Aided Language Development

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Gayle Porter - Disclosure

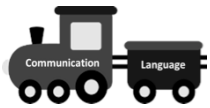
- Co-founder and consultant - CPEC Melbourne, Australia
- Private Speech pathology practice
- Developer, Copyright & Trademark owner of PODD communication system resources
- Receives royalties from sales of PODD resources
- Honorariums for trainings on a range of topics

Language

- Language is made up of socially shared rules that include the following:
  - What words mean (e.g., "star" can refer to a bright object in the night sky or a celebrity) - Semantics
  - How to put words together (e.g., "Peg walked to the new store" rather than "Peg walk store new") – Syntax
  - How to make new words (e.g., friend, friendly, unfriendly) Word morphology
- Language may be in a variety of forms
  - Spoken language (speech)
  - Written language
  - Sign language
  - Graphic symbol / pictograph language

"Communication is the engine that drives language"

Martine Smith (2003)



- The purpose of language is to enable us to understand others and be understood
- The ability to use language is important in terms of how it enables us to meet our varied communication requirements

Language supports communication

Autonomous communication

Being able to say

whatever I want to say,

to whoever I want to say it to,

whenever and wherever

I want to say it

However I choose to say it

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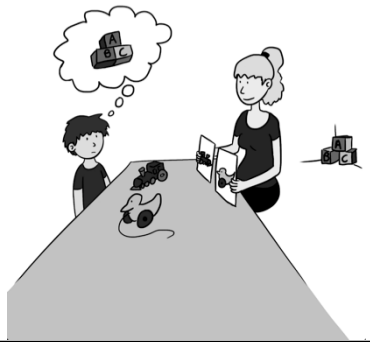
What is Autonomous communication?

- Autonomous communication is different from
  - Choice-making
    - select preference – other person's options
  - Answering Yes/No
    - agree / disagree other person's idea
- Autonomous communication originates in the thought of the speaker (said)

Whose message is it?



Whose message is it?

Whose message is it?

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Communication Autonomy

Autonomous communication is not necessarily sophisticated or complex language

Need to be able to communicate in the words you're thinking

Autonomous communication is
not the necessarily independent

Another person may have a role in operating the system to enable an individual to "say what they want to say".

Autonomous Communication: need to generate own messages in own words

- Need to select own words to express autonomous messages
  - Spelling to generate own words
  - Whole word / symbol AAC systems
    - Degree of autonomy will be influenced by the size and diversity of the vocabulary pool
    - Larger the pool the more likely it is that the word I'm thinking will be there
    - Efficient organization supports more frequent autonomous communication

Communication Accessibility

There are people in the social environment who

- understand the alternative communication form
- can scaffold it in the acquisition period
- are able and willing to communicate in a manner that gives the individual maximal communicative autonomy.

(von Tetzchner & Grove 2003)

Purpose of AAC

To enable the person to meet all of his/her varied **communication requirements** as

- intelligibly
- specifically
- efficiently
- independently
- in as socially valued a manner as possible

To understand others and to be understood.

Porter, 1997

We need cognitive clarity on the purpose(s) of aided language for each individual

- To support understanding
  - Individuals who have significant challenges understanding spoken language forms
- To support to individual to autonomously express themselves (spoken language functions)
- To produce written language (text)

When someone requires AAC to support understanding

Partners need to approach every interaction with the questions

- How can I support you to understand my message?
- What modalities can I add to my speech to support your understanding?
  - Demonstration
  - Gesture
  - Objects of reference
  - Sign language
  - Aided language (graphic symbols, written text)

Problem-solve how each individual can meet their varied communication requirements

- **To understand others & express self**
- Full range of
  - Purposes (e.g. ask questions, complain, comment)
  - Messages, topics
  - Social roles (e.g. student, sister, friend, employee)
  - Partners
  - Environments and physical positions
- **Express individual personality**

Multi modal communication

- We all use multiple modes to communicate.
- Choose the most effective method to "get our message across"
- Different modes of communication may be more or less effective to communicate
  - different types of messages
  - in different situations
  - with different partners

Multi-modal communication

"an individual does not abandon simpler strategies in the march towards independence. Instead the individual acquires more and more sophisticated communication methods to add to an existing repertoire."

