# Functional Communication using tablets with speech generating device for adolescent with autism: strengths and limitations

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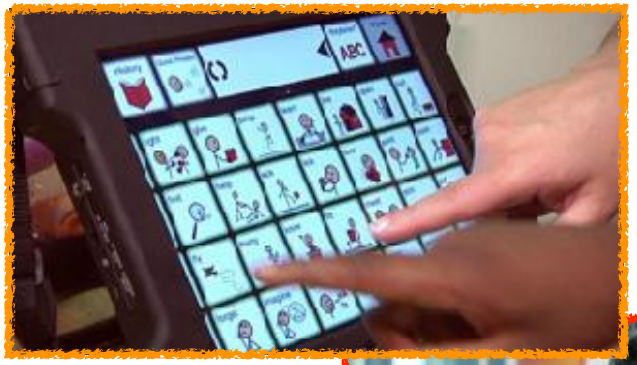
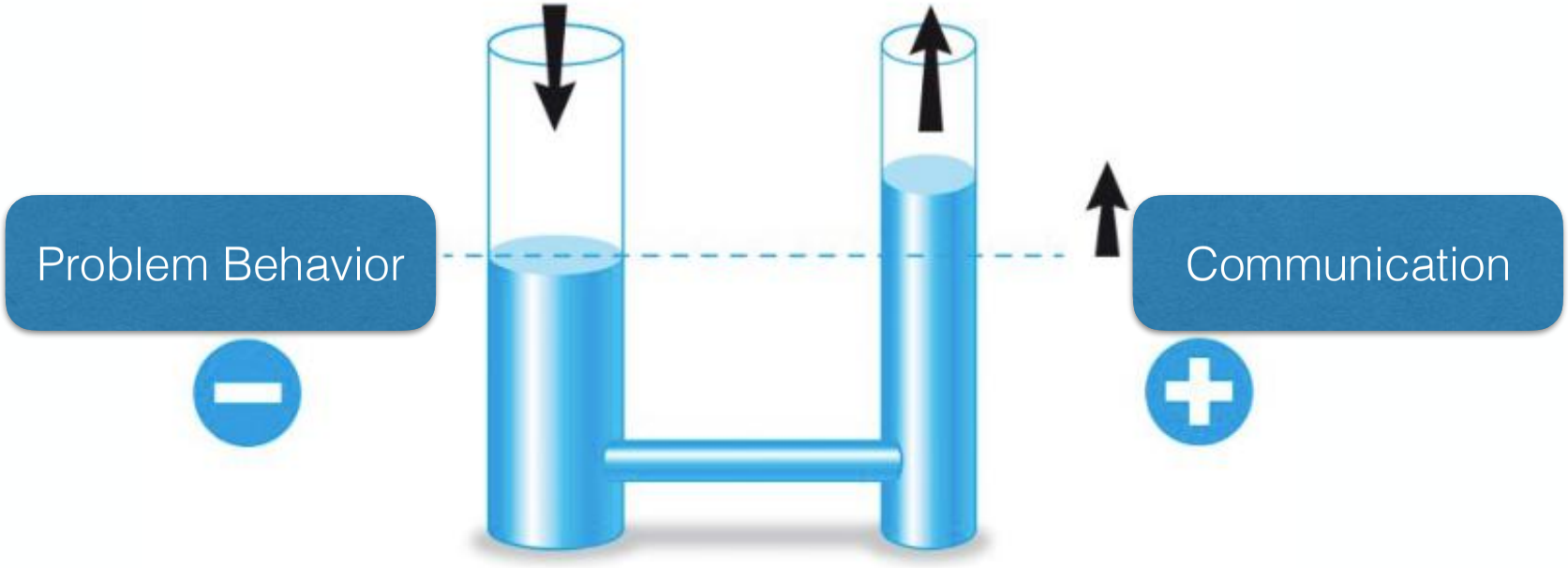


# Importance of communication

- Brings about desired changes or conditions
- Allows to control the social environment
- Allows to get what we want when it is wanted
- Allows to get rid of we don’t want when it is not wanted
- Social community is paired with the delivery of Reinforcement related to the MAND




Research has shown that mand training benefits individuals with autism in terms of decreasing challenging behavior (e.g., Durand 1999) and, in some cases, increasing speech production (e.g., Charlop-Christy et al. 2002).

Although the goal of many language training programs is to develop vocal verbal behavior, this can sometimes be a long and difficult process (Carbone et.al. 2010)

# if a child is non-vocal?

Augmentative and alternative communication (AAC) systems are often recommended for individuals with autism spectrum disorder (ASD) who have not developed vocal language or who have unintelligible or limited vocal speech (Romski & Sevcik, 1997; Sigafoos, Schlosser, & Sutherland, 2010).

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Since prompting spoken words is virtually impossible, Carbone (2001, 2004), McGreevy (2002) and Sundberg and Partington(1998), strongly recommend that an alternative be selected and implemented **immediately**:

- signs 
- manual or electronic selection of pictures, symbols or words  
- writing 
- typing 

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Within AAC, two broad categories exist, **aided** and **unaided** (Mirenda 2003).

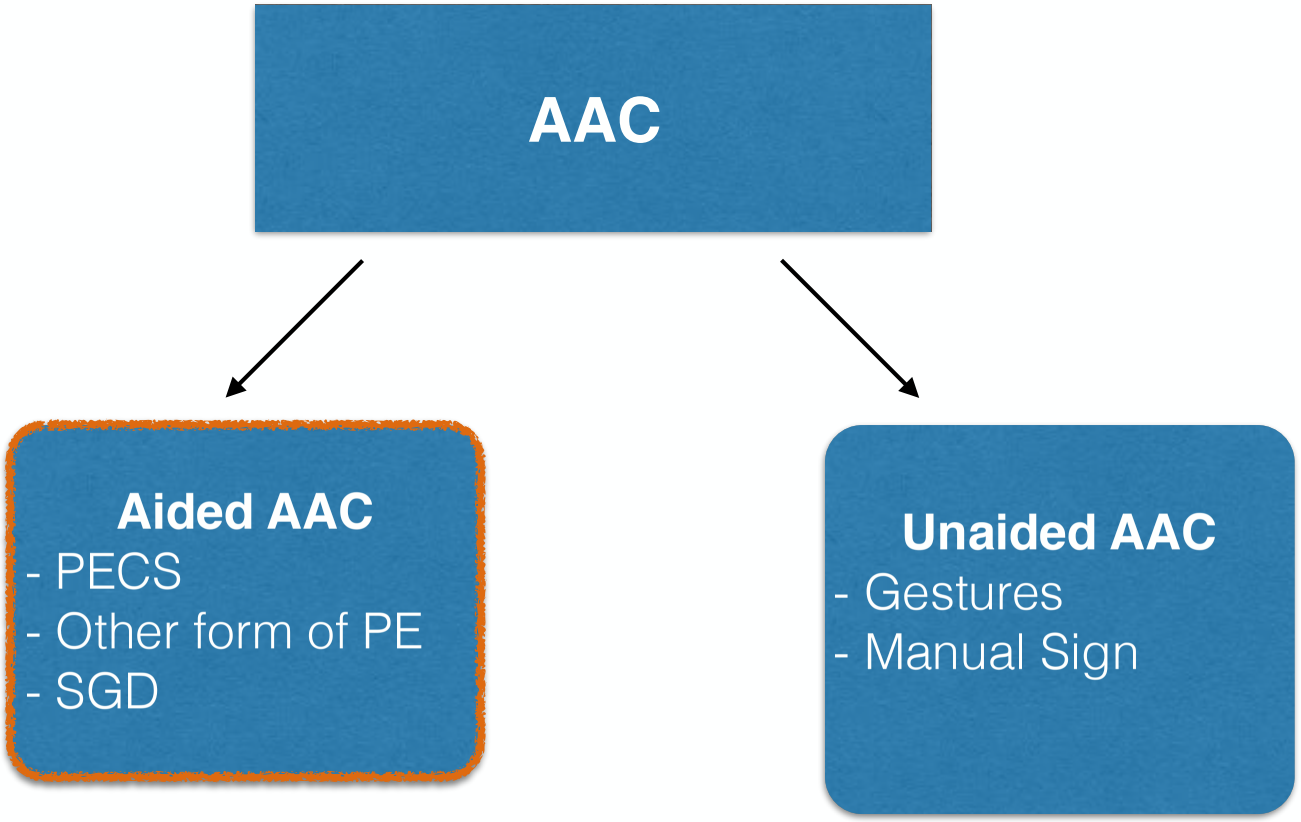
**Unaided** AAC does not require any equipment and includes manual *signs* and *gestures*.

