

# To 'tech' or not to 'tech'...

*Use of technology (AAC) with children with severe communication impairments and challenging behaviour*

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# Wouldn't it be wonderful if...

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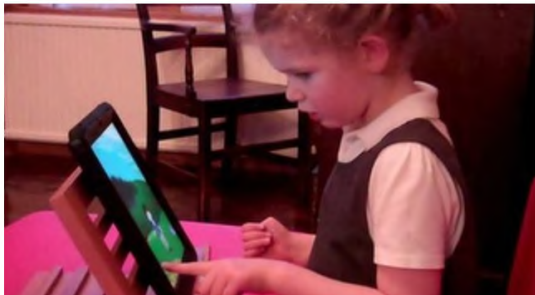
Health

**Are apps the key to revolutionising autism learning?**

By Philippa Roxby  
Health reporter, BBC News

© 15 January 2012

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**Technology has completely and utterly changed Veronica's life.**

with," says her mother Sam Rospigliosi, from Edinburgh.

"Who knows, she might even use it as her voice in the years ahead if she never

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**APPS FOR AUTISM:  
COMMUNICATING ON THE  
IPAD**


*Autistic people whose condition prevents them from speaking are making breakthroughs with the help of tablet computers and special applications*

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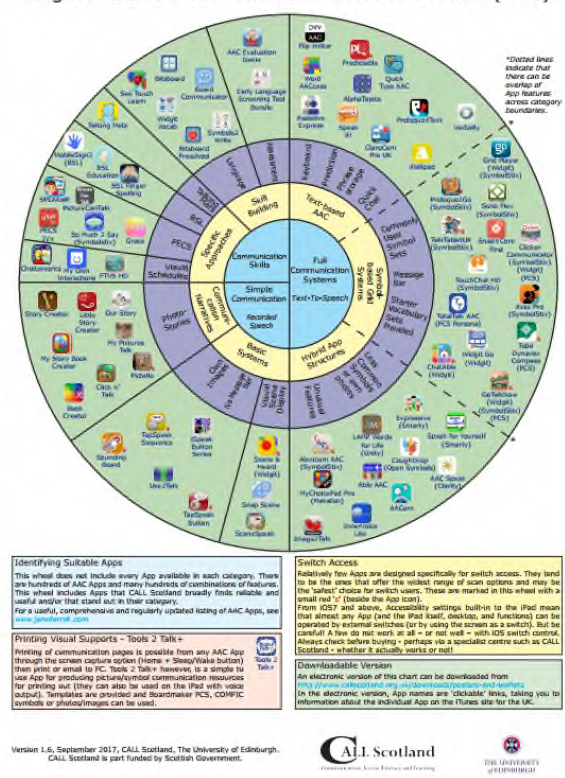


# Overview

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1. Technology: what's out there? Platforms & Apps
  2. Parent & professional perspectives
  3. AAC intervention ASD
  4. Challenging Behaviour
  5. Decision making in practice
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## iPad Apps for Complex Communication Support Needs: Augmentative and Alternative Communication (AAC)



# 1. What's out there? Apps

- Vast and growing fast
- Available on android & apple platforms
- At least 5 apps for PECS
- Research is limited e.g. Autism Speaks: 214 apps listed as related to 'communication'
  - 8% had some related research but no direct research support for use and
  - 3% had solid OR specific evidence that it is helpful (no judgement on quality of research)
- Research commonly related to:
  - Proloquo2go
  - App Development e.g. PixTalk (Leo et al 2011)
- Published recommendations based on clinical judgement



FAMILIES & ADULTS RESEARCH ADVOCATE GET INVOLVED

Name	Category	Platform	Age	Supporting Research
Accessible Literacy Learning (ALL™)	• Communication • Language	• Windows 8 • iPad	• All Ages	Evidence
Alpha Writer	• Communication • Language	• iPad • iPhone • ITouch	No Data	Evidence Show more
Autism Learning Games: Camp Discovery	• Accessibility • Communication • Functional Skills • Language	• iPad	• Children (6-12)	Evidence Show more
Conversation Coach	• Communication	• iPad	No Data	Evidence Show more
innerVoice	• Accessibility • Behavioral Intervention • Communication • Educational	• iPad • iPhone • ITouch	• All Ages	No Data
ProxTalker App	• Communication • Language	• iPad • iPhone • ITouch	• All Ages	Evidence Show more
Reading Rocks E-Edition	• Communication • Functional Skills	• iPad	No Data	Evidence Show more
Talking Mats	• Communication • Educational • Organizer	• Android • iPad	• All Ages	Evidence
Tobii Dynavox Snap™ + Core First®	• Communication	• iPad	• All Ages	Evidence