Blackstone & Hunt Berg, 2003. p. 15

"the function of communicative abilities is to solve communicative challenges."

von Tetzchner & Grove, 2003 p.14

Multi-modal communication

- Communicators focus on the function and content of the message, with the form decided in relation to it's effectiveness at transmitting the message in a given situation.
- Evaluated in terms of effectiveness (or potential) at enabling the individual to meet their varied communication requirements as
  - intelligibly
  - specifically
  - efficiently
  - independently
  - in as socially valued a manner as possible
- Personal preference also influences mode

Everyone uses AAC !

We all use AAC when external or internal constraints limit the effectiveness of our spoken language.

Over distance

Noisy bar

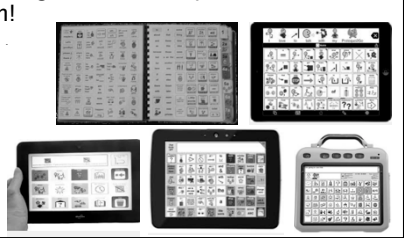
International travel

Laryngitis

Internal constraint

Complex Communication Needs

- Effectiveness of spoken language (gesture) more frequently limited
- Worth investing in a more sophisticated AAC system!



Communication competence for people who use AAC (Light, 2003; Light & McNaughton, 2014)

Sufficient knowledge, judgment and skill

- linguistic competence (language)
- operational competence
- social competence
- strategic competence

Psychosocial factors

- Motivation
- Attitude
- Confidence
- Resilience

Habits to support autonomous communication

- Routinely ensuring the AAC system is readily available for use ALL THE TIME
  - Prepared for communication AT ANY TIME
- Providing enough time and opportunity for the person to communicate their own message in the manner / words they prefer

"Ultimately, the goals of AAC intervention must be that the children and adults with complex communication needs have the opportunity to live happy and fulfilled lives where they are able to participate fully in education, employment, family, and community life; where they are safe and secure, and have access to needed services; where they are respected and valued for who they are; where they have a chance to develop friendships and intimate relationships; and where they have the opportunity to make meaningful contributions to society ".

(Light & McNaughton, 2015. .p 3)

Aided language development

When children are introduced to aided augmentative and alternative communication (AAC) to assist with expressive communication, the ultimate goal is the same for all children: to provide access to the same languages that are spoken and written within that child's community."

Binger, Harrington & Kent-Walsh, 2024, p.33

"Grounding AAC approaches in a model of typical language development—with a focus on learning to use the vocabulary, linguistic rules, and narrative conventions of their community—supports these fundamental goals".

Binger, Harrington & Kent-Walsh, 2024, p.33

"Typical spoken language developmental norms and trajectories can be used as models for aided language development and can help guide clinical decision making. These guidelines inherently help to ensure that clinicians promote all aspects of language development with children who have complex communication needs—not just pragmatics and semantics."

Binger, Kent-Walsh, Harrington & Hollerbach, 2020, p. 318.

Basic Issues in Language Development

von Tetchner presentation, ISAAC conference 2024

- Language use in everyday interactions
- Form: phonology, speech perception, articulation
- Semantics: Word intention and extension , meaning construction
- Syntax: word order
- Morphology: inflections, grammatical vocabulary
- Conversational skills: E.g., Turn-taking, recognizing and repairing misunderstandings
- Pragmatics: E.g., Literal and figurative language
- Multilingual issues

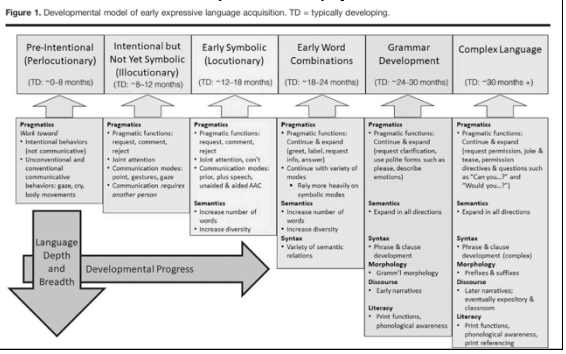
Spoken language domains

(Lahey, 1988)