**Aided** AAC the *Picture Exchange Communication System* (PECS) (Frost and Bondy 2002), *other forms of PE* (i.e. not implementing the PECS protocol), *speech generating devices* (also referred to as Voice Output Communications Aids, or VOCA) (Mirenda 2003)

Augmentative and alternative communication (AAC) systems, such as picture exchange (PE) and speech generating devices (SGD) have been shown to be effective in teaching individuals with autism to acquire a communicative (e.g., mand) repertoire (Goldstein 2002; Rispoli et al. 2010; Lancioni et al. 2007; Mirenda 2003).

PECS is an instructional system, which teaches aided communication through the exchange of graphic picture symbols (see Frost & Bondy, 2002).

Several studies have provided empirical support for the use of manual sign manding in producing a functional communication repertoire in the absence of effective vocal verbal behavior repertoires for children with developmental disabilities (see Schlosser & Wendt, 2008, for a review; Gregory, DeLeon, & Richman, 2009).




This presentation will be mainly focus on aided AAC

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let's step down from research for a moment

and let the behavioral provider climb up!

Rarely in my experience I have met adolescents or young adults with autism or intellectual disability **non-vocal** or with **severe articulation deficit** who use AAC systems of communication consistently even when those systems were introduced early in their life…

# Is Matching Law involved?

Formalized by **Herrnstein** (1961, 1970)

Basically, the rate of responding is proportional to the rate of reinforcement received from each choice alternative.

When similar reinforcement is scheduled for each of the concurrent responses, **the response receiving the higher frequency of reinforcement will increase in rate whereas a corresponding decrease will occur in the response rate of the other behavior.**

Said in other words:

When there are 2 possible responses that you can engage in, you'll engage in the one that has resulted in reinforcement more often

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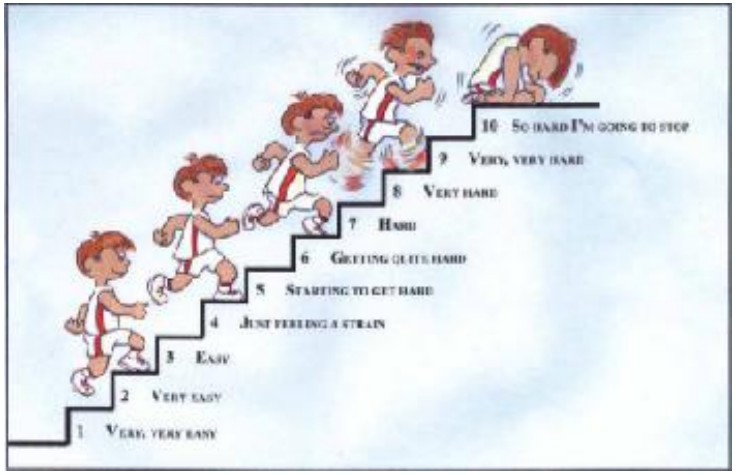
- 
ARRABBIATO
TRISTE
SORPRESO

# Response Effort




- Task Analysis of response: **13 steps**
- Time: **90 seconds**

# Response effort for caregivers

Update Communication Book

- Look for Picture
- Print Picture
- Plastify Picture
- Put Velcro

# this is not a presentation against PECS!

PECS met evidence-based criteria with 2 group design and 4 single case design studies. (Charlop-Christy, Carpenter, Le, LeBanc, & Kellet, 2002; Dogoe, M. S., Banda, D. R., & Lock, R. H., 2010; Ganz & Simpson, 2004; Howlin, P. et.al. 2007; Jurgens, A., Anderson, A., & Moore, D. W., 2009; Magiati & Howlin, 2003; Tincani, 2004, )

According to the evidence-based studies, this intervention has been effective for preschoolers (3-5 years) to middle school-age learners (12-14 years) with ASD.

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# My question

- The use of tablet as speech generating devices with adolescent and adult with autism can be more effective over a long period of time especially for those who will not develop vocal mand?

# Using SGD in  adolescent and young adults: possible….

- 

# First: What is a SGD?

SGDs can be defined as any low or high-tech electronic or computer-based device with a visual display that can be programmed to produce synthetic speech or recorded digitized speech (Sigafoos et al., 2011).

SGDs are electronic devices that rely on the speaker's pressing of a picture or text depicting the desired item or activity on an electronic screen with enough force to evoke a digitized SGD message (Lancioni et al. 2007).


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# Using SGD in adolescent and young adults: possible…


- Using a device such as a tablet as a SGD may be more normalizing and less stigmatizing for a person with a disability than a PE book.

- Tablets are common consumer product. *A child carrying and using an iPad may be viewed as quite typical.*

(Peluso 2012)

# Using SGD in adolescent and young adults: possible…


# Using SGD in adolescent and young adults: possible…


- The use of touch screen tablet technology has become widely accepted as part of the classroom-learning environment (Peluso 2012)
- More Social Validity?

# Using SGD in adolescent and young adults: possible….


- Because of the **voice output** of a SGD, gaining the listener's attention before communicating, or picture exchange, is not a necessarily part of communication training.

- Greater naturalness for listeners, greater social acceptability among peers, and decreased misunderstandings among unfamiliar listeners due to the precision of the messages *(Sigafoos et al., 2011).*

# Using SGD in adolescent and young adults: possible….


- Material more appealing
- Children with ASD may respond better to the game-like interface (Tincani and Boutot 2005).

# Using SGD in adolescent and young adults: possible….


- Every time a learner emits a specific SGD response, it results in an identical speech output from the SGD (e.g., pressing a cookie symbol always results in the output “cookie”).

- The consistent presentation of speech models might enable individuals to imitate speech output vocally without listener prompting.

let’s go back to science and reasearch!


**Comparisons** of the effects of PE systems and SGDs on the mand repertoire with persons with autism and intellectual disabilities have yielded mixed results, which is not surprising given differences between procedures and devices across modalities.

*Education and Training in Developmental Disabilities, 2005, 40(3), 264–278*


# Increasing Functional Communication in Non-speaking Preschool Children: Comparison of PECS and VOCA

Stacey Jones Bock, Julia B. Stoner, Ann R. Beck,
Laurie Hanley and Jessica Prochnow
Illinois State University

Bock et al. (2005) compared the relative effectiveness of two communication strategies (PECS and VOCA).

Acquisition rates of mands and of six four-year-old boys diagnosed with a developmental disability were measured.

Three children acquired mands using PECS at a slightly faster rate, while three children acquired mands using both devices at equal levels.

Generalization probes following training suggested that preferences for PECS or SGD varied among subjects and did not necessarily mirror acquisition data.

*Education and Training in Developmental Disabilities, 2008, 43(2), 198-216*


# Comparison of PECS and the use of a VOCA: A Replication

Ann R. Beck, Julia B. Stoner, and Stacey J. Bock
Illinois State University

Tom Parton
McLean County Unit 5 Schools

Beck et al. (2008) compared acquisition rates of mands using PECS and VOCA in four preschool children with developmental disabilities.

All four participants communicated more independently with PECS; ***however, participants were required to exchange and carry a 6×6 cm picture symbol in the PECS condition; while participants were required to carry a substantially larger and heavier SGD device during this condition. Therefore, it is possible that differential response effort confounded results in favor of PECS in this study.***

*Augmentative and Alternative Communication*, June 2009 VOL. 25 (2), pp. 99–109

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# A Comparison of Picture Exchange and Speech-Generating Devices: Acquisition, Preference, and Effects on Social Interaction

JEFF SIGAFOOS[a]*, VANESSA A. GREEN[a], DONNA PAYNE[b], SEUNG-HYUN SON[c], MARK O'REILLY[d] and GIULIO E. LANCIONI[e]

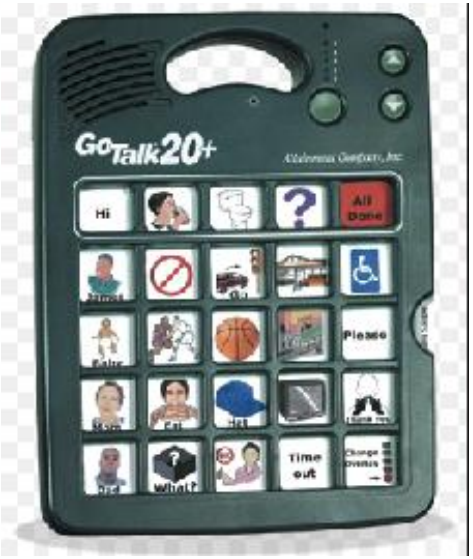
[a]*College of Education, Victoria University of Wellington, New Zealand,* [b]*School of Education, University of Tasmania, Australia,* [c]*Department of Education, Korea University, Seoul, Korea,* [d]*Department of Special Education, The University of Texas at Austin, USA, and* [e]*Department of Psychology, University of Bari, Bari, Italy*

Sigafoos et al. conducted **three studies** comparing PE and SGD for an adolescent boy with a developmental disability.