AAC Apps Lists

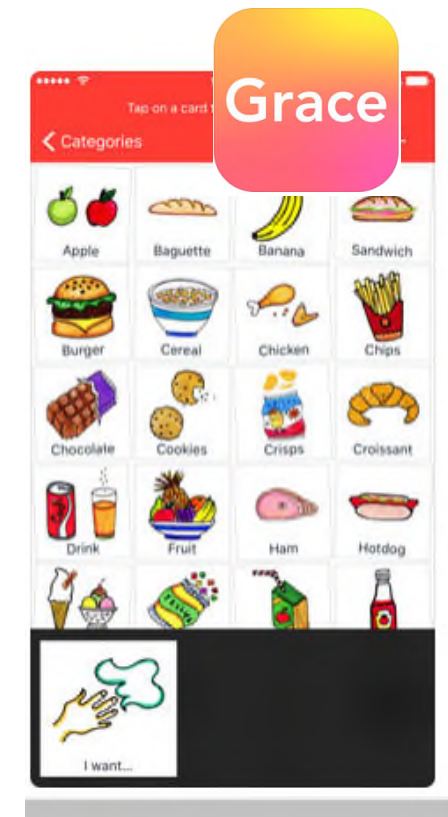
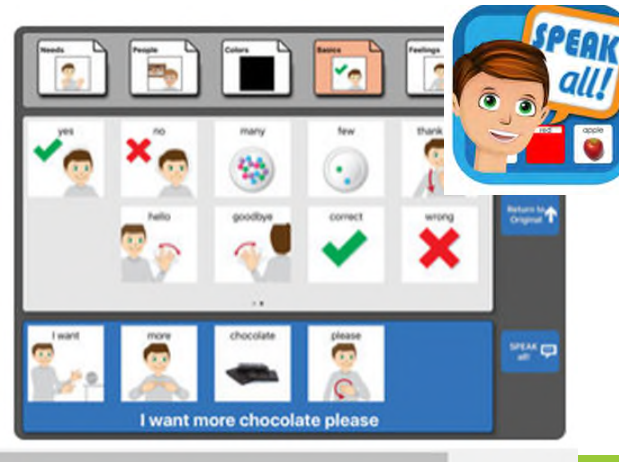
173 apps

iPads and apps

# Have a closer look..

## PECS apps

- Pyramid Education: starts from phase 3, but two separate apps (PECS III is teaching phase 3, PECS IV+ for transitioning from PECS® to high-tech AAC). £79
- SPEAKall! developed directly in the Purdue AAC and Autism Research Lab tested in the Purdue Speech-Language Clinic £39
  - Described as evidence-based, MSc thesis referenced ?peer reviewed publications?
- Grace - Picture Exchange for Non-Verbal People (Steven Troughton-Smith) £29
  - Reviews generally positive (SLTs and parents) but looking for greater customisation options





## Symbol based Grid based systems

- Proloquo2go £250
  - research-based core word vocabulary
  - customisable
  - designed for a range of fine-motor and visual skills
  - regional vocabulary and accent
  - supports bilingual use
  - 100 natural-sounding children & adult voices across languages
- Tobii Dynavox Compass Connect (free 30day trial £87 per year subscription)
  - Windows & iOS systems
  - provides pagesets structured to address needs of individuals with e.g. autism, cerebral palsy, aphasia
  - clinician-developed communication pagesets
  - access to clinical & technical support



## 2. Parent & Professional perspectives of technology

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### Parents of typically developing children (Broekman et al 2016)

- When parents of TD children choose apps - 5 overarching needs:
  - need for independent entertainment
  - co-education
  - a tailored challenge
  - familiarity (e.g. child wants to repeat actions over and over again)
  - pass time
- Highest importance given to entertaining and self-guided apps to support self-occupation (80% attaching high importance to this need)

### Parents of children with ADHD (Powell et al 2017)

- Best if child can relate to it, parent can personalise it to own circumstances

BUT

- Not always necessary, can be distracting, accessing technology can be problematic, don't always met needs

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## Parents of children with ASD

“[child] has an iPad. we fundraised for it at her last school (each pupil there got one).”