- Language Form – the structural components of language
  - Phonology (structure of sounds)
  - Morphology (structure of words)
  - Syntax (structure of sentences)
  - Story grammar (structure of narratives; Ukrainetz 2006)
- Language Content – vocabulary
  - Learning new words
  - Semantic networking of these words
- Language Use – purposes of language
  - Communication functions
- Language Discourse – how we use language across sentences

These domains are interdependent and do not arise in isolation

Binger, Harrington and Kent-Walsh, 2024, p. 35



Aided language

- Not a distinct language
- It is a different mode / representation to generate the dominant spoken language
  - Speech output devices
- Language-based goals that are similar (if not identical) to goals identified for children who rely on spoken language, with a focus on all of the usual language domains: pragmatics, semantics, grammar, and discourse.
- ? Influence of the different form on the language developmental process, e.g.
  - Representation, multimodality
  - Speed of communication
  - Access method
  - Vocabulary available in the system, organisation of vocabulary for use

Aided language differences

Stadskleiv, et al 2022

- Asymmetry between language input in spoken language and output in aided language
- Aided communicators dependent on expressive means provided by others
- Communication partners play a crucial role in
  - Inferring meaning from aided language construction
  - Resolving communication breakdowns
  - Co-constructing meaning and rephrasing aided language constructions into speech

Children typically learn to communicate from interactions with family & friends

The Language environment

"Language development is a social process, and the language environment is where language is both learned and practised."

von Tetzchner, Martinson & Stadskeiv, 2024 p. 357

- Children engage in social interactions
- Learn the functions of communication and language during interaction with more competent members of the language community
- Quantity and quality of these interactions will influence development
- Reciprocal adaptation of communication partners

Your child needs to learn to communicate using AAC

Interaction is critical for communication & language development

- Family and friends will continue to be the critical influence on the child's communication and language development.
- However, **these interactions will now also need to incorporate the use of alternative forms of communication.**

Interaction is critical for communication & language development

- Immersion in the alternative form effectively supports individuals learning to use AAC
  - Partners are faced with learning to communicate in a foreign form that they have most likely never experienced or seen used by competent users of AAC.
  - Natural interaction patterns may be compromised as partners attempt to manage a new AAC system.

"An environment which supports the acquisition of alternative language forms does not seem to come naturally."
von Tetzchner & Grove, 2003, p. 13

Communicatively accessible language environments

von Tetzchner, Martinson & Stadskeiv, 2024

- Provide the individual with means of communication they can understand and use
- Significant people in the environment
  - Understand individual's expressive language
  - Use a language mode the individual understands
- Communication is met with communication (rather than praise or rewards)
- Opportunities for using AAC and learning through communicative problem solving

"*AAC intervention is therefore more than teaching the individual some form of AAC – the wider aim is to create a language environment that supports the individual's communicative problem solving and development and use of AAC."*
von Tetzchner, Martinson & Stadskeiv, 2024. p 357

Intervention - Others model AAC

- Aided language stimulation (Goossens', Crain & Elder, 1992)
- System for Augmenting Language (Romski & Sevcik, 1992)
- Natural Aided Language (Cafiero, 1998)
- Aided language modeling (Drager et al, 2006)
- Aided AAC Modeling (Binger and Light, 2007, Biggs, Carter & Gilson 2018)
- AAC Modeling (Sennott et al, 2016)
- Augmented Input (Allen et al, 2017)

Intervention - Others model AAC

- Interventions that include modeling may have distinct features (Sennott, Light & McNaughton, 2016; Allen et al 2017)
- Sennott, Light & McNaughton 2016 differentiate
  - AAC modeling where the partner uses the AAC system in the context of naturalistic communication interactions
  - Instructional modeling where the teacher models an instructional target.

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Types of Models

- General receptive input
  - Variety of genuine messages
  - Natural contexts
  - Genuine interaction
  - Immersion

- Modeling as a prompt or cue

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Modeling as a prompt or cue

- Another models a possible "message/turn" in a natural situation
  - Opportunity, but no expectation that the person will produce the modeled message at that time
- Model a targeted "message/turn" in a set up situation
  - Expectation that the person will produce that specific message
  - The model is a prompt to "GET THEM TO SAY IT"
- Mand-model
  - Say "…"
  - Person is expected to imitate the model

Aided Language Stimulation
(Goossens', Crain & Elder, 1992)

