Collaborative Technology for Face to Face Interaction

Nicola Yuill
Children & Technology Lab
www.sussex.ac.uk/psychology/chatlab
digitalbubbles.org.uk
The stereotype #1

Technology *isolates*:
The stereotype #2

People with autism love technology:

So is technology a digital bubble?
People can subvert personal computing…

ourbusinessnews.com mPowering

Pass the iPad: Yuill et al. 2012
Children and Technology Lab

Designing technology to support collaboration
Collaboration

‘coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem’

Teasley and Roschelle, 1993
Collaboration in human evolution

mediamused.blogspot.uk

www.gpccolorado.com/socio-cultural-institutions/
Collaboration in development

A attends to object
B attends to object
A attends to B attending
B attends to A attending

Kozima, 2010
Natural collaboration

- [https://www.youtube.com/watch?v=Z-eU5xZW7cU](https://www.youtube.com/watch?v=Z-eU5xZW7cU)

Tomasello group:
Max Planck Institute for Evolutionary Anthropology, Leipzig Department of Developmental and Comparative Psychology

Theory of Mind
- individual capacity

Enactivist approach – emergent property of interaction

trainthebrain.co.nz, ballroomdancereviews.com
Collaboration drives development

Vygotskyan Intelligence Hypothesis
(Moll & Tomasello, 2007)

‘Let us be very clear on this point. Participation in these interactions is critical.’
Autism

Openlearn (Open University) labspace.open.ac.uk/mod/resource/view.php?id=482959
Collaboration in autism?

Collaborative drawing task: E draws, passes to C, C draws, passes to E....

When the experimenter adds roller-skates to a TD child’s drawing of a cat, she turns it into a jet-propelled sabre-toothed tiger.

A child with HF ASC disregards the experimenter’s drawing (upside down house in the middle) and fills the page with robots.

Borbely & Yuill, in review
Designing for collaboration

Interaction Lab, Holon Inst Technology
Mechanisms of Collaboration Framework

1. Coordinate **Awareness** of others: AKC
2. Coordinate **Control** of action: SCoSS
3. Sharing **Information**: CLOVER

Mechanisms for Collaboration: A Design and Evaluation Framework for Multi-User Interfaces

NICOLA YUILL, University of Sussex
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Multi-user interfaces are said to provide "natural" interaction in supporting collaboration, compared to individual and non colocated technologies. We identify three mechanisms accounting for the success of such interfaces: high awareness of others actions and intentions, high control over the interface, and high availability of background information. We challenge the idea that interaction over such interfaces is necessarily
1 Sharing Awareness
Augmented Knights’ Castle

- Context-specific sound effects via RFID
- Sharing sound – attention capture
- Measure attention and social play

Let me tell you why we built castles in the Middle Ages

Oh your Majesty, I have forged your sword
German and UK studies

48 German children, 6-11yrs
20 mins in triads with KC OR AKC

36 UK children, 7-9yrs, 2 x 30 mins in triads with KC OR AKC

Yuill et al, Frontiers 2014
Patterns of play over time

Time ----------->

Actor...

koop parallel
AKC

KC

coop parallel
2 Sharing Control
SCoSS: Separate control of shared space

- Dual control
- Dual representations, one per player
- Green box represents agreement
- Constraint: need to agree to move on

Pairs of 5-7 yr-old children with ASC in special schools: Limited or no speech, P levels 4-6

Sam Holt, Chris Girvan
Measuring other-awareness

Attentional: watching other’s actions

Active: acting contingently on other’s action: roots of collaboration

‘coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem’
Active awareness of the other

1. Pictures appear in both players boxes at once.

2. Right-hand-side picture placed on grid by Child B (black cursor).

3. Child B waits for Child A to place his picture on to his grid, this is shown by the position of Child B’s black cursor hovering over the We agree icon, but not clicking it.

4. Child A places his picture so that it matches Child B’s. Child B quickly clicks the We agree icon (now green, confirming it was pressed before Child A’s, which is still pink).
Frequency of other-awareness

5-7 yr-old children with ASC in pairs: limited speech, P levels 4-6:
Holt & Yuill, 2014
3 Synchronising shared devices

Playground design

8 5-7-yr olds in special school:
Yuill, Strieth, Roake, Aspden & Todd, JADD 2006
3 Sharing info: CLOVER*

Tablets linked between several pairs of children: ASC 7-14yrs

- Orchestration – providing the right cues at the right time
  Kreitmayer 2014

*Collaborative learning orchestration to support verbal engagement and reflection
or not sharing...
Design for collaboration

Supporting collaboration via

- shared *awareness* through attention capture in social play: AKC
- managing shared *control* in collaborative tasks: SCoSS
- synchronising *information* via devices: CLOVER

- Supporting collaboration enables access to social learning
- Providing evidence by comparing different designs
- Increasing understanding of mechanisms of collaboration by studying its challenges
Takeaways

Collaboration scaffolds development

We can design for collaboration

It’s interdisciplinary

https://www.pinterest.com/pin/143481938100847801/
1. **What are the key take-home messages from your talk today?**
   - collaboration is very important for social and cognitive development
   - tech can be isolating but it can also support collaboration
   - we can design tech to help children with ASC collaborate - so bringing them in not shutting them out of opportunities

2. **What are the implications of your research on practice in the field?**
   - That collaboration is a vehicle for development and growth and that it can be supported by technology
   - We want people to think about providing the right supportive environment where collaboration emerges naturally from design of the environment rather than being forced

3. **Who should listen to this/read about your work?**
   - We have a real interest in theory: is it better to think about autism from a cognitive, theory of mind point of view or from a more dynamic, embodied and enactive view?
   - And we want technology designers to think about how design supports collaboration in a diverse range of groups - including autism
   - And we’d like to share our ideas about technology design with parents and practitioners -- it's not only about inventing some very sophisticated hi-tech piece of kit, but how we use the existing tech in ways that support sharing
Discuss…

“Technology is neither good or bad: nor is it neutral” (Kranzberg, 1986)
Sharing because of or despite design?
Collaboration: individual capacity or emergent property of interaction?

Vygotskyan intelligence: face to face only, or online too?