**Design implications from Cognitive Event Analysis: A case study of digitally mediated interaction in autistic children**

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### Background and Aims

- ‘Social overtures’ are deliberate initiations and maintenance of social interactions, and reduced or atypical overtures are associated with autism [1]
- **We ask**
  - How and when do autistic children make social overtures whilst using digital technologies?
  - Can we extract design recommendations to promote opportunities for such child-led interactions?

### Procedure

- Four autistic children with learning disabilities (8-11 years) were observed in class with a range of different technologies (free-play setting)
- Three interfaces were available: **screen-based** (iPads), **physical to digital** (Osmo), and **augmented physical** (Code-A-Pillar).
- Nine observations were recorded over the course of 5 weeks. Footage analysed so far = 2.5 hours (20%).

### Cognitive Event Analysis

- Cognitive Event Analysis is a technique which aims to infer cognitive changes from observed behaviour, and provides a valuable link between behaviour (event), time and context. [2]
- ‘Events’ in this study were **social overtures** made by children whilst they played with the technologies. These were identified using standardised criteria from autism assessments [1]. Events were annotated for features of digital technologies or digital environments which preceded social overtures.

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### Digital features which facilitate social interaction

#### Example 1: Visual Cues

One child is playing Toca Tea Party with their teacher, with another child (A) looking over from a distance. **A pop-up bubble appeared on the plate** on the same side as A (see figure).

When the bubble appeared, the child moved closer to the other child and said **“I’ll do it!”** The children then continued to engage in turn-taking, responding to the in-game events in Toca Tea Party.

#### Example 2: Multimodal feedback

Even when **collaboration is suggested**, rather than enforced, children can still respond and engage in collaborative play. Having the **choice** to do so may be important for autistic children. **Pop-up events** can provide something to comment on and share with others.

#### Example 3: Tangible environments

Child C was playing with Code-A-Pillar at one side of the room, and programmed the toy to move to the other side of the room. The Code-A-Pillar started headed towards another group of children (see figure). When the Code-A-Pillar bumped into the group of people, the teacher yelled **“Look out!”** and all started laughing.

### Conclusions and Future Directions

- Digital artefacts, such as visual cues, multi-modal feedback, and tangible designs, can facilitate social interaction in autistic children. We extend previous research to examine **intrinsic, child-led** interactions.
- Cognitive Event Analysis (CEA) offers a valuable link between behaviour, time, and context, and this information can be useful for evaluating child-computer interaction, particularly with small idiosyncratic samples.
- Our future work will analyse the rest of the dataset and highlight more ways that off-the-shelf technologies can create social opportunities for autistic children, as well as the contexts in which autistic children initiate interaction in digital environments.

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### References


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**Thank you!**

To all of the children, teachers, and the school that contributed to this research

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