- System design - Engineering the environment with aided symbols
  - Multiple activity specific displays placed in the environment
- Modeling
- Stimulating self-initiated, generative use (Specific prompts and cues)

Creating an aided language learning environment

- Vocabulary available to communicate at any time (engineering the environment)
- People using aided language systems to interact in natural contexts
- Training partners to use the AAC systems to interact in natural contexts and support AAC habits for autonomous communication

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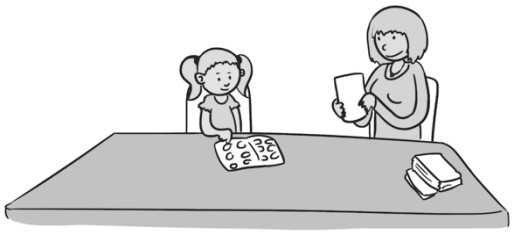
PREPARED for communication AT ANY TIME

- Autonomy
  - To communicate according to my own intentions
  - The right to choose when to communicate (or not)
- Need AAC system available for communication at any time
  - Engineering with personal, robust language, communication systems so vocabulary is always with person (habits for communication at any time)
  - Method to initiate communication
- **Electronic and non-electronic AAC systems for autonomous communication at any time**

Typical children are immersed in spoken language
Children learn language while busy doing other things!

Some children have speech or language challenges and need speech therapy

These children come from and go back into spoken environment to practice and learn pragmatics in the real world



If we apply the same service delivery model of therapy for children who have complex communication needs…

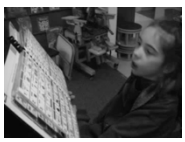
They come from and go back into spoken language environment with limited opportunity to learn pragmatics of using AAC in the real world.

Critical for Learning Pragmatic use of language!

We need to start with creating the aided language environment. Then, not all the children with CCN will need language therapy

"No one taught me to communicate, I just learned it"

(Kim at 13 years old).



Individuals learning to use AAC need to:

See their system of communication used interactively by other people to communicate real messages in real situations

- Interacting with them
- Interacting with others in their presence
- Range of purposes, messages, topics

Individuals learning to use AAC need to:

Have multiple opportunities to practice communicating real messages in real situations

- with appropriate scaffolds as required

Individuals learning to use AAC need to:

Receive natural feedback as to the effectiveness of their communication

- Respond to everything without question (early learning from babble)
- Don't understand, say so!

Individuals learning to use AAC need to:

Have their informal communication and language messages expanded by other people using modes of communication they will be able to use to communicate more effectively.

- Linguistic map
- expansion,
- recast

Interacting in the mess of the real world

Indicating the symbols

- What helps the individual to attend to the communication?
  - Point
  - Highlight with torch
  - Pull off single symbol
- What access method are they learning to use?
  - use the alternative access technique the individual is learning in order to specifically model how they can indicate symbols on the display.
  - "I could do that!"

Model More than Just "This Pictograph Means This" Also Model Important Concepts Such as:

- "Oh I can say that using…."
- "This is the type of context I can say it in"
- "That's how I go about taking up my turn to say that in this situation"
- This way of communicating is valued and responded to by others.

Stimulating autonomous, self-initiated, generative communication

Autonomous, self-initiated, generative communication

- In addition to learning language and operation of the AAC system the individual will need the knowledge, judgement & skill to
  - Generate ideas of what to say
  - Initiate communication within the discourse of their daily lives
  - Introduce their own messages and topics
  - Solve problems (strategic competencies)

Pragmatics (social use of communication)

- Use of language, vocalisation, gesture, facial expression, eye-contact, body movement
- Appropriateness of communication
- Taking turns in interaction (discourse)
- Initiating communication
- Selecting, introducing, maintaining, changing topics
- Feedback to partner
- Repairing communication breakdown
- Changing communication to suit different partners, situations & social roles
- Use of communication for different purposes

Pragmatics!!!!!!!

