A comparison of PECS and an iPad used as a speech generating device to teach requesting to preschoolers with autistic spectrum disorder

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Background

- About myself: SLT working on an AAC specialist team
- 50% of these children: ASD
- the use of AAC (Augmentative and Alternative) communication is now considered both necessary & appropriate for ASD (Brunner & Seung, 2009)

Challenge: Parents and other therapists

- had own communication solutions utilising mainstream technology including iPads to support communication
- less interested in low tech solutions such as PECS, an intervention which is backed by evidence (Sulzer-Azaroff et al, 2009)
- Mainstream technologies e.g. iPads were being recommended by therapists as AAC devices (Light & McNaughton, 2012)

Was I missing something here??

Why was I not recommending this mainstream technology?

Background

So what did the literature say: PECS vs iDevices?

- transition to a SGD considered when Phase IV of the PECS programme was achieved (Frost & McGowan, 2011)
- Reasons for transitioning:
  - need to access greater vocabulary
  - the advantage of voice output

Literature review- iDevices:

- few studies which focussed on the use of iPads to develop requesting skills especially for pre-school children with ASD
- One systematic review of 8 studies utilising an iDevice concluded that these could be used successfully to target communication skills (Kagohara et al, 2013)

Background

Comparison of PECS and iDevices:

- Even fewer studies which compared the ease & speed of learning of PECS & iDevices (Sigafoos et al, 2009)

- Van der Meer et al's (2012) study compared the concurrent acquisition of AAC including PECS & iPad & found variability in learning to use the systems. Conclusion: possibly due to child preference

- Flores et al (2012) compared a picture exchange based system with iPad.

  - Frequency of communication requesting using the iPad was the same or higher than the picture-based condition. anecdotal evidence suggested that 2 of the participants preferred the iPad for requesting.

Background

Limitations of previous studies:

- Restricted to a single step response limiting the number of items a child could request e.g. Flores et al (2012)

- Advanced operations including navigation skills are necessary to access a wider vocabulary similar to that which can be accessed from Phase III of the PECS protocol (Achmadi et al, 2012).

- Achmadi et al's (2012) study demonstrated that adolescents can be taught to navigate

Aim of Study

To investigate the possibility of an iPad as a SGD and to compare the relative efficacy of the iPad with PECS in developing requesting skills with pre-schoolers with ASD

Research Questions

1. Can preschoolers with ASD be taught to use both PECS and an iPad as a SGD to request?
2. Which AAC system results in a faster rate of acquisition of requesting skills?
3. Do preschoolers demonstrate a preference for either of these AAC modes prior to and during intervention?
4. Can preschoolers be taught advance operations involving navigation on the iPad?
5. Can a PECS protocol be adapted for the iPad?

Predictions:

- that both AAC modes would be learnt and that the speed of acquisition would be related to preference.
- that navigation on the iPad could be taught successfully as part of an adapted PECS protocol

Methodology: Design

- A multiple baseline design (MBD) across participants combined with an adapted alternating treatment design (AATD)

- This design enabled the therapist to concurrently teach the participants to request reinforcers using both PECS & an iPad as an SGD.

- MBD: allowed for the sequential introduction of intervention with baseline being extended between participants

- AATD: allowed for comparison of intervention performance between PECS and SGD conditions & effects on requesting

- Social validity: evaluated using a questionnaire administered to carers x2. prior to baseline & after completion of follow-up session

Methodology: Participants

- 3 children were recruited through the ACTU waiting list according to the following inclusion criteria:
  - ASD diagnosed by a psychologist
  - Under the age of 6 years
  - Have less that 10 words used functionally for communication
  - Unable to manage Phase 1 PECS independently
  - Not current users of speech-output technology
- All children assessed using the DTC from the DLS adapted from English to Maltese
- Communication profile: analysis of 20 min video recording which included play and snack-time activity in baseline
- ADOS-2 was administered by the researcher

Methodology: Materials

- **PECS Condition:** Standard large PECS book . 2" PCS symbols with corresponding label written in child's primary language (Maltese or English) used.