The results showed **equally rapid acquisition** of the PE- and SGD-based requesting response, but only the distancing manipulation had any positive effect on social interaction.

Concluded that PE and SGD are **equally viable modes** of communication, but acquisition of an initial PE- or SGD-based requesting response may not be sufficient to promote social interaction.

# At this point VOCA was used as SGD




VOCA is a light- weight, digitized AAC device with a built-in handle and static locations separated by a keyguard.

# From now on studies were conducted using SGD on tablets


*Augmentative and Alternative Communication*, 2012; 28(2): 74–84

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DOI: 10.3109/07434618.2011.644579

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INTERVENTION NOTE

# A Comparison of Communication Using the Apple iPad and a Picture-based System

MARGARET FLORES*, KATE MUSGROVE, SCOTT RENNER, VANESSA HINTON, SHAUNITA STROZIER, SUSAN FRANKLIN & DORIS HIL

*Auburn University, Alabama, USA*

Flores et al. (2012) compared acquisition of communication in five school-aged children with autism across picture exchange and the iPad as a SGD.

Results showed higher levels of manding in the iPad condition for three participants and equal levels of manding for iPad and PE for the other three participants. One limitation of this investigation was participants' previous training history with PE (Flores et al. 2012).

J Dev Phys Disabil
DOI 10.1007/s10882-013-9337-1

REVIEW ARTICLE

# Evaluating Picture Exchange and the iPad™ as a Speech Generating Device to Teach Communication to Young Children with Autism

Elizabeth R. Lorah · Matt Tincani · Jessica Dodge · Shawn Gilroy · Anna Hickey · Donald Hantula

In a 2013 study Lorah et al. found that **three** participants met mastery criterion for mands using the SGD more quickly, while **two** participants met mastery criterion for mands using PE more readily.

However, the overall **rate of independent manding across training and maintenance was higher for four participants using the SGD**.

**Four** participants demonstrated a clear preference for the SGD device and one for PE.

Findings differ from Bock et al. (2005) and Beck et al. (2008), who found that PECS was acquired at a slightly faster rate for the majority of participants.In previous comparison studies, the PECS protocol was used with both modalities. **Because the SGD device was substantially larger and heavier than pictures used during PECS training, differential response effort may have produced the higher levels of responding for PECS in these studies.**

J Autism Dev Disord
DOI 10.1007/s10803-014-2314-4

ORIGINAL PAPER

# A Systematic Review of Tablet Computers and Portable Media Players as Speech Generating Devices for Individuals with Autism Spectrum Disorder

**Elizabeth R. Lorah · Ashley Parnell · Peggy Schaefer Whitby · Donald Hantula**

Lorah et al. (2014) reviewed 17 studies that evaluated the use of handheld computing devices or portable multimedia players as a SGD, in the acquisition of verbal behavior (communication repertoire) for individuals diagnosed with ASD or a related disability (i.e., ID).

**53 of the 57 total participants (93 %) acquired the ability to communicate using the iPod or iPad as a SGD**. With regard to the teaching strategies, a multitude of methods have been used (i.e., physical prompting, time delay prompting, graduated guidance, etc.) with no clear method of instruction emerging as preferred or more effective.

J Autism Dev Disord
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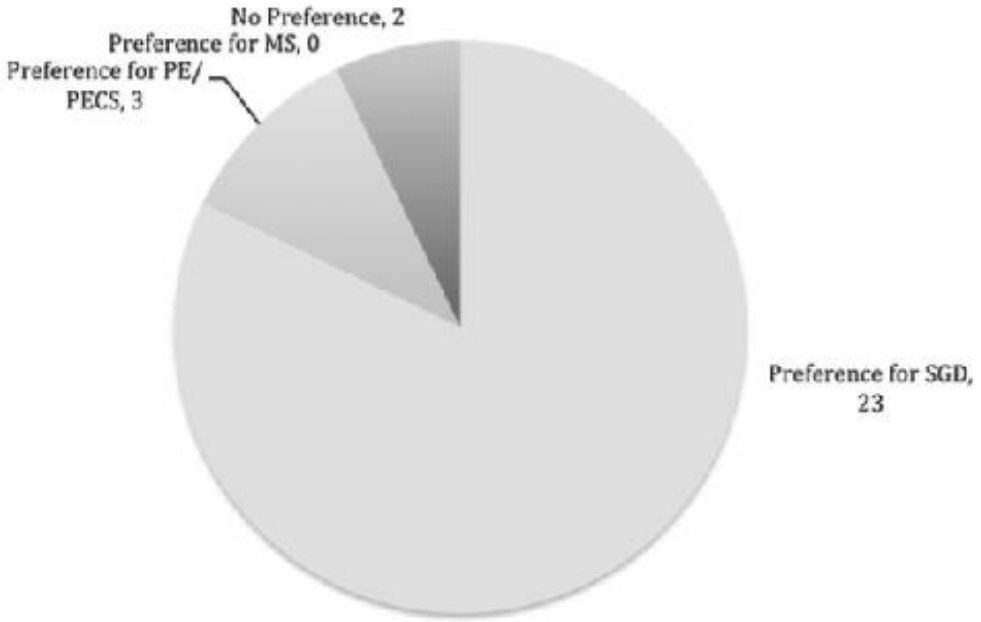


**Fig. 2** Participant device preference. Number of participants included in device preference assessments and the demonstrated preference between manual sign, picture exchange or the picture exchange communication system, and the iPad or iPod Touch as a SGD

19 participants involved in this research were exposed to a **device preference measure** following completion of the training;

**16 of the total 19 participants demonstrated a preference for the SGD**, one for PE, and two did not present a preference for any device.

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J Autism Dev Disord
DOI 10.1007/s10803-014-2314-4

ORIGINAL PAPER

# A Systematic Review of Tablet Computers and Portable Media Players as Speech Generating Devices for Individuals with Autism Spectrum Disorder

Elizabeth R. Lorah · Ashley Parnell · Peggy Schaefer Whitby · Donald Hantula

**Eight** studies have offered **a comparison of the iPad or iPod Touch as a SGD to other modalities of communication.**

Studies comparing these devices to picture exchange or manual sign language found that **acquisition was often quicker** when using a tablet computer.

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Although a primary purpose of AAC is to increase functional communication by supplementing or replacing vocal speech (Light, Beukelman, & Reichle, 2003; Schlosser & Wendt, 2008), researchers have suggested that AAC interventions also have the **potential to increase vocal speech** (Blischak, Lombardino, & Dyson, 2003; Schlosser & Wendt, 2008).

**Increasing target vocal word** approximations emitted in conjunction with SGD responses may, however, be an important first step for individuals with limited vocal speech.

The establishment of these vocalizations provides a basis for **shaping vocal mands** (i.e., requests; Skinner, 1957).

Shaping mands in the context of an SGD intervention may be beneficial because the clarity of the SGD output can help to **ensure that the response can be understood by a wide range of listeners** (Schepis & Reid, 2003).

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A review of the literature suggests that **AAC interventions are not likely to hinder vocal speech.**

However, these interventions alone may not facilitate gains in vocal speech (Ganz, Davis, Lund, Goodwyn, & Simpson, 2012; Gevarter et al., 2013a, 2013b; Millar, Light, & Schlosser; 2006; Schlosser & Wendt, 2008; van der Meer & Rispoli, 2010).

In particular, vocal speech gains may be less likely when individuals **lack sufficient vocal imitation skills** (Gevarter et al., 2013a; Schlosser & Wendt, 2008).

It has been suggested that in comparison to AAC systems without speech output, **SGDs might provide particular advantages for increasing vocal speech** (Blischak et al., 2003; Kasari et al., 2014; Schlosser & Wendt, 2008).

Researchers have hypothesized that the **simultaneous presentation of visual representations (e.g., pictures) and audio representations (i.e., speech output) may aid in the acquisition of vocal speech** (Blischak et al., 2003; Kasari et al., 2014; Schlosser & Wendt, 2008).