“iPad!! Get an iPad. Spend some money and get one with lots of memory. Loads of brilliant Apps to use, films to download. Life has been made a lot more enjoyable for my [child]. You can also get different Apps for communication as well. Well worth it, that and a trampoline for keeping my [child] **amused, engaged and occupied.**”

“she uses it a LOT. she uses it as a structured part of school/learning - **educational apps** to help her to read and write (she learned to read from her iPad, and is now working on spelling apps); she uses it **to relax** - some favourite apps over and over, or **comfort** tv/videos.”

“**Wow**, thanks for all suggestions I will try some of them”

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# Professional perspectives 'a blessing & a curse' (King et al 2017)

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Tablets used for multiple purposes: e.g.

- education
- communication
- social interaction
- Reward
- Professionals valued tablets / committed to overcoming challenges

# Challenges (King et al 2017):

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Inadequately designed apps

App violation

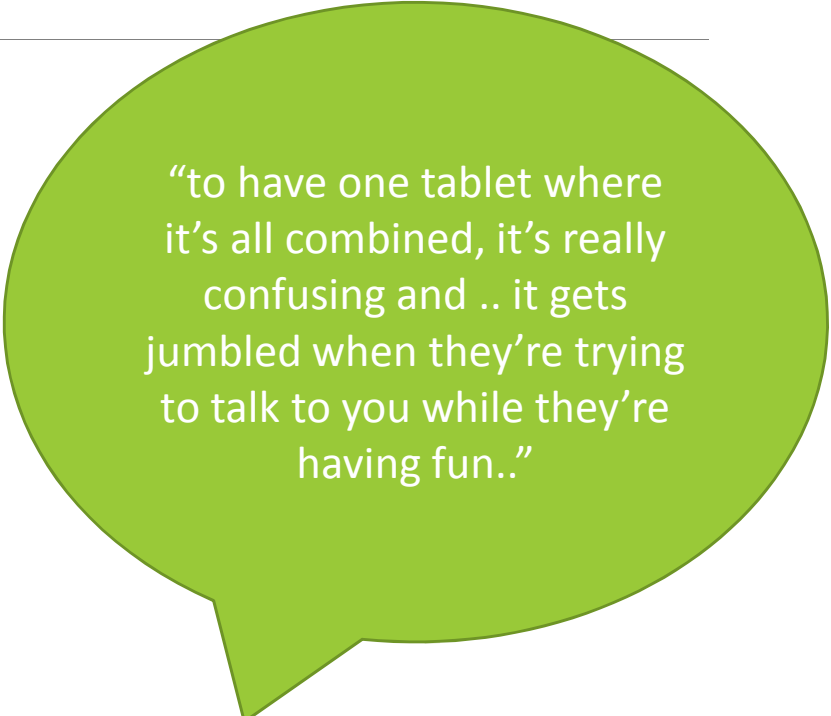
- repetitively enter/exit app
- inappropriate internet use,
- perseveration on YouTube.

Challenging behaviour assoc. with app use:

- escaping tasks until tablet is a choice
- arguing/fighting over tablet,
- self-stim behaviour,
- using tablet to self-injure,

Social isolation during tablet use


Multiple competing uses: consensus - if AAC then single function tablet



“to have one tablet where it’s all combined, it’s really confusing and .. it gets jumbled when they’re trying to talk to you while they’re having fun..”

### 3. AAC Intervention in ASD: evidence?

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- a) Speech generating devices (SGD's) & ASD
  - b) Preferences & comparisons: SGD, Picture Exchange, Manual Signing
  - c) Tablet/smartphone use
  - d) App use
  - e) Child factors
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# a) Speech generating devices (SGD's) & ASD

Literature review: 23 studies (Van der Meer & Rispoli 2010).

