to Microsoft's Smart Menus, Word Personal led to greater satisfaction and sense of control for "feature-shy" users
- *Different study:* multi-layered interfaces show benefit for older adults (65+) mastering basic features on mobile application

Adaptive

Are there designs that can improve the overall benefits of adaptive (system-controlled) personalization?

Spatial

Inconsistent results



Graphical

Lack of evaluation



[Gajos et al., 2006]

Temporal

Underexplored



Ephemeral Adaptation



APPROACH

Abrupt onset of predicted items

Gradual onset of non-predicted items

DESIGN BENEFITS

Temporary adaptive support

Maintains spatial consistency

Based on literature in visual attention

Results

Ephemeral

Menu1	Menu2	Menu3
Saturn		
Venus		
Jupiter		
Mercury		
Aquarius		
Gemini		
Taurus		
Virgo		
Libra		
England		
Spain		
Germany		
Pecan		
Walnut		
Almond		
Pistachio		

Fastest
Preferred

Color highlighting

Menu1	Menu2	Menu3
Ceramic		
Marble		
Porcelain		
Granite		
Molson		
Labatt		
Coors		
Kokanee		
Cougar		
Hatchback		
Minivan		
Sedan		
Recliner		
Loveseat		
Couch		
Sectional		

Preferred

Control (static)

Menu1	Menu2	Menu3
Canola		
Sesame		
Safflower		
Olive		
Cheetah		
Cougar		
Tiger		
Leopard		
Samsung		
Panasonic		
Pioneer		
Sanyo		
Cotton		
Flannel		
Spandex		
Linen		

Ephemeral Adaptation: Further Applications

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By PETER BAYER and CHARLIE SAVAGE 20 minutes ago
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By DAVID STOUT and MICHELINE MAYNARD 3:20 PM ET
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Helene Cooper ON THE WHITE HOUSE

The Direct Approach
Obama aides are planning a


Khalid Mohammed/Associated Press
Mutanabi Street, famous for its book market, was destroyed in a car bombing in March 2007.

A New Chapter for Baghdad Book Market
By ERIC OWLES 2:32 PM ET
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Iraqi Arrests Extend Beyond Key Ministry
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Comments (229)

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Review | Shows for Scrooges
Also in Theater: 'Pal Joey' Opens After Turbulence

The Metropolitan Opera

MARKETS » At close 12/18/2008

S&P 500	Dow	Nasdaq
885.28	8,604.99	1,552.37
-19.14	-219.35	-28.04
-2.12%	-2.40%	-1.71%

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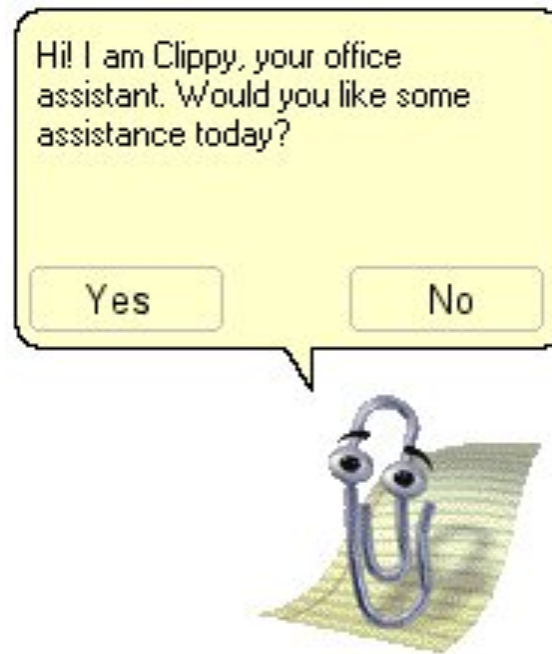
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Mixed-Initiative (human-computer partnership?)