Few studies have investigated the relation between SGDs and the development of natural speech production or vocalization

SGD interventions that do not specifically target (e.g., prompt and reinforce) vocalizations have shown mixed results (Gevarter et al., 2013a; Schlosser & Wendt, 2008).

For some individuals, instructional strategies that specifically target vocalizations may be necessary to produce vocal speech gains during SGD intervention (Gevarter et al., 2013a; Sigafoos et al., 2009).

However, to date only one study have examined the effects of combining SGD and vocal language interventions for individuals with ASD who have limited communication skills (Gavarter et al. 2016).

JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2016, 49, 17–33 NUMBER 1 (SPRING)

# *INCREASING THE VOCALIZATIONS OF INDIVIDUALS WITH AUTISM DURING INTERVENTION WITH A SPEECH-GENERATING DEVICE*

CINDY GEVARTER, MARK F. O'REILLY, MICHELLE KUHN, KASEY MILLS, RAECHAL FERGUSON, AND LACI WATKINS

UNIVERSITY OF TEXAS AT AUSTIN

JEFF SIGAFOOS

VICTORIA WELLINGTON UNIVERSITY

RUSSELL LANG

TEXAS STATE UNIVERSITY

LAURA ROJESKI

UNIVERSITY OF TEXAS AT AUSTIN

AND

GIULIO E. LANCIONI

BARI UNIVERSITY, ITALY

For **three of four participants**, the addition of vocal language instructional methods to an SGD-based intervention resulted in an **increase in independent vocalizations**.

we tried!

The focus of our study was to investigate the possible relation between the introduction of the Ipad based SGD and the number of different and new Mands emitted for two adolescent with autism.

Additionally we investigate the effects of the introduction of a SGD on their vocal mands

# Participants

two boys with autism, all male. At the moment of intervention:

**David** 13 years old, received 10h per week of home-based instruction and 4h per month of behavior supervision

**Giorgio** 13 years old, received 4h per week of center-based instruction, 1h per week of individual speech therapy and 1h per month of behavior supervision

Humanas Actiones Intelligere

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# Participants

Although both participants presented mand skills in the second level of the VB-MAPP assessment they also presented **defective articulation.**

In the VB-MAPP Barrier Assessment they scored moderate barriers (score of two). In particular their vocal mands are hardly understood by strangers.

Both participant received Pecs training in the past and were able to discriminate between pictures.

# Materials ans Settings

The SGD training materials were an iPad and the **application Pecs Phase 3 for IPad**. Pictures were 2cm size and preferred item were represented either with symbols provided with the application, photo taken with the Ipad or pictures downloaded from internet.

David: Sessions were conducted at **home** either with therapists and parents in different rooms of the house.

Giorgio: Sessions were conducted in a room of the **after school center** with therapist.

# Applications used in research mentioned

- Pecs on apple iPad
- Proloquo2go
- GoTalk Now


# PECS Phase III 4+

Pyramid Educational Consultants, Inc

★★★★☆ 8 Ratings

$2.99

## iPad Screenshots



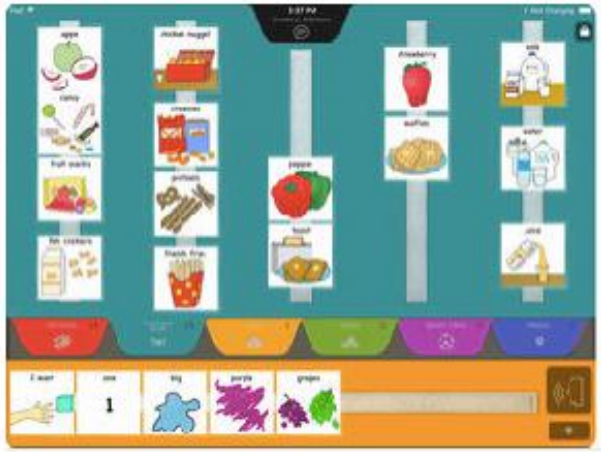
## App Store Preview

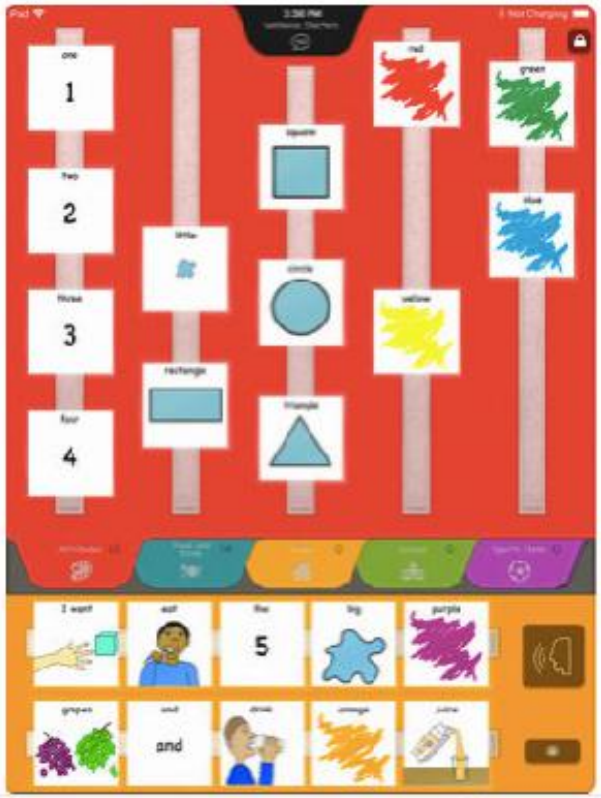

# PECS IV+ 4+

Pyramid Educational Consultants, Inc

$49.99

## iPad Screenshots





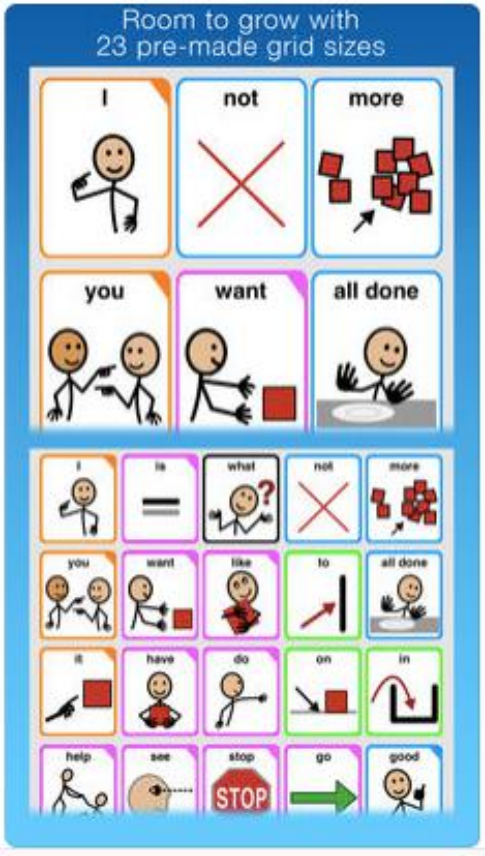
# Proloquo2Go 4+

AssistiveWare

279,99 € • Offre acquisti in-app

## Istantanee

iPhone iPad Apple Watch



# GoTalk Now

4+

Attainment Company

89,99 € • Offre acquisti in-app

## Istantanee iPad



# Dependent Measures

## % of independent vocal mands

Vocal independent mand was defined as the participant saying clearly the word or a sentence of 2 or more words related to the item he was manding.