- **SGD condition:** iPad with BigGrips frame feature matching approach: SoundingBoard app (Gosnell et al, 2011)
  - digital recordings in both English and Maltese
  - imported images which duplicated those used in the PECS condition
  - SoundingBoard's dynamic feature: to link several boards together, greater vocabulary access.
  - 'Home' and 'more' buttons were programmed in the same place for ease of access.
  - The app was customised individually for each participant according to the results of a reinforcer assessment

Methodology: Design

- Study phases
  - **Baseline**: all participants commenced simultaneously, longest baseline for 3rd child. Video taken to generate 1st communication profile. Reinforcer assessment.
  - **Intervention**: 12 sessions over 4 weeks, 6 in each condition, 20 mins length.
    - PECS: followed Frost & Bondy's(2002) protocol
    - SGD: Utilised an adapted PECS protocol. Task analysis used to ensure consistency in the number of steps in both conditions.
  - **Post-intervention**: most efficient intervention applied alone, 3 sessions. Efficiency determined by comparison of % of errors & training time for each condition
  - **Follow-up:** 1 session, both PECS & SGD available. Session videoed for a 2nd communication profile.

Methodology: Adaptations to PECS protocol for the SGD

- **Phase 1:**
  - Communication partner uses a 2 handed open hand cue into which the SGD was placed by the child
  - SGD is activated after the SGD is placed in communication partner's hand
- **Phase 3:**
  - 'category' button introduced to navigate to more toys, food
  - Home page set up with categories for the child to navigate to food, drink and toys

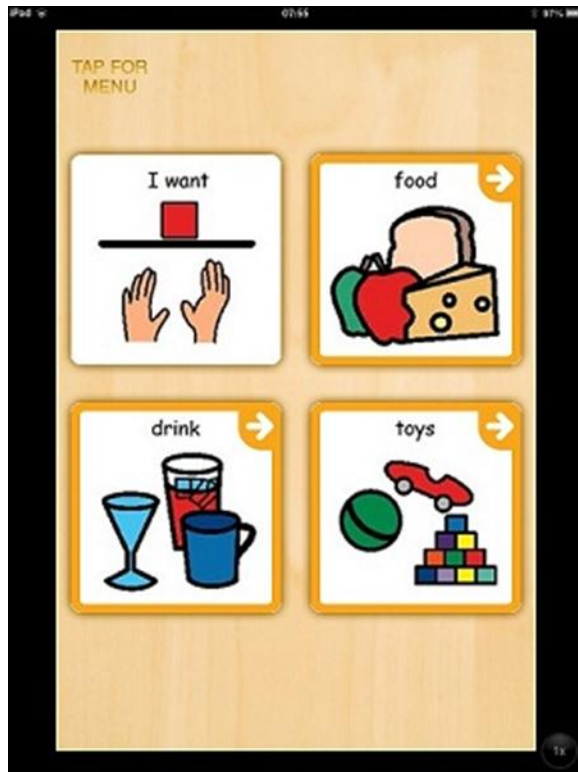# Methodology: Adaptations to PECS protocol for the SGD