- Intervention (requesting skills) two main approaches: operant/behavioural techniques and naturalistic teaching procedures.
- 78% of the studies were categorized as providing conclusive evidence for use of SGDs

Meta analysis: 24 single case studies (Ganz et al 2011)

- Strong effects for aided AAC in ASD (best: communication also social skills and challenging behaviour NB small no. studies for latter 2)

**Table 2** Summary of effect size results for combined effects, targeted behavioral outcomes, and intervention types

		IRD	IRD CI
Combined		0.99	0.98–0.99
Targeted behavioral outcomes	Communication	0.99	0.99–0.99
	Social skills	0.90	0.84–0.95
	Academics (Spelling)	0.79	0.76–0.82
	Challenging behaviors	0.80	0.76–0.84
Intervention types	Picture exchange communication system	0.99	0.98–0.99
	Other picture-based AAC systems	0.61	0.57–0.64
	Speech-generating devices	0.99	0.99–1.00

SGDs are **viable** communication **options** for children with autism

## b) Preferences & comparisons: SGD, Picture Exchange


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- Literature review 7 studies, 12 participants (van der Meer, Sigafoos, O'Reilly, & Lancioni, 2011)
  - 67% of participants demonstrate some degree ( $\geq 55\%$ ) of preference for using SGD
  - 33% for Picture Exchange

### SGD cf PECS

- Mclay et al 2014 (4 children) Proloquo2go, little difference in rate of acquisition, relatively better maintenance for SGD vs PECS vs Msign, SGD preferred
- Sigafoos et al 2009 (single case study) TechTalk both viable but highlight persistence over distance important for promoting interaction.
- Bock et al 2005 (6 children) Beck et al 2008 (4 cases) used GoTalk (dedicated static device) – operant/behav. techniques used for both SGD & PECS, variable responses from individuals: preference, acquisition, generalisation.

“Individuals with developmental disabilities often show a preference for **different** AAC options”



## c) Tablet/smartphone use

Systematic review (Still, Rehfeldt, Whelan, May, & Dymond, 2014): 16 studies, 46 participants teaching functional requesting skills (>16 years ASD).

- intervention results were largely positive.

Systematic review (tablets & media players as SGDs)(Lorah et al 2014) 17 studies, single subjects designs, (mainly proloquo2go)

- 3/17 answering qs, labelling
- 23 showed preference

“Tablets can be implemented as AAC”

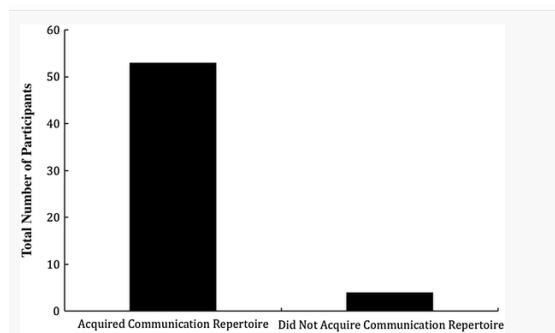


Fig. 1  
Acquisition of communication repertoire. Total number of participants who did or did not acquire the trained communication repertoire using the iPad® or iPod Touch® as a SGD, across all 17 studies included in the review

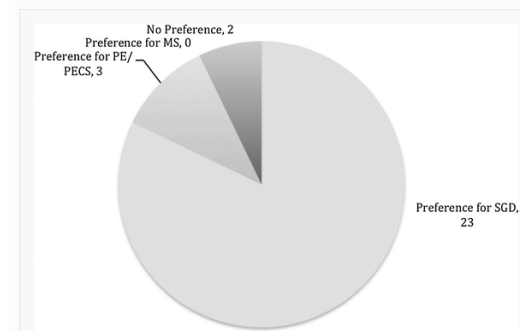


Fig. 2  
Participant device preference. Number of participants included in device preference assessments and the demonstrated preference between manual sign, picture exchange or the picture exchange communication system, and the iPad or iPod Touch as a SGD



## d) App use

iPad use in the classroom (King et al 2013)

- professional present: app function violated 16%
- participants independent: app violation 45%

Type of apps:

- Game apps 86% fulfilled
- Academic apps 71% fulfilled
- AAC apps 58% fulfilled
- although all six participants were virtually nonverbal, only used iPads as AAC 36% of the time

Lack of need or opportunity to use AAC was reported as the third highest factor related to inappropriate AAC abandonment (Johnson et al., 2006), and using an iPad® for multiple functions inherently prevents AAC availability

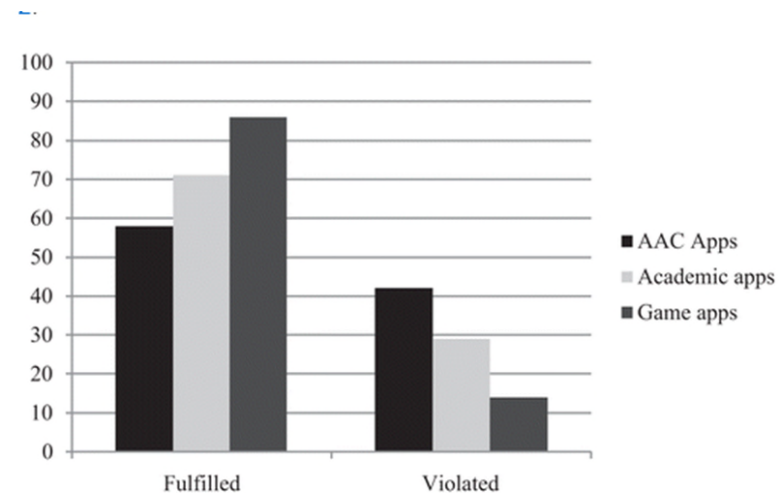


Figure 2. The percentage of app function fulfillment and violation within each app category.

# Specific Apps

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PECS III App compared to traditional PECS (Ganz et al 2013)

- 3 pre-school children, minimally verbal
- Clinical setting
- App mastery achieved for all
- 2 preferred app

# e) Child factors: Who is it most effective for?

Meta analysis single case studies (Ganz et al 2011, Ganz et al 2014) ) PECS, SGD, other picture system.

- Age: works for all but better for younger (moderate to large effects)
- Diagnosis: best outcomes for those without developmental disability (additional) effective, but least so, for those with multiple diagnoses (at least moderate effects) (2011) but opposite (2014)
- ASD alone: SGD>PECS (NB only 5 studies)
- ASD & ID: PECS>SGD>other
- Mode of AAC: aided better for younger

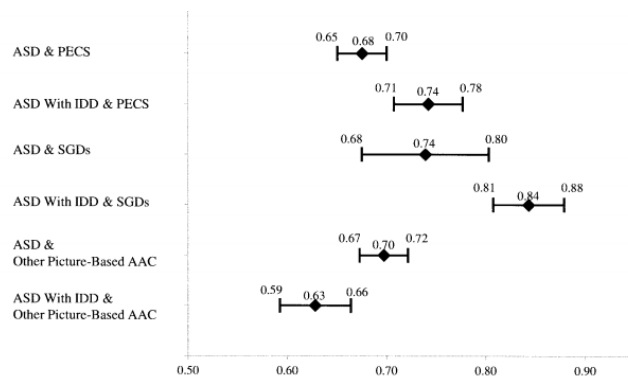


Figure 2. Forest plot of effect sizes disaggregated by disability category and type of augmentative and alternative communication (AAC). ASD = autism spectrum disorders; IDD = intellectual/developmental disabilities; PECS = the Picture Exchange Communication System; SGDs = speech-generating devices.

Table 2

IRD calculations and 84% confidence intervals for diagnostic categories and ages.

	IRD	CI
Participant diagnoses		
ASD	0.83	0.82–0.85
ASD & DD	0.70	0.66–0.74
ASD & MULT	0.53	0.44–0.62
Participant age ranges		
Preschool (age 5-years and under)	0.86	0.85–0.88
Elementary (age 6–10 years)	0.70	0.67–0.73
Secondary and older (age 11-years and older)	0.64	0.60–0.68

Diagnostic codes: AUT = autism/autistic disorder only (or only co-morbid with speech-language impairment); DD = developmental delay, developmental disability, mental retardation, cognitive/intellectual impairment; PDD = pervasive developmental disorder-not otherwise specified only; MULT = DD plus a sensory impairment.