## % of independent mand with SGD

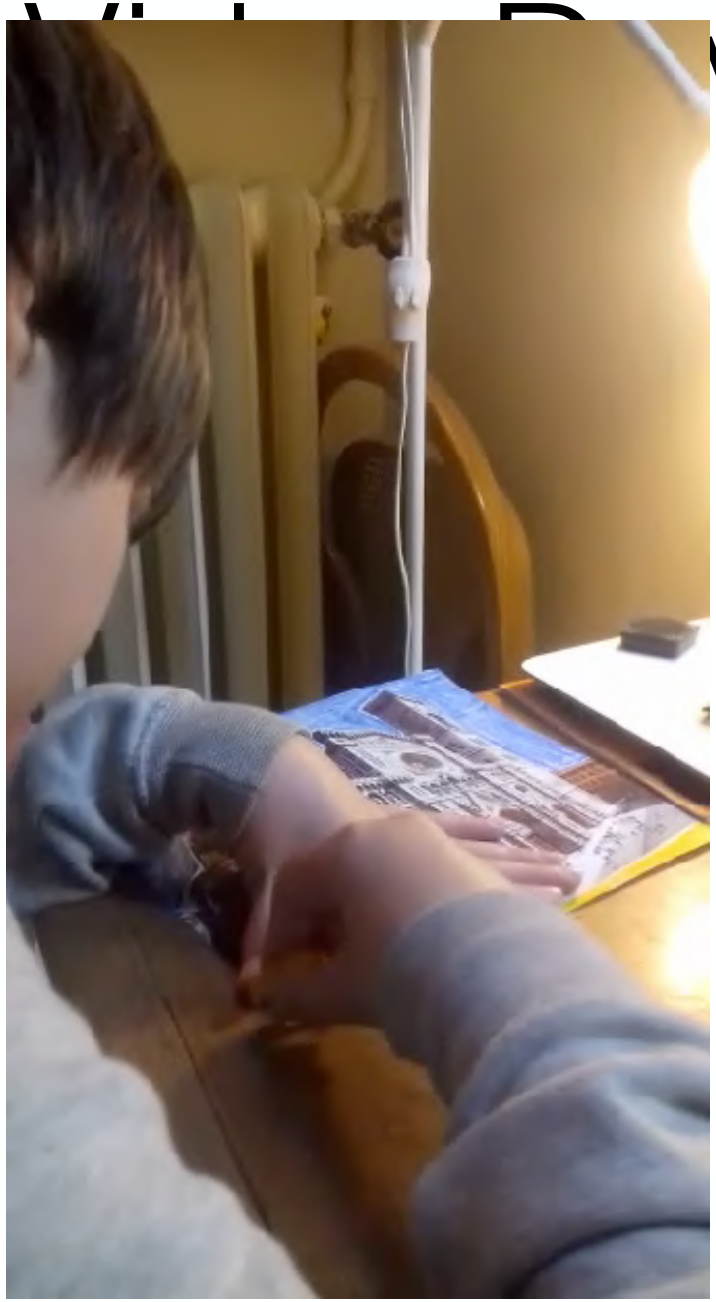
An independent mand with SGD was defined as the participant discriminating among other pictures and touching the picture on the screen of the iPad depicting an item with enough force to evoke the digitalized SGD output without gestural, verbal, or physical prompts (Lorah et al. 2013) and

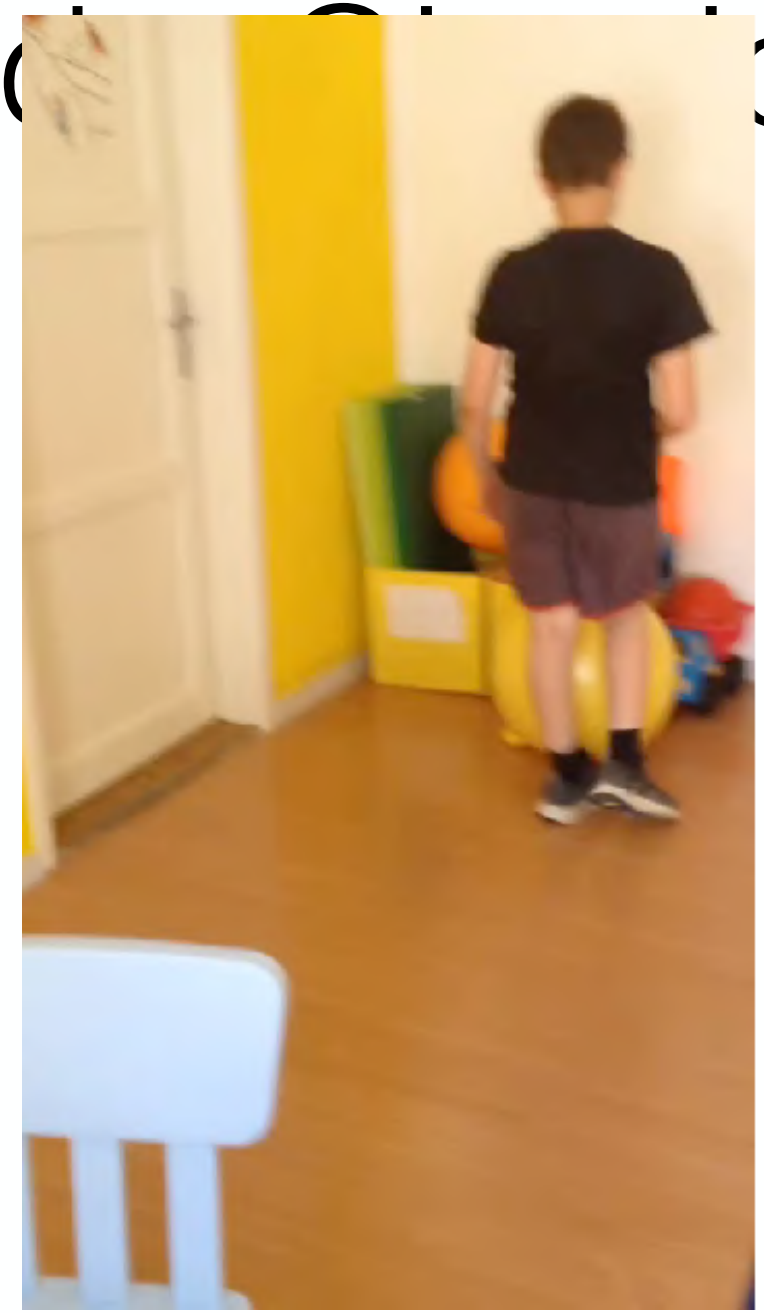
## % different mands

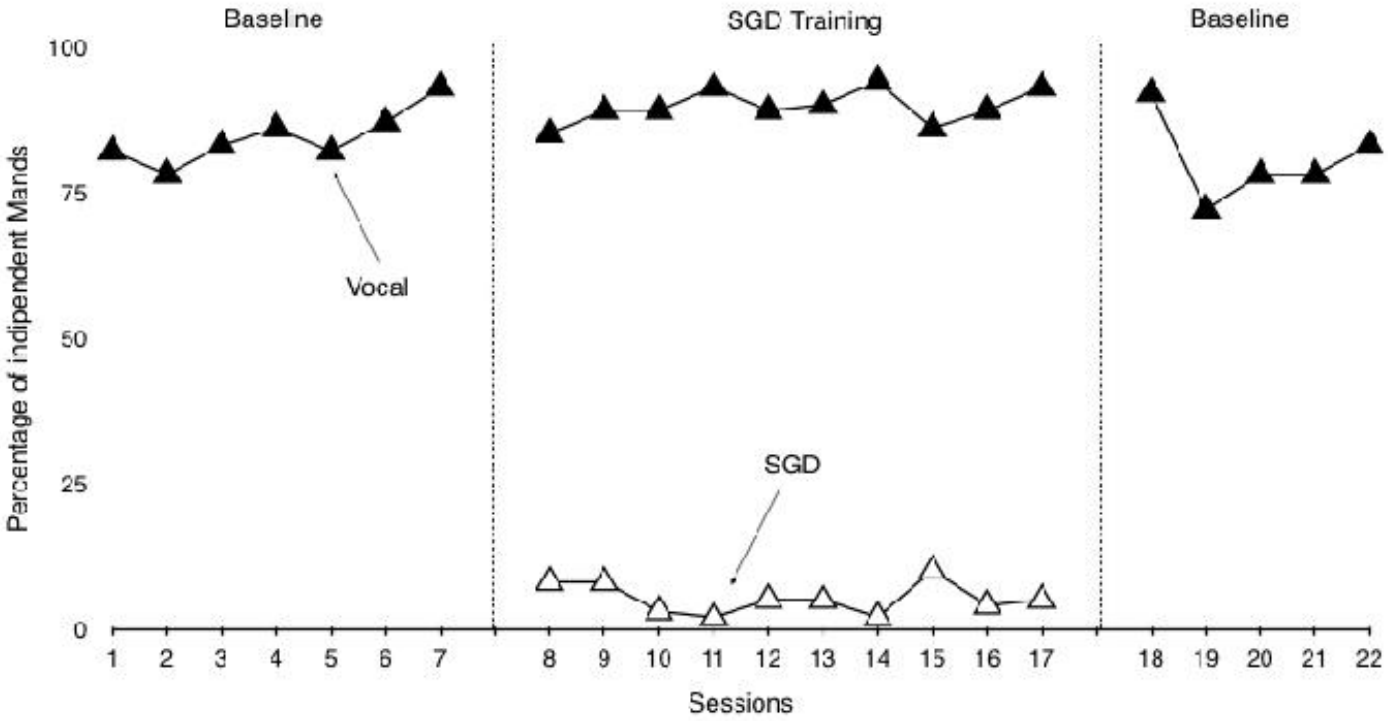
The number of different mand was defined as the number of different items requested independently during each session. We then calculate the % overall the total number of Mands.