- Same surface message – different pragmatic function in discourse
- Speech Act pairs
  - Ask question – next turn is "answer"
  - Directed to "Tell me .." – next turn is "compliance"
  - Statement – range of pragmatic functions
  - Initiate – range of pragmatic functions

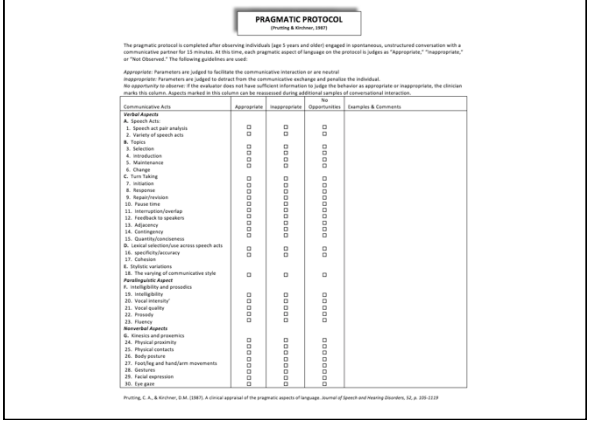
What cues communication?

- Non-obligatory turns
  - Something to say
  - Recognize an opportunity within the interaction / context to communicate my message
  - Initiate to communicate my message
- Obligatory turns
  - Answering question
  - Responding to direction or instruction to communicate a message

Discourse patterns

Light, Collier and Parnes, 1985

- Interactions observed were largely defined by
  - caregiver talk
  - forfeited turn opportunities
  - communicative turns by the children occupying minimal conversational space.
- The children were most apt to assume the conversational floor when they were obliged to do so
  - they tended to forfeit their "optional" turn opportunities within the discourse
  - primarily communicated using their AAC system when their caregiver issued obliges with a high degree of summoning power (asked a question, directed to tell something).



PRAGMATIC PROTOCOL

(Prutting & Kirchner, 1987)

The pragmatic protocol is completed after observing individuals (age 5 years and older) engaged in spontaneous, unstructured conversation with a communicative partner for 15 minutes. At this time, each pragmatic aspect of language on the protocol is judges as "Appropriate," "Inappropriate," or "Not Observed." The following guidelines are used:

Appropriate: Parameters are judged to facilitate the communicative interaction or are neutral

Inappropriate: Parameters are judged to detract from the communicative exchange and penalize the individual.

No opportunity to observe: If the evaluator does not have sufficient information to judge the behavior as appropriate or inappropriate, the clinician marks this column. Aspects marked in this column can be reassessed during additional samples of conversational interaction.

Communicative Acts	Appropriate	Inappropriate	No Opportunities	Examples & Comments
Verbal Aspects				
A. Speech Acts				
1. Speech act pair analysis	☐	☐	☐	
2. Variety of speech acts	☐	☐	☐	
B. Topics				
3. Selection	☐	☐	☐	
4. Introduction	☐	☐	☐	
5. Maintenance	☐	☐	☐	
6. Change	☐	☐	☐	
C. Turn Taking				
7. Initiation	☐	☐	☐	
8. Response	☐	☐	☐	
9. Repair/revision	☐	☐	☐	
10. Pause time	☐	☐	☐	
11. Interruption/overlap	☐	☐	☐	
12. Feedback to speakers	☐	☐	☐	
13. Adjacency	☐	☐	☐	
14. Contingency	☐	☐	☐	
15. Quantity/conciseness	☐	☐	☐	
D. Lexical selection/use across speech acts				
16. specificity/accuracy	☐	☐	☐	
17. Cohesion				
E. Stylistic variations				
18. The varying of communicative style	☐	☐	☐	
Paralinguistic Aspect				
F. Intelligibility and prosodics				
19. Intelligibility	☐	☐	☐	
20. Vocal intensity'	☐	☐	☐	
21. Vocal quality	☐	☐	☐	
22. Prosody	☐	☐	☐	
23. Fluency	☐	☐	☐	
Nonverbal Aspects				
G. Kinesics and proxemics				
24. Physical proximity	☐	☐	☐	
25. Physical contacts	☐	☐	☐	
26. Body posture	☐	☐	☐	
27. Foot/leg and hand/arm movements	☐	☐	☐	
28. Gestures	☐	☐	☐	
29. Facial expression	☐	☐	☐	
30. Eye gaze	☐	☐	☐	

Prutting, C. A., & Kirchner, D.M. (1987). A clinical appraisal of the pragmatic aspects of language. *Journal of Speech and Hearing Disorders, 52*, p. 105-2119

Intervention practices
What is the person learning?