2011

2014

# Promising .... but

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Most research related to:

- One function: Requesting
- One context: snack time
- One setting: School
- Task performance rather than participation in life


Use of small sample sizes – impact on identification any child/family/ educator factors, generalisability of results

In meta-analyses not always specified if SGD is a dedicated VOCA or utilising new tech

What about maintenance and generalisation of skills?

The needs of adolescents & adults: more than asking for food? (Holyfield et al 2017)

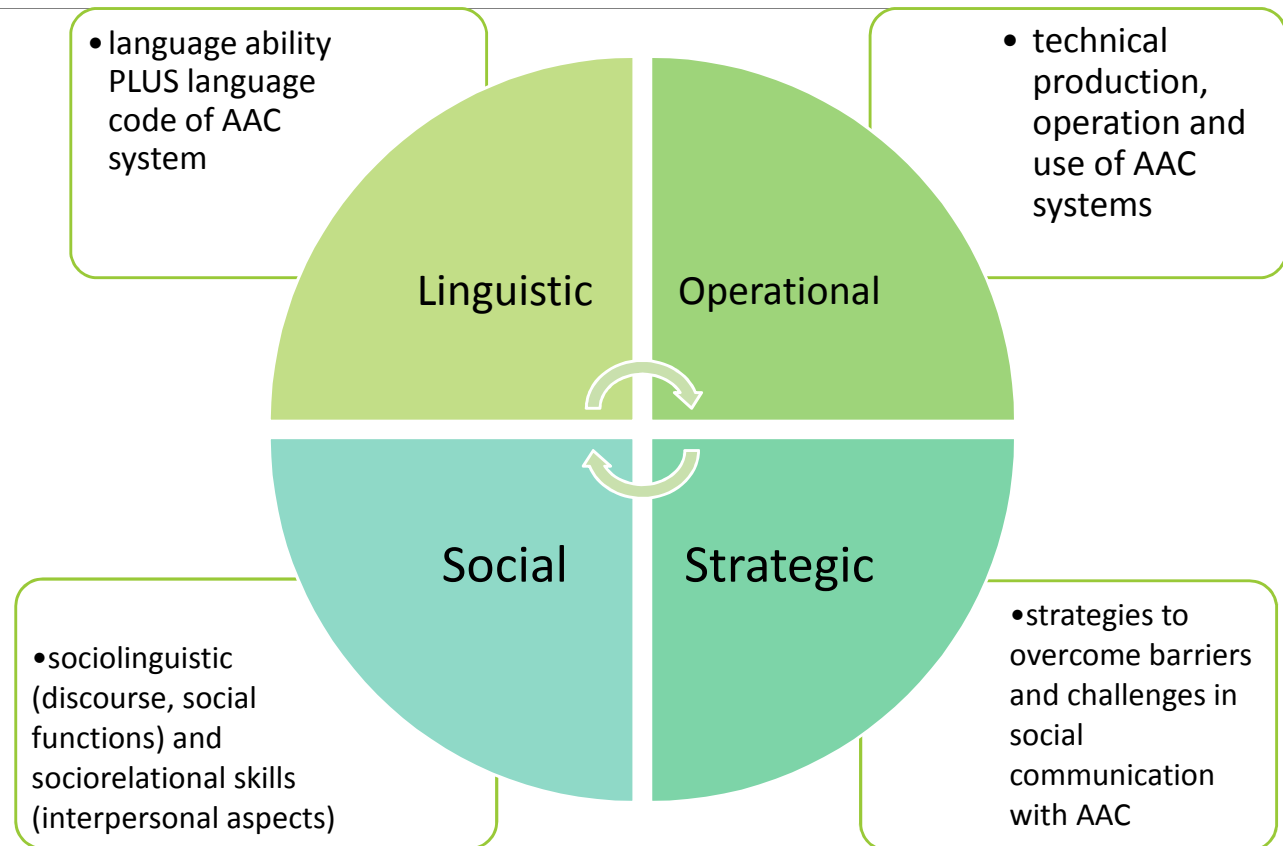
Child factors: Children are more than just a diagnosis...