## N° of new mands.

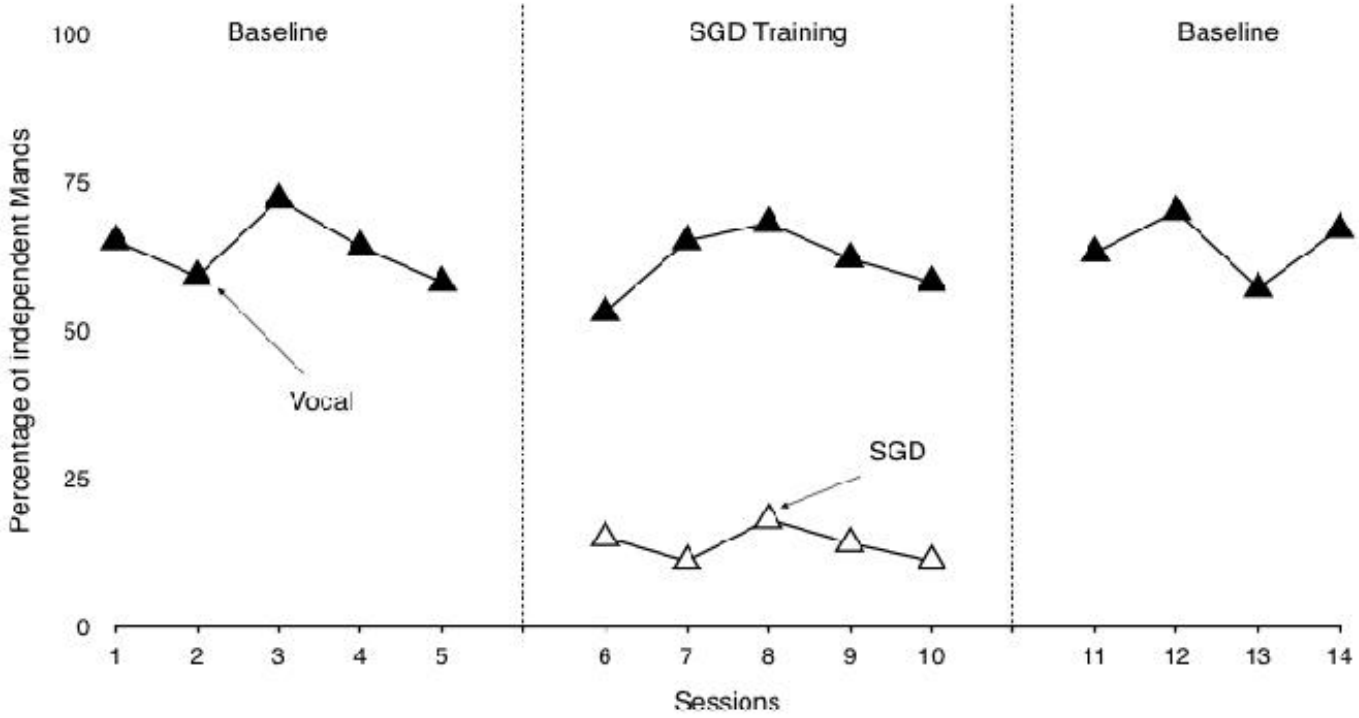
The number of new independent mands was defined as the number of item never asked in previous sessions.