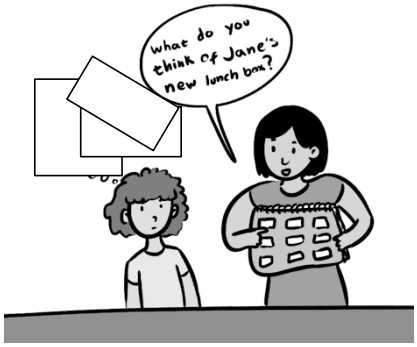
- What's being modelled?
- What's the cue to communicate?
- Is the intervention stimulating the intended pragmatic function?

Intervention

- Teacher aims
  - Model use of AAC system
  - Encourage students to join in and communicate
  - Teach students how to give an opinion

Are we doing what we think we are doing?

What's actually happening?



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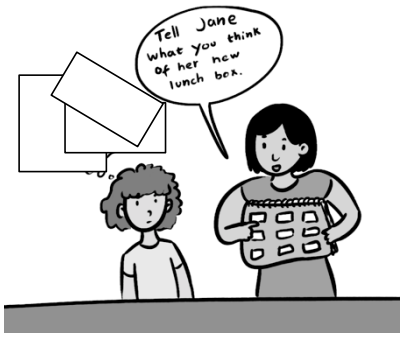


Reflection on intervention

- What was modeled?
  - Pragmatic functions?
  - Anything that person might say?
    - Age, gender, personality
  - Were there models of how to initiate to give an opinion?

Reflection on intervention

- What are they learning cues their communication?

I communicate when someone asks me a question or directs me to do so!

Reflection on intervention

- Does this cue, stimulate giving an opinion?

Giving an opinion requires self-initiated, generative communication

Need to have an opinion, to give one!

Early communication is initiated by the communicator

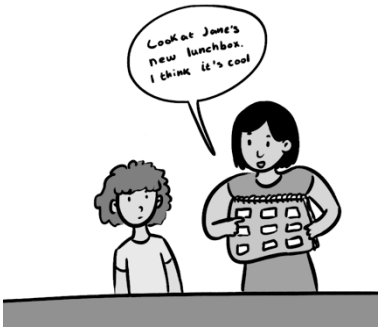
- Easier to talk when you have something to say
- Early communicators talk on own topic
- Answering specific questions is a later acquired purpose

Natural contexts, genuine meaningful interactions

- Do not have to create opportunities to communicate
- There are many natural, genuine purposes to communicate all around
- Help the person to:
  - Observe and identify them
  - Join in
  - Ideas of messages to say in each context

What's actually happening?

Provide opportunity but no demand



Model a possibility - initiation

Model a possibility - answer

Initiate own, autonomous message

Early initiations to express

- Taking a turn in INTERACTION
  - May be "babble"
- Communicators who understand speech may "fish" for word
  - Heard it was there, but don't know symbol
- Respond to all initiations as meaningful communication
- Respond to whatever they do within context of interaction
  - Respond naturally
  - DO NOT ask for clarification

Natural contexts, genuine meaningful interactions

- Do not have to create opportunities to communicate
- There are many natural, genuine purposes to communicate all around
- Help the person to:
  - Observe and identify them
  - Join in
  - Ideas of messages to say in each context

Providing ideas of what to say

- Model messages individual might want to say
  - "kid talk"
- Utilise pre-existing, natural communication opportunities
- Show them how they can join in, become a part of the communication happening around them

Communicator selects: what they want to say, when they want to say it, to whoever, whenever they choose to say it.
(or not!)

Remember that the individual will learn to use their AAC system in the way they experience others using their system to communicate.

- **What**
- **Where**
- **When**
- **Who**
- **How**

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Learner's question:
"Is this something I want, see myself (capable of) doing?"

Needs to spark their interest
- Interesting possibilities!
- Looks like fun!
- Might help!
- I can do that!
- What a good idea!
- Etc

All modeling is not equal!

What do partners say to people with complex communication needs?

- Less likely to complain about self
  - More likely to ask questions e.g. ARE YOU TIRED
- Need to change language to model complaint messages the individual needs to learn using AAC system.
  - e.g. Maybe, SOMETHING'S WRONG, YOU'RE TIRED
  - Linguistic map onto the individual's non-symbolic, informal communication as per typical development

What do partners say to children with complex communication needs?