### 3. AAC intervention in ASD: Communicative competence

*"– the state of being functionally adequate in daily communication and of having sufficient knowledge, judgment, and skills to communicate effectively in daily life."* (Light 1989)

Depends on knowledge, judgement & skills (Light & McNaughton 2016)



Light & McNaughton 2016





## 4. Challenging Behaviour:

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- Aggressive behaviour (verbal abuse, threats and physical violence)
- Destructive behaviour (breaking furniture and other objects)
- Disruptive behaviour (repetitive screaming, smearing faeces, spitting, non-compliance, running away)
- Self-injurious behaviour (SIB) (self-biting, head banging)

### Behaviour problems associated with

- limited social awareness:
  - wandering, destructiveness, tempers, aggressiveness, noisiness, hyperactivity, uncooperative, difficult public behaviours
- social awareness:
  - teasing, bullying, rebelliousness, pestering, lying

Significant impact on all concerned



# Risk factors in ASD

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- Risk factors
  - Younger age
  - Severity of autism?
  - Higher frequency of repetitive or ritualistic behaviour\*
  - Higher levels of impulsivity, hyperactivity, negative affect
  - Reduced levels of ability and **expressive language**\*\*
    - \* predicts severity
    - plus \*\* predicts greater significance in older children
- Sleep problems, anxiety and challenging behaviour positively assoc. (Rzepecka et al)
- Prevalence & persistence
  - 3 x more common in children with disabilities
  - One-third of children <6 years with ASD had CB in the Clinically Significant range (Hartley, Sikora, & McCoy, 2008).
  - Some severe behaviours are persistent over time e.g. SIB
  - BUT behaviours emerging in some young children can disappear over time

# Management

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## Positive Behavioural support

- **Understand** the behaviour: Functional Analysis
- **person-centred** approach - life history, physical health, emotional needs
- **proactive** and **preventative**, teaching new skills to replace behaviours that challenge e.g. Functional Communication Training
- **Combines perspectives** from different professionals
- *Non-contingent reinforcement*

## Medical & Pharmacological

- Physical Health
- Psychological health



The importance of understanding WHY a behaviour is occurring – rather than how to stop it

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**5 common functions of behaviour** (Durand & Carr, 1991)

**PAIN** must be ruled out as an underlying cause of behaviour

- To indicate the need for help and or / attention
- To escape from stressful situations or activities
- To obtain a desired object
- To protest against unwanted events / activities
- To obtain stimulation

**Most are *communication* related**

**NB:** In children with ASD often related to anxiety



# Proactive strategies

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- changing the environment
- promoting activity and occupation e.g. structured daily activities/ adjusting the school curriculum
- identify adaptations to a person's environment and routine:
  - strategies to help them develop alternative behaviours
    - **improved communication**, emotional regulation or social interaction
  - strategies to help them **understand** expectations and the environment
- identify preventive strategies to calm the person when they begin to show early signs of distress, including:
  - individual relaxation techniques
  - distraction and diversion onto activities they find enjoyable and rewarding

# Targeted strategies: Functional Communication Training

Meta-analytic review  
FCT 36 cases (Heath  
et al.)