Figure 1: Home page on the SGD

Figure 2: 'Home' and 'category' buttons for navigation purposes

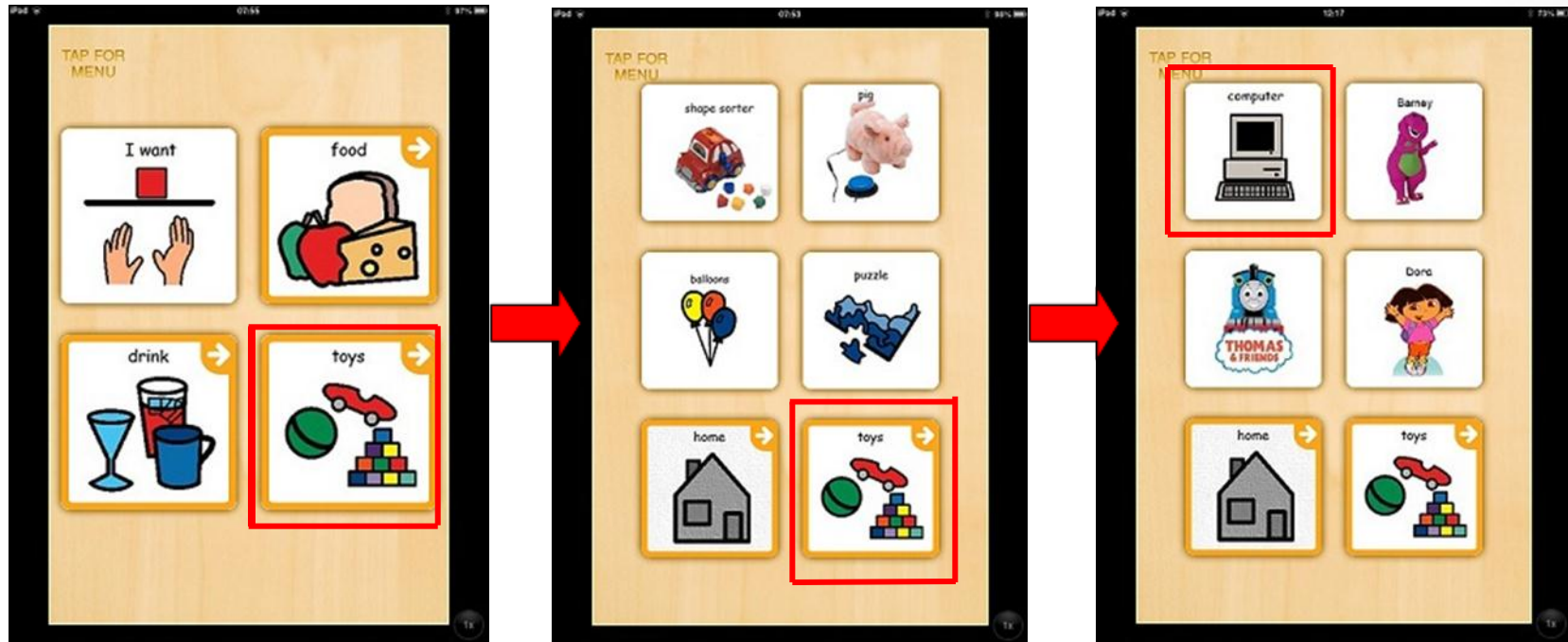# Methodology: Adaptations to PECS protocol for the SGD

Figure 3: Example of how a child would navigate to request 'computer'.

Methodology: Learning criterions

- **Overall learning criterions Phase III:**
  - PECS: To open the PECS book, locate the correct visual & physically exchange the visual with communication partner
  - SGD: To travel to the communication partner with the SGD & then use a multi-step requesting sequence to navigate through the app to find the visual of what is wanted

