# CLICK-EAST

# Evaluating the Impact of an iPad app on Social Communicative Abilities in Young Children with Autism

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## Background

- Children with autism can struggle to attend to social information and this affects their ability to learn, especially from people [1]
- Children with autism often show a strong preference and facility for using technology, including computer games [2,3]
- There is a widely-held assumption that early intervention has the greatest potential to benefit children with autism [4]
- The Click-East project combines these three statements in an attempt to teach social attention with a specially-designed iPad app, accessible to very young children, and thereby open up a range of real-world learning opportunities
- We believe that computer-based learning may be particularly appropriate for teaching social attention because interpersonal methods often require the very skill they're trying to teach
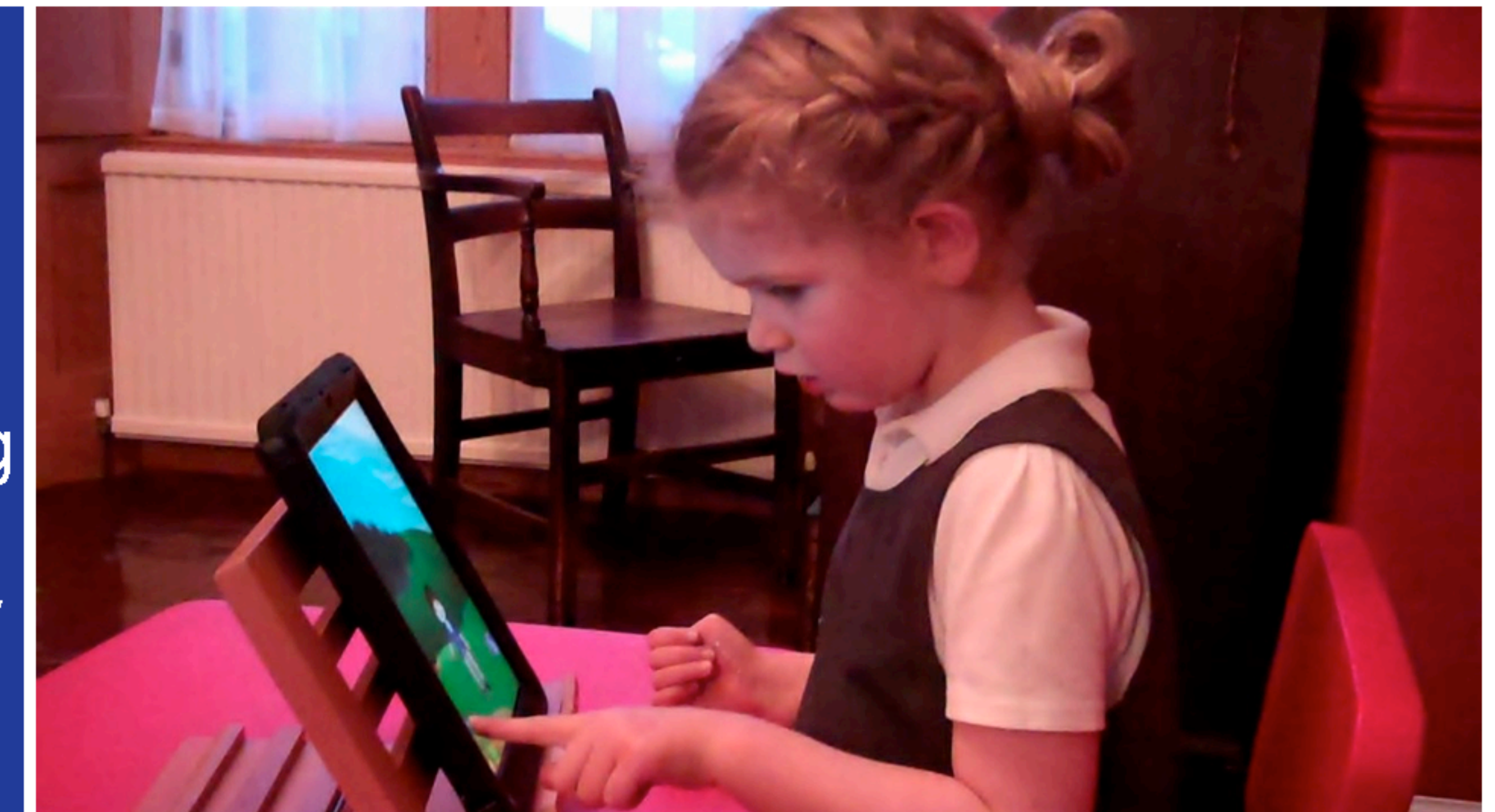
## The app: design process