Best effect in  
children

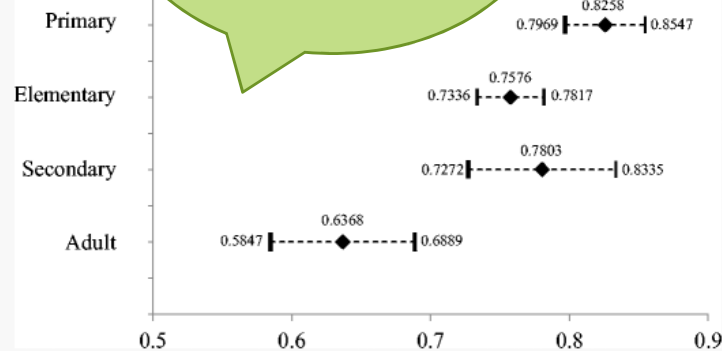


Fig. 2  
Robust improvement rate difference for age of participants

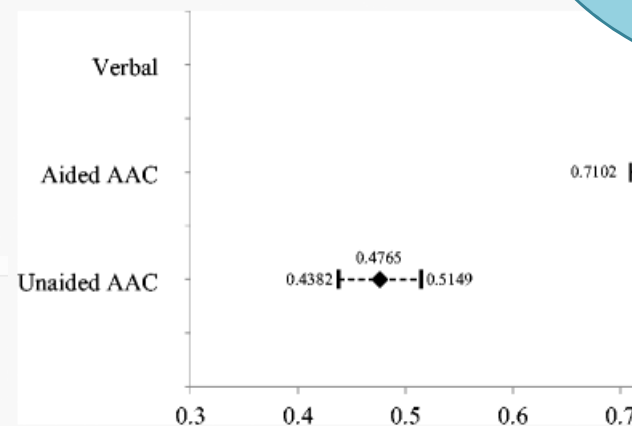


Fig. 1  
Robust improvement rate difference for mode of communication

FCT beneficial for CB but  
varies with mode of AAC,  
age and diagnosis

Best effect on  
challenging behaviour:  
Verbal > aided AAC >  
unaided AAC

Best effects  
for children  
with Autism

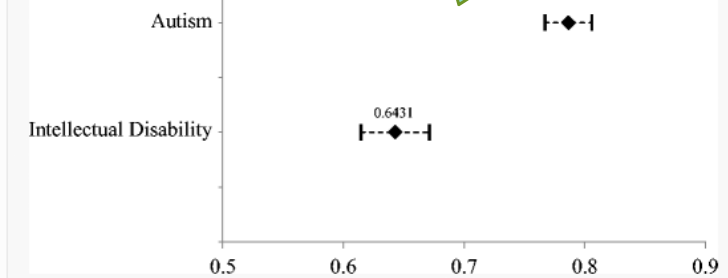


Fig. 3  
Robust improvement rate difference for disability



## 5. Decision Making in Practice

### To tech or not to tech...a tool not a panacea

- Decisions should be underpinned by good quality assessment of the CYP
- Utilise Light model of communicative competence, Positive Behaviour Support
- Select technology based on CYP needs, identify best instructional approach
- A focus on maintenance generalisation, total communication
- Consider proactive versus targeted approaches to challenging behaviour

#### Quality:

- Some systematic reviews & meta-analyses (small sample sizes)
- Narrow focus

Conclusions: technology can help, but likely dependant on child factors, preference, dedicated device?



- User preference for mode of AAC
- off task behaviour when unsupervised
- Parents are interested in technology

# Resources: AAC

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<http://www.callscotland.org.uk/downloads/posters-and-leaflets/ipad-apps-for-complex-communication-support-needs/>

shows Apps that CALL finds useful: reliable, relatively straightforward to use; reasonable/good value for money; and / or that stand out in their category for some reason.

<http://www.janefarrall.com/aac-apps-lists/>

Three star rating system, although definitions not located

[https://www.autismspeaks.org/autism-apps?tid\\_1=39881&tid=All&tid\\_2=All&keys=Evidence](https://www.autismspeaks.org/autism-apps?tid_1=39881&tid=All&tid_2=All&keys=Evidence)

Rated according to level of evidence

<http://www.researchautism.net/autism-interventions/types/behavioural-and-developmental/technology-based/apps/apps-publications>

# Resources AAC

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CODES Framework : <https://codesframework.wordpress.com/>

COMFOR : <https://ppw.kuleuven.be/pserg/comfor>

Supports identification of what is the most suitable form of augmented communication; and at which level can the means chosen be offered. Suitable for children and adults with a developmental level between 12 and 60 months

(Noens, Berckelaer-Onnes, Verpoorten, & Van Duijn 2006)



# Resources: Challenging behaviour

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Challenging Behaviour Foundation [www.challengingbehaviour.org.uk](http://www.challengingbehaviour.org.uk)



Positive Behaviour Support <http://pbsacademy.org.uk/>

NICE Guidelines:

<https://www.nice.org.uk/guidance/ng11>

<https://www.nice.org.uk/guidance/CG170/chapter/1-Recommendations#interventions-for-behaviour-that-challenges>



**NICE**  
National Institute for  
Health and Care Excellence

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