David




Giorgio

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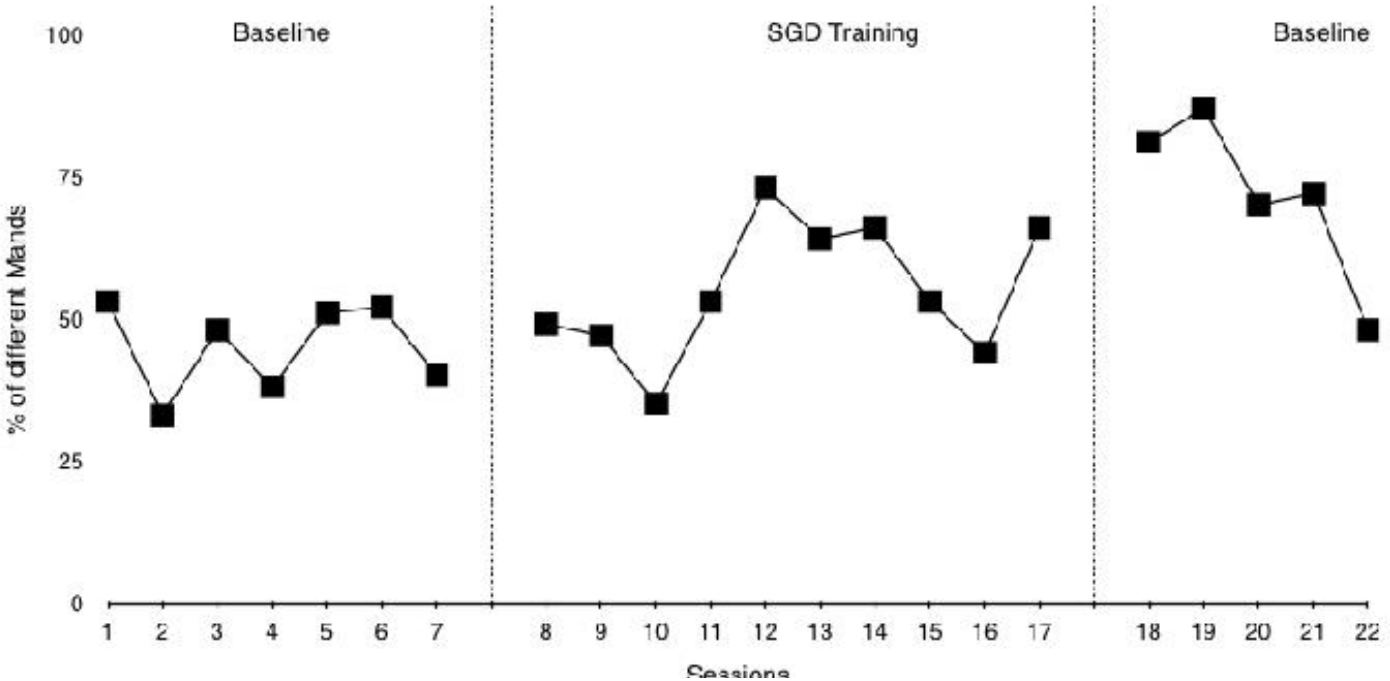
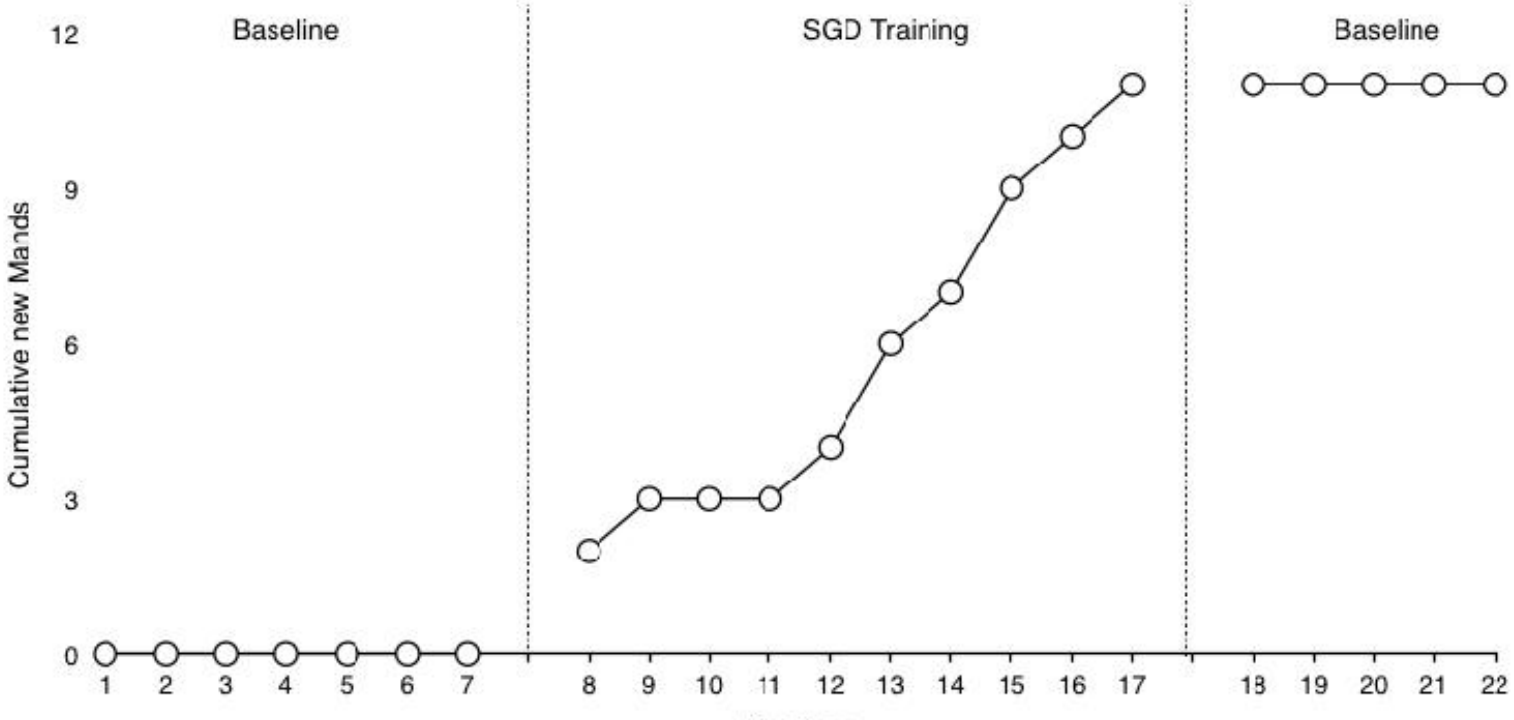
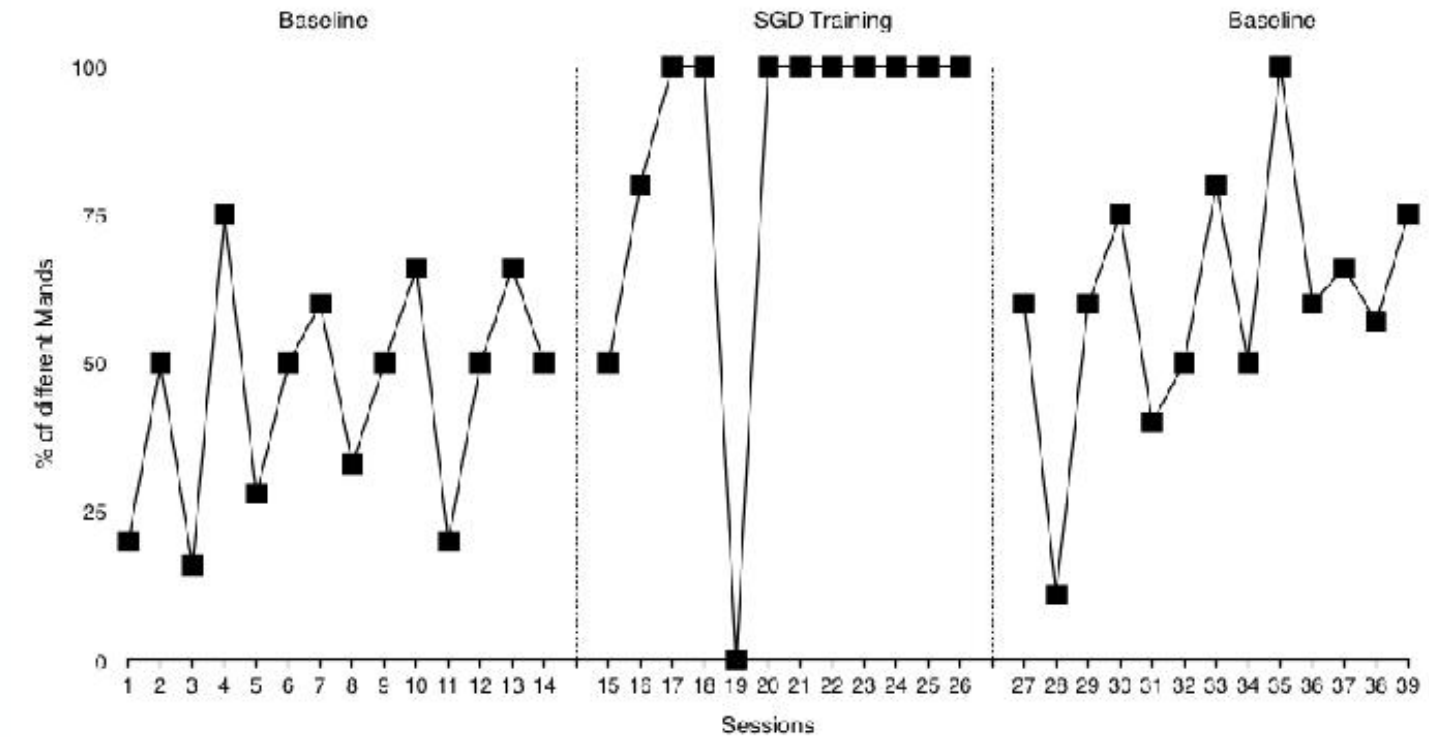
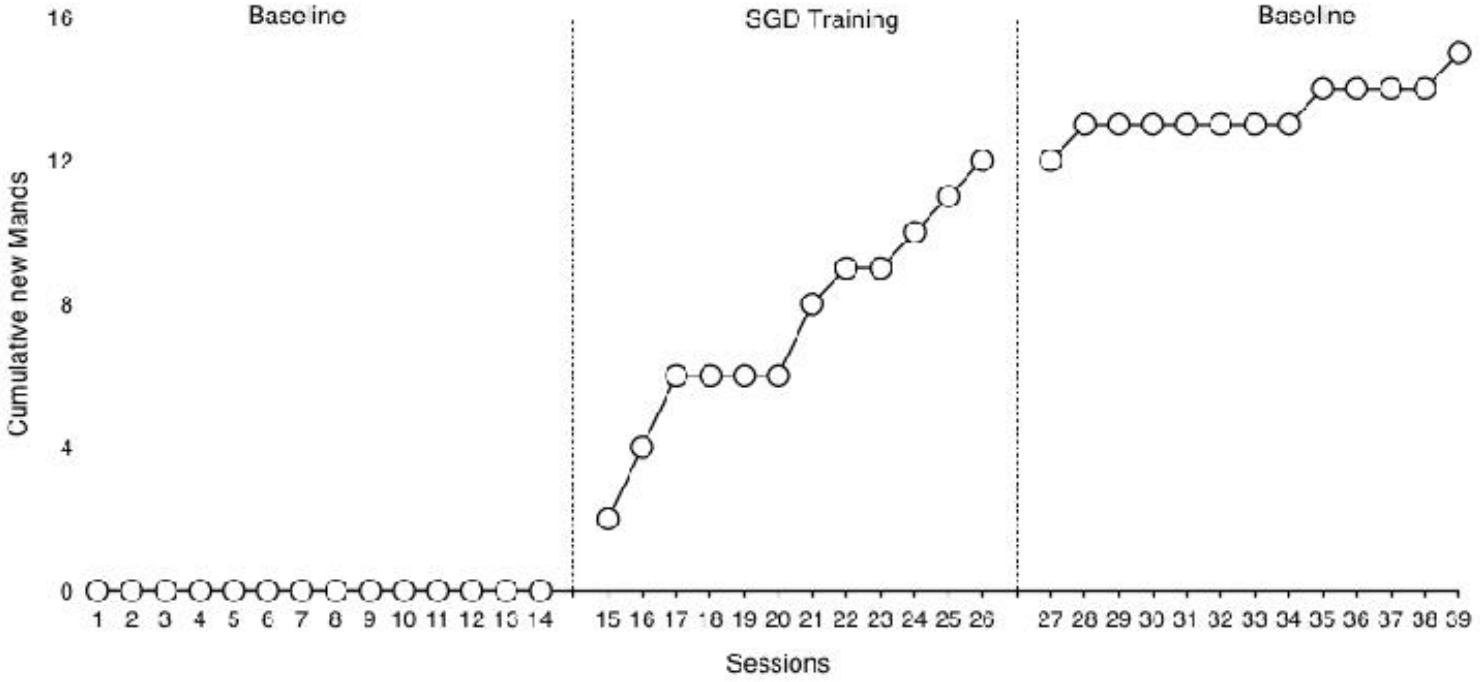
# David with therapists






