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## Creating Exploratory Touch-screen Games that Include Novel and Surprising Aspects as Motivators of Communication for Children with Autism

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### OVERALL GOAL: To investigate design strategies for technologies as ASC, specifically how to motivate children’s communication within, and around, touch-screen games.

### Background

- Unpredictability and “lack of sameness” are frequently stressful for children with ASC [1]
- Work with the ECHOES virtual environment for ASC suggests that novel and surprising aspects (i.e. discrepancies) of a technology can be experienced as interesting, positive motivators of communication when balanced with substantial sameness [2]
- ECHOES activities [3] introduced novel elements, and unplanned software issues meant that the system intermittently appeared to make “mistakes” (e.g. executing the “wrong” actions with respect to activity goals or to object properties)
- Children frequently and spontaneously initiated to social partners about discrepancies, opposite to what ASC literature might predict [2]
- Subsequent analyses of child-ECHOES interactions, combined with “lessons learned” from school studies, have identified characteristics that may have allowed discrepancies to be perceived as motivating but still emotionally manageable [4]

ECHOES results suggest a NEW DESIGN STRATEGY: deliberately including novel and expectation-violating aspects in games as a way of motivating children’s communication.

### Design principles

Design principles, largely derived from ECHOES, are intended to support transfer of “motivating but manageable" discrepancies to new contexts [4] by:

- Establishing clear child expectations and maintaining integrity of the environment and activities.
- Ensuring flexibility and resolvability of child-system interactions (choice of actions, no “dead ends”)
- Offering wide variety of discrepancies at an appropriate frequency, so as to interest all children.
- Posing ambiguous opportunities for communication, rather than demanding specific behaviours or communicative forms.

### Game Design Overview

Mini-games structure child-system and child-adult interactions, provide a shared focus and experiences about which to communicate.

- Current games are NOT educational or “skill-building”; participation, goal completion are not inherently valuable.
- Each mini-game has one main goal, repeated actions (e.g. adding, subtracting, or changing aspects), offering the child an opportunity to notice and communicate about things s/he thinks are novel, or that violate expectations.

Over multiple sessions of play, mini-games establish, and then violate, child expectations about their contents. [SEE RIGHT]

- Multiple exposures to the “normal” game version allow a child player to develop expectations about its patterns and behaviours.
- When expectations are established, the game can be disrupted (e.g. adding, subtracting, or changing aspects), offering the child an opportunity to notice and communicate about things s/he thinks are novel, or that violate expectations.

“Sameness” of content around mini-games helps to structure games sessions, ensure novel, surprising aspects are “motivating but manageable”.

- Hello/Goodbye scenes help signal transitions, and are exactly the same in every games session.
- Menus (left) are like a visual schedule, make clear which activity is being played now and next.

### Proof-of-concept study

- 12 children with ASC (10 M, 2 F) participated in a study in a UK special school during Spring 2015
- Children were developmentally 3-7 years old (per BPVS), with phrase-level language
- Children completed 3-4 games sessions, playing the “normal versions” on day 1, and different discrepant versions on days 2 and 3.
- Video recordings of sessions will be annotated for child behaviours. Which design elements did they notice? How did they react? Did they initiate?

### Example: Children react to “missing cloud”

Right: Child immediately touches screen where cloud should be, then asks researcher where it is.
Left: Child asks researcher “Where’s a cloud?”, then watches screen corner closely until it returns.

### Video analysis (in progress) aims to evaluate the success of the design strategy and individual game aspects at motivating communication, not child success at “finding” novel or surprising aspects.

### References


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![Game Design Overview](image-url)