The app was designed with input from multiple sources including participatory design[5], user testing and expert evaluation. Design activities included:

- Advisory group interviews, n=4, talking with parents, a teacher, and an adult with AS to explore the value and function of computer technology in real life
- Child design questionnaire, n=13, TD children aged 2-10yrs completed a questionnaire (with parents) about preferred game features and activities
- Adult design questionnaire, n=9, adults who work with pre-schoolers with autism completed a questionnaire about preferred game features and activities
- Image design activity in school, n=20, children with autism and other DDs created pictures and then rated each other's art. Analysed for content and layout (Fig 1)

Subsequently, versions of the game were evaluated by users to check minimum ability level required, preferred reward options and general enjoyment:

- Minimum ability test, n=12, TD toddlers with no iPad experience tried the game to establish minimum ability level. Observed successful play from 15 months old.
- User testing in nurseries, n=10, pre-schoolers with ASD played beta-versions of the game while observed by the research team, and rated it using a smiley face system
- User testing at home, n=10, young children with ASD took beta-versions of the game home for testing and evaluation by parent report, including 3 participants who kept the game for at least two weeks
- Expert evaluation, n=16, by professionals working with children with ASD

The completed app permits the user to repetitively rehearse two skills - attention to people and following social cues - in a motivating environment. This approach may complement other strategies by providing a "daily dose" of learning content.

Figure 1: Images from participatory design activities indicated a mix of realistic settings and fantasy worlds. A striking feature was the repetitive layout of these images which was reflected in the simple, regular layout and repetitive structure of the game

Autism specific features of the completed app include:
- Low-impact eye region
- Repetitive learning
- Instant access
- Social target skill
- High-interest distractors
- Limited sensitivity to repeated touch
- Tailored, instant, concrete rewards
- No reading or instructions

Figure 2: rewards for the game. Players can choose their preferred option. They collect tokens for each correct response and a longer animated reward sequence every five trials

Figure 3: sample images from part one (attention to people) and part two (following social cues)

## User feedback & feasibility data

So far, 34 children with confirmed autism (ADOS SCI total > 12) have had access to the research app at home for a period of two months.

- Mean play time = 10hrs 40 mins, or approx 10 mins per day.
- Percentage reaching highest level = 74%
- Proportion experiencing faults or breakages = 9%

Parents report:
- High motivation to play, enjoyment and efficacy of reward system
- More able gamers may get bored before the research period is completed
- Learning of new language, then used appropriately in real world settings
- Possible evidence of increase in pointing skills
- No lower ability level has been identified

Available on the App Store

The free iTunes app (see right) has received over 50,000 downloads worldwide. Online feedback indicates high satisfaction with the app but a demand for more content.

## Next: randomised controlled trial

A randomised controlled trial is underway to formally evaluate the efficacy of the app. The RCT protocol includes:

- 54 families enrolled with a child with autism aged under 6 years old
- Baseline assessment including ADOS, parent-child play, language measures and Mullen Scales of Early Learning.
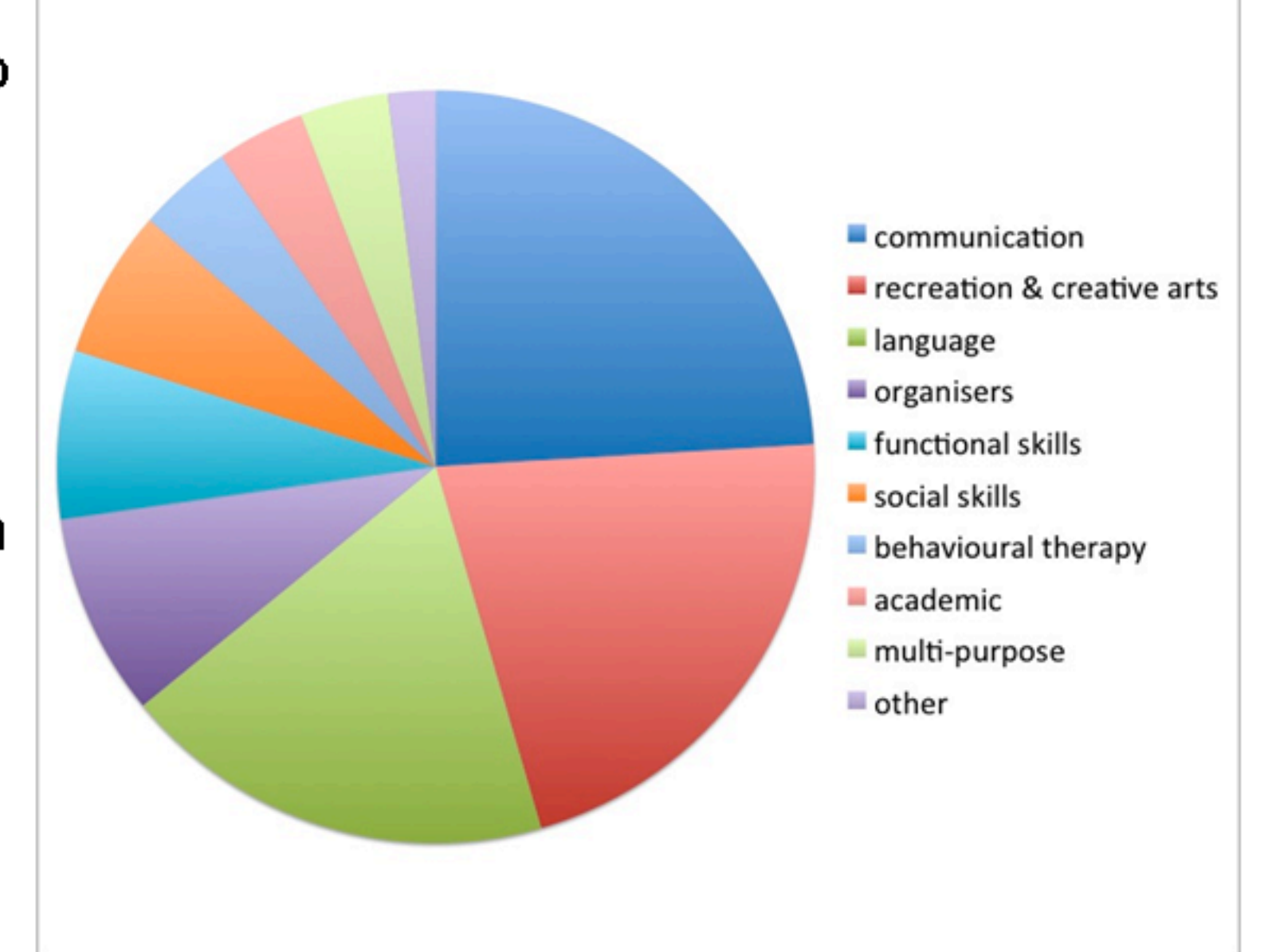- Evaluation of computer game use and skill, plus demographics

Children are randomised by opaque envelope procedure to intervention or wait-list control. Intervention participants take home an ipad with the app and no other functions for two months.

Evaluations post intervention and at 6-month follow up include
- ADOS, parent-child play, language
- In-game play data
- Parent evaluation of the app

Figure 4: The app is licensed to a commercial partner and published on iTunes. This successful collaboration allows the app to reach the maximum, international user community.
FindMe joins a small proportion of apps which target social skills (22/345). These data are extracted from an autism app list on the Autism Speaks website[6]

legend: communication, recreation & creative arts, language, organisers, functional skills, social skills, behavioural therapy, academic, multi-purpose, other

## Conclusions

- Multiple expert input and interdisciplinary working represents best practice in technology design for this population and gave rise to a number of autism-specific enhancements to the game
- The game has been well-received by users and game play data indicate high levels of both success and engagement. Data indicate the feasibility of this approach even for children with low abilities.
- RCT data will help to reveal the game's efficacy but a modest therapeutic impact may still be worthwhile in the context of time and financial pressures on support for families.
- There is a requirement for better sharing of best practice in design and evaluation of technologies for autism and a consistent methodological and theoretical model for this field

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