David with parent

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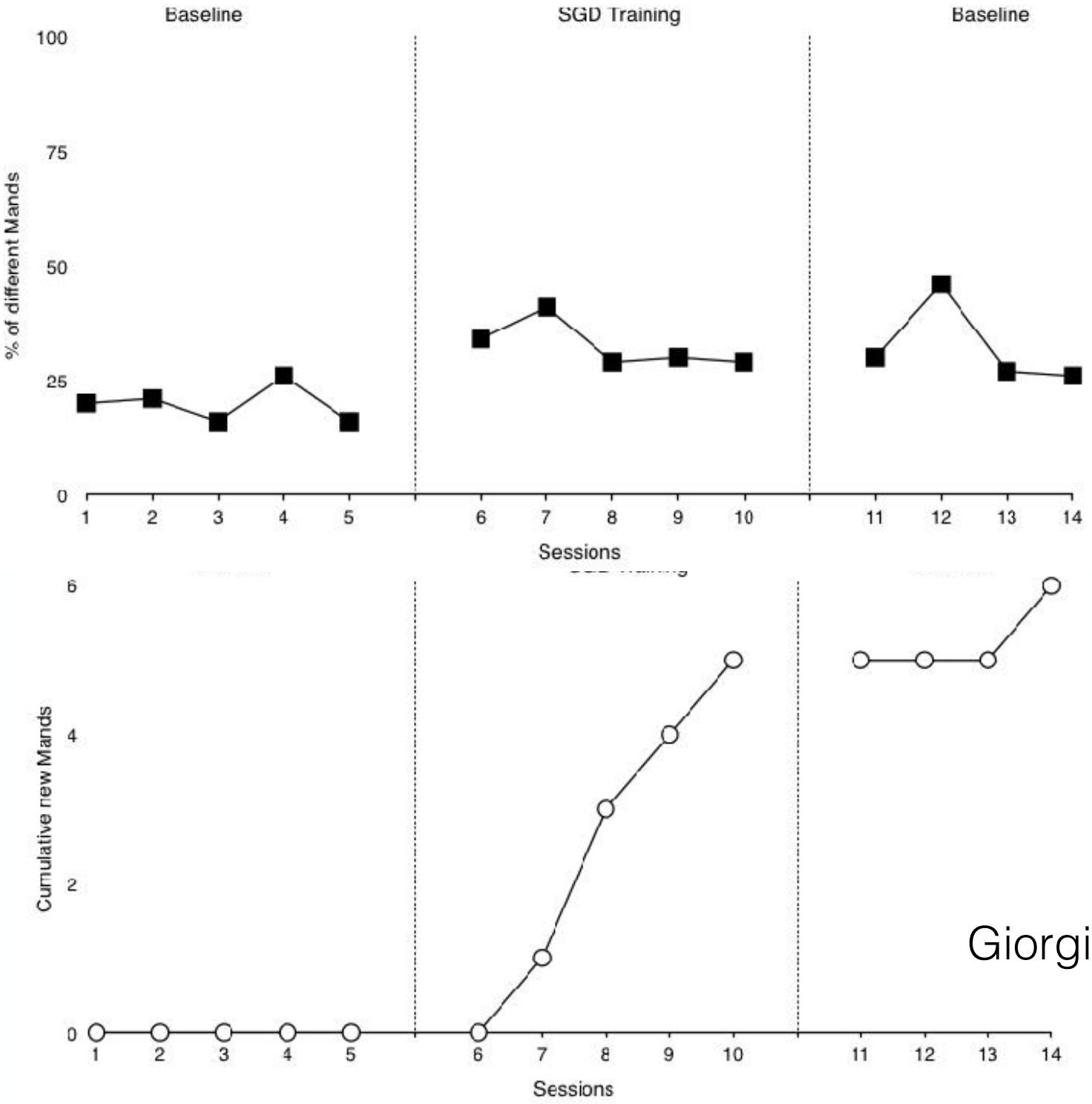



Giorgio with therapist

# Discussion

For both participant the introduction of SGD did not inhibited the production of vocal Mands.

Both participant preferred to communicate through vocal Mand than SGD during training condition

Both participant generated more new Mands (items never asked before) during the SGD training condition.

The relation between the introduction of the SGD training and the number of different items requested was not clear.

# Conclusion

As suggested by previous research the influence of the AAC on language could be individual

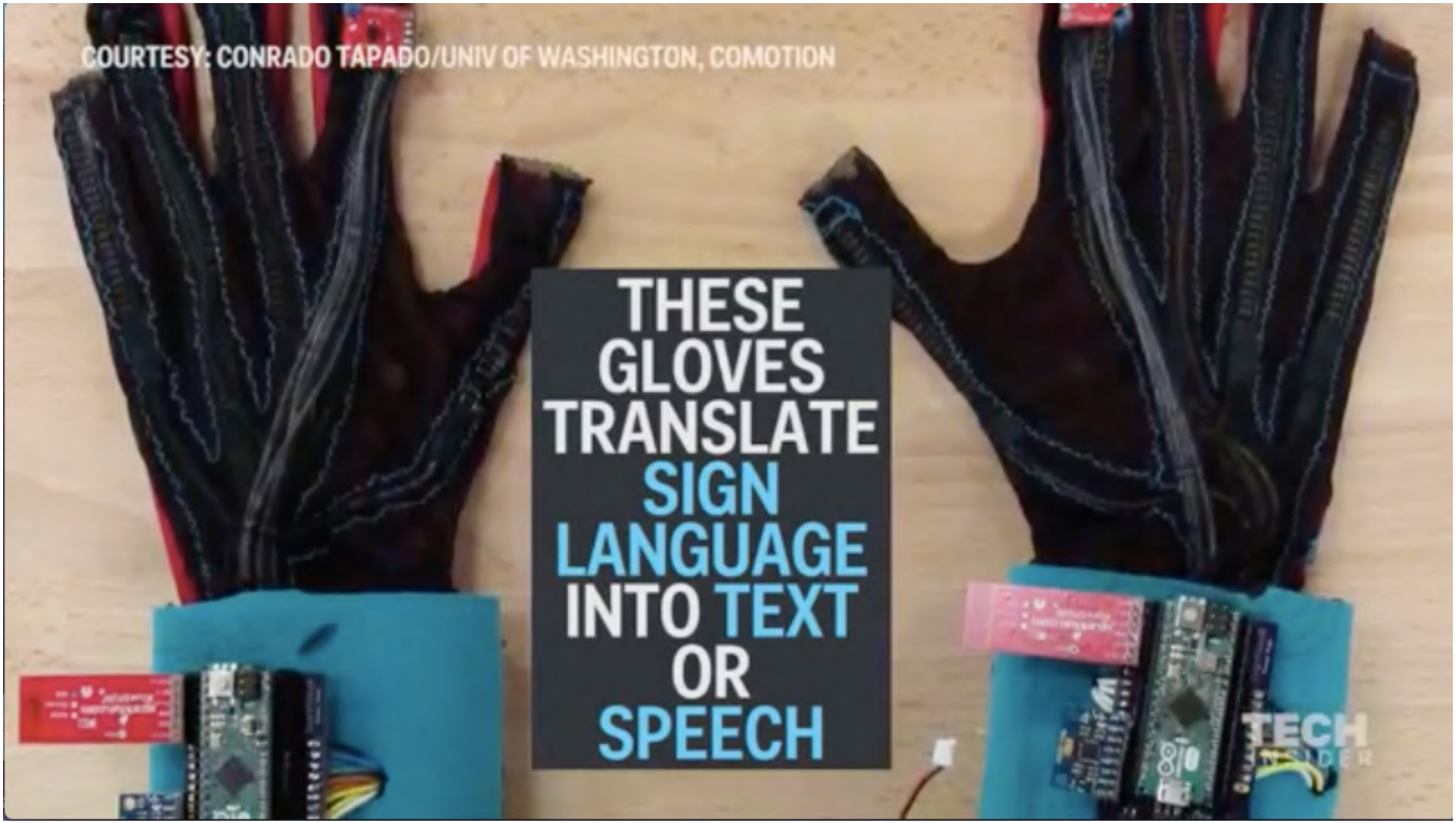
The SGD may function as an operating motivation and SD for certain reinforcer. This may have influenced the emission of new Mands.

Further investigation could examine if the introduction of a SGD can improve defective articulation and closer approximation of words.

# But…

*"Regard no practice as immutable. Change and be ready to change again, Accept no eternal verity, Experiment"*

(Skinner, 1979, p. 346)


COURTESY: CONRADO TAPADO/UNIV OF WASHINGTON, COMOTION
THESE GLOVES TRANSLATE SIGN LANGUAGE INTO TEXT OR SPEECH

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