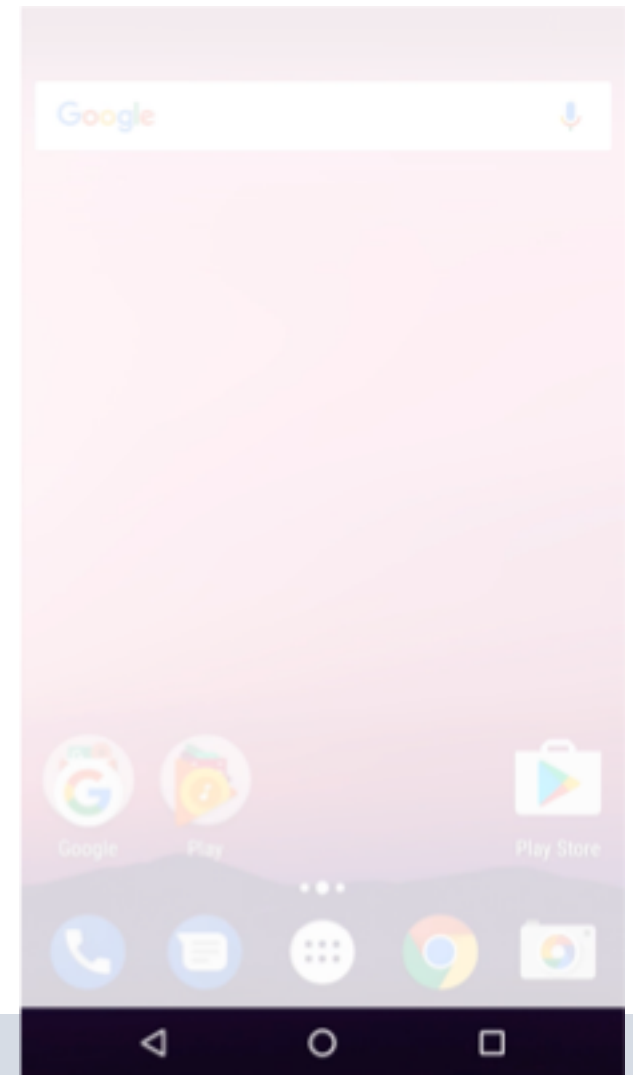
[Clippy: based on Lumiere, Horvitz, 1998]

[5 slides removed for public posting]

Supporting
personalized gesture
creation for eyes-free
gesture use

Supporting personalized gesture creation for eyes-free gesture use

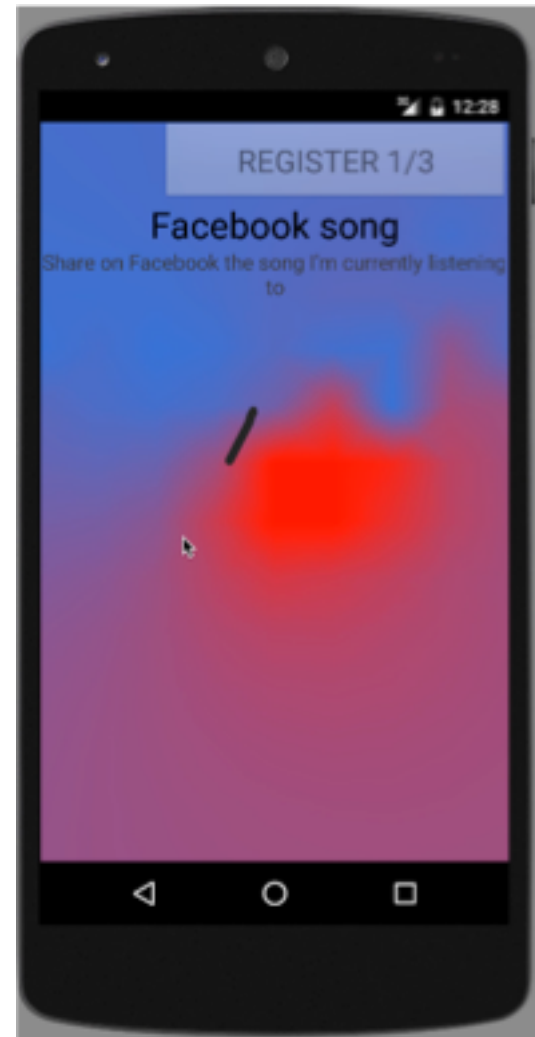
“call partner”



[Joseph Malloch, Carla Griggio, Joanna McGrenere, and Wendy Mackay. CHI 2017]