Methodology: Preference assessments

- Conducted at the beginning of every session
- Participants were presented with both PECS & iPad on one occasion.
- More frequently chosen AAC presumed to be the preferred system (van der Meer et al, 2012)
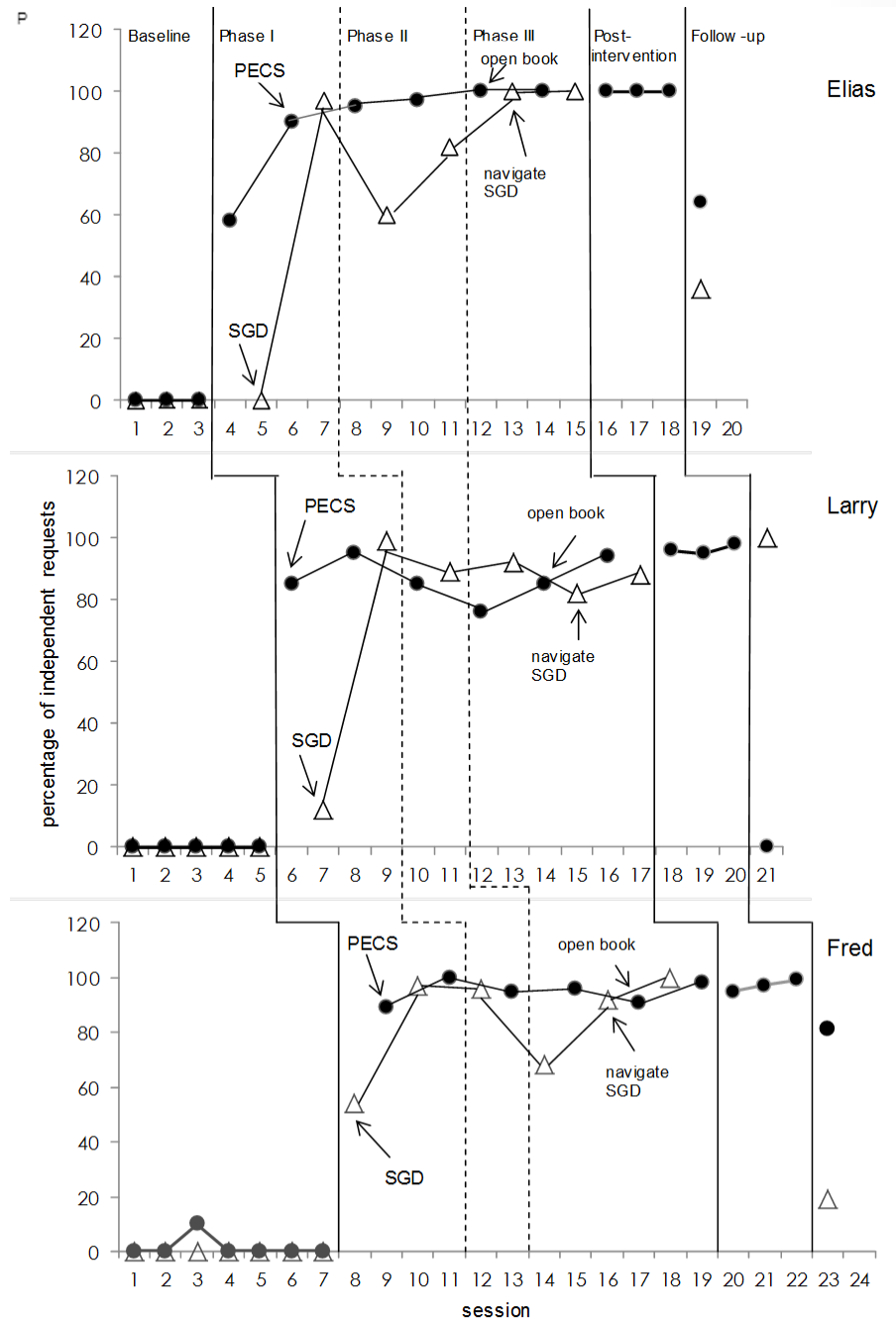
Results

Figure 4: Independent requests as a percentage of all requests made in the study

Results

- All participants achieved Phase III for requesting in PECS & the SGD within 6 sessions of intervention for each

- Increase in communicative acts particularly requesting for all 3 participants

- Wicoxon matched pair test, no statistically significant difference was evident between the 2 intervention conditions for any of the participants

- PECS selected for the follow-up phase for all participants: based on mean percentage of prompted requests which was lower in PECS condition. All of the participants also required an additional session to master the use of the SGD at Phase I.

Results:

- Wicoxon indicated no significant statistical difference in the number of requests made by the participants during each 20min intervention session using the SGD or PECS.

- During the follow-up session where participants had access to both AACs, 2 children used PECS more than SGD. The third child used SGD solely.

- Preference probes indicate a preference for SGD in all phases of the study for all 3 participants. Particularly evident in baseline phase: PECS book not chosen on any occasion by any of the participants.

- All 3 children chose the PECS book after the first intervention session with the SGD.

Results

- Communication profile comparison between baseline & follow-up phase:
  - increase in requesting
  - increase in the use of AAC with a corresponding decrease in informal communicative acts
  - One child developed speech during the intervention phase results indicated that both spontaneous & imitated speech was higher in the SGD condition.
  - Another participant exhibited increases in speech in both AAC conditions
  - The third participant showed an increase in speech during the follow-up phase only during PECS use

Results

- Social Validity:
  - Prior to baseline 2 carers felt their children would prefer and do better with iPad as their children had shown an interest in the technology before the study
  - The questionnaires indicated that both AACs were considered socially valid; all respondents felt that their children should continue to use both AAC systems in the future, they perceived that both had supported the participants to learn requesting skills.