Fieldward

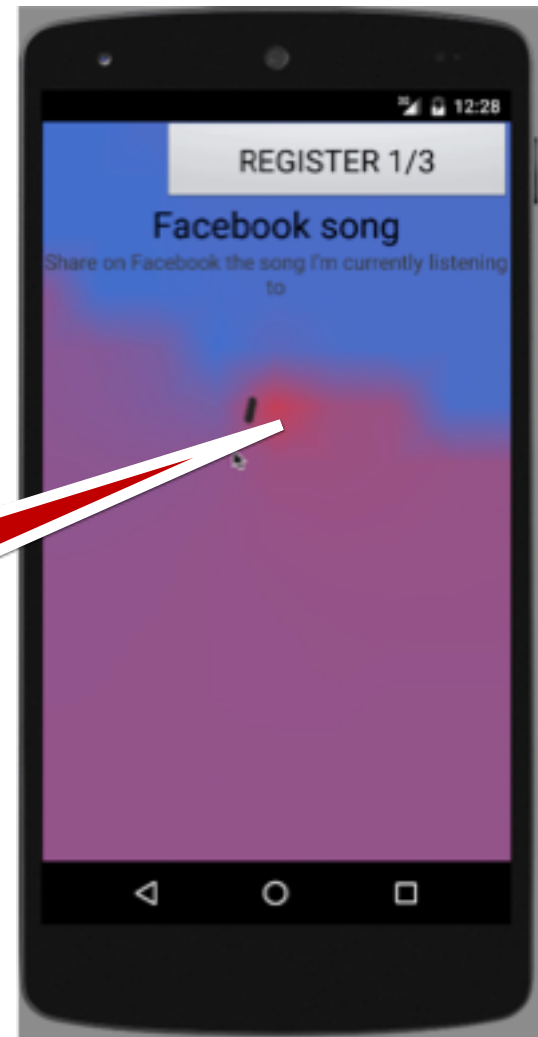
Shows a color gradient indicating optimal directions to make a recognizable gesture



Fieldward

Shows a color gradient indicating optimal directions to make a recognizable gesture

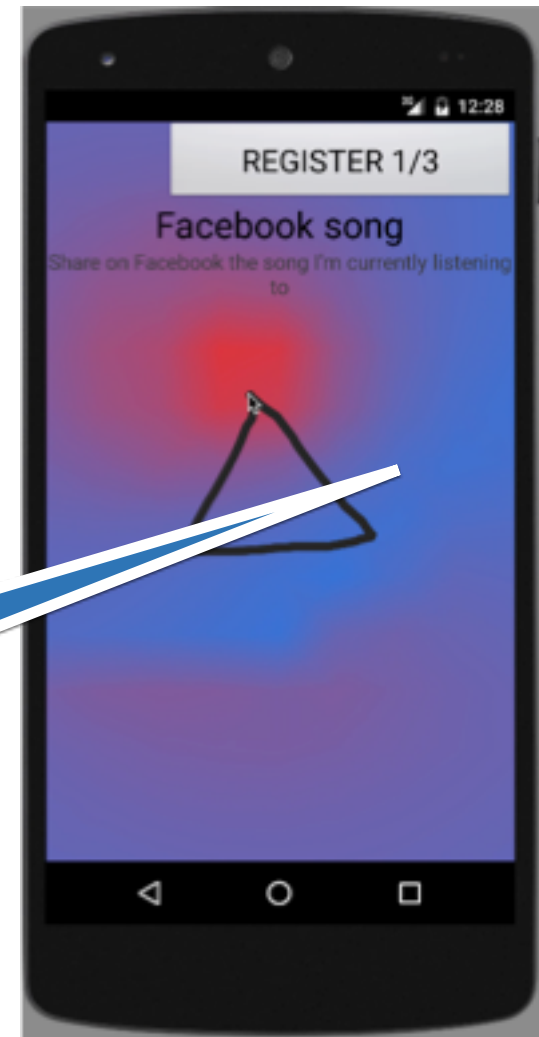
Gestures that end on a **Red** zone collide with an existing gesture



Fieldward

Shows a color gradient
indicating optimal directions
to make a recognizable gesture

Gestures that end on a
Blue zone are recognizable



Another adaptable example

Designing
Personalized
Interactive Media
Systems for
People with the
Severe Cognitive
Impairment
Associated with
Rett Syndrome

**How can user-centered
design be adapted for such
populations?**

**What toolkit might permit
parents to easily configure
systems for their daughters?**

The Video Button



Built,
delivered,
and
evaluated
two
systems

The Video Bucket



[Anthony Hornof, Haley Whitman, Marah Sutherland, Samuel Gerendasy, and Joanna McGrenere. CHI 2017.]

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Final reflections

- There is an inherent appeal to personalized interfaces & interaction
- Personalization can offer better performance and is preferred
- But there are tradeoffs (underexplored)
- Personalization is tricky to design & evaluate
- Multiple methods are needed

Final reflections (cont'd)

- More longitudinal evaluation is needed
- Richer characterization of individual differences
- Further mapping out design space
- Understanding of co-adaptation process
- Crisper articulation of value of personalization

Thanks!