Summary

- All participants learnt to request using the SGD through an adapted PECS protocol including;
  - multi-step navigation.
  - travelling with the SGD in Phase I.
- All children attempted to activate the SGD before travelling with it (Phase 1).
- Physical prompter was required to overcome this & required 2 sessions for all the participants.
- All participants learnt to navigate the SGD with ease although 2 of the participants attempted to exit the customised boards and preferred to scroll through the lists within the app.

Summary
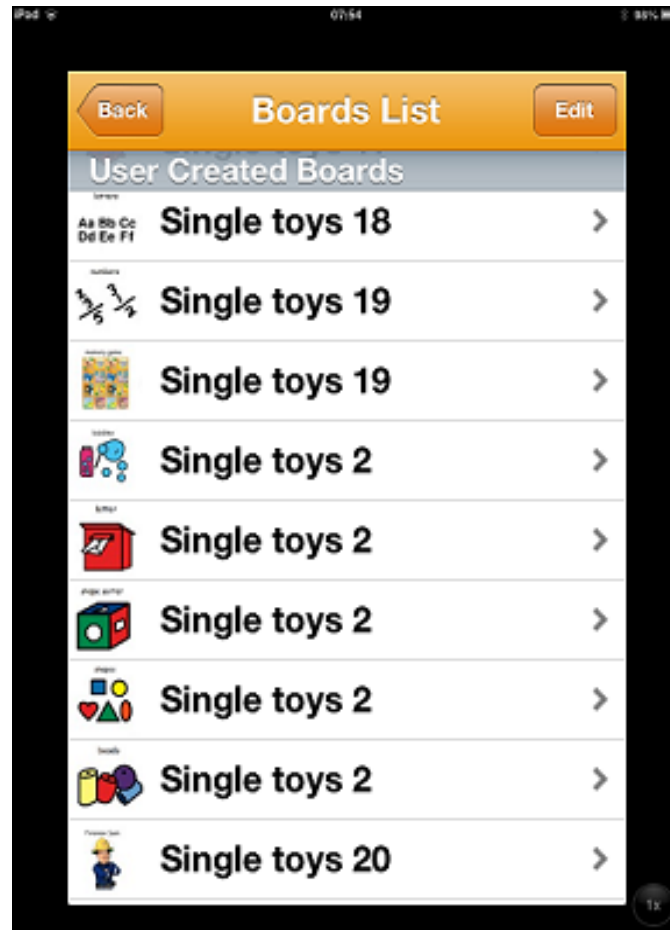
Board list in SoundingBoard app

Clinical Implications and future research

- SGD can be considered as initial intervention for preschoolers with ASD- widens potential AAC options for beginning communicators

- All participants had psychological assessments indicating that their Performance scores on the WPPSI-III was average/low average. What about children with lower cognitive skills?

- Participants learnt both AACs with no significant differences, therapists must therefore consider other factors concerning AAC decision making. Preference probes were inconclusive. Parental opinion did not match up to the preference probes.

- Individual child strengths must be considered when choosing AAC.

Clinical Implications and future research

- Further studies required to investigate child characteristics which may influence choice of one over another.

- Future research directions include utilising other methods to teach SGD use, and use of apps with different layouts

- With one participant speaking more during SGD sessions, further research is also needed to identify if some children are more likely to respond to a SGD and if so what the child intrinsic factors might be.

Limitations of the study

- 3 participants thus caution when generalising findings to other children.
- Study only covered Phases I to III of PECS. Thus commenting was not included.
- Only one session of follow-up was carried out
- Study limited to clinical setting

Conclusions

- Given that there was no statistically significant difference between PECS and SGD, both can be considered for initial intervention to teach requesting to preschoolers with ASD who have limited verbal abilities.

- This study extends the literature in 3 ways:
  - Preschoolers can be taught both the iPad as a SGD as well as PECS
  - They can be taught advanced operation of navigation
  - The study provides an adapted PECS protocol for teaching SGD use

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