- Less likely to request activities
  - More likely to ask questions e.g. DO YOU WANT …….
  - Tell the person what IT'S TIME TO DO …
- Need to change language to to model requesting messages the individual needs to learn using AAC system
  - e.g. I WANT ……
  - The partner's request is acted on, unless individual refuses request or says something else.
- **May use a helping doll, assistant, peer model**

Accomplice

- Teach familiar partners to be accomplices (not turn stealers)

"Hey, you forgot the GoPro."

An accomplice may

1. assist a communicator to problem solve and successfully communicate a required message to another partner.
2. "read" the communicator's informal communication message and assist them to problem solve/use a mode that will be more intelligible to another partner.
3. Know the communicator's message, confirm with them that they want to communicate this message and then suggest how/assist them to communicate it to another partner
4. Suggest an idea of what the communicator could say at a given time to contribute to a conversation with another partner (they choose to or not)
5. Assist a communicator to problem-solve how they can express their message more intelligibly, efficiently, specifically or in a more socially valued way, i.e. assists to solve, or prevent probable communication breakdown.

Partners need to develop fluency to use AAC system

AAC and Families: Dispelling Myths and Empowering Parents

Smith and Barton-Husley, 2016

- Myth 1: AAC cannot be embedded in natural routines
- Myth 2: AAC systems place undue stress on families
- Myth 3: Speech-Generating Devices are too difficult for families to use with their child
- Myth 4: AAC is only for communication partners other than immediate family
- Myth 5: Communication should not be a priority for early Intervention

Communication partners learning to interact using AAC

- Shared understanding of purpose of AAC (AARCH)
- Insight – complex communication needs
- Motivation – Why?
  - See how using AAC can add to the child & families' (or individual's) life
  - Long term implications for the future
- Inspiration - Knowledge of possibilities

Developing your child's communication session

- Beliefs, concerns and questions (asked or not) influence uptake of AAC, understanding of communication
- Aim to develop a shared understanding of important concepts
  - Communication is multi-modal, we all use AAC
  - Communication is complex
  - Communication for varied purposes
  - Interaction of child and partner in typical development of communication and speech
  - Why child with CP might have difficulty learning to communicate, develop speech
  - AAC will not prevent speech development
  - What is important to their child is autonomous communication
  - Learning communication, language & speech happens during genuine, daily life interactions and takes time

Table 12.1 Common information in courses about AAC and developmental disorders

Typical and atypical development of communication and language
Communicative access
Terminology: augmentative and alternative communication (AAC)
Manual sign systems, graphic communication systems and tangible symbols
Communication aids and how to make communication folders and books
The technology of communication devices
The diagnostic groups in need of AAC: individuals with motor disorders, autism spectrum disorder, intellectual disabilities, and developmental speech and language disorders
AAC over the life span: use and support for children, adolescents and adults
AAC and speech development
AAC and orthographic writing
Assessment of individuals who may need AAC
Vocabulary development and selection of vocabulary
Sentence construction with AAC
Conversation with AAC
Communication breakdown: misunderstanding, negotiation and repair
A developmental approach to AAC intervention
An individual plan for AAC intervention and use
AAC intervention strategies
Supporting participation in activities
AAC and play
A language-supportive environment for children using AAC
Being a communication partner for individuals using AAC
AAC in the family and everyday life
Scaffolding of AAC in the family
Educational needs of family members
AAC in the classroom: beyond individual training
Making peers AAC competent
Collaboration between the family and kindergarten and school
AAC and life quality within and outside the family
Challenging behaviour and communication
Using AAC: a creative process

von Tetzchner, Martinson & Stadskeiv, 2024 p. 366

Partners learning to be users of AAC

- In order to create an aided language-learning environment, partners need to develop fluency using the system.
- Since there typically is not an immersion environment readily available for the adults learning to use AAC, they need to be taught in a more direct and graded manner.

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Partners learning to interact using AAC

- Developing fluency to use AAC system
  - Training sessions to learn and practice the patterns used in the individual's AAC system language organisation.
- Graded expectations to develop fluency
  - Have the whole system there, with you for communication at any time
  - Start with one pattern, add another, then another
    - Begin with frequently occurring messages you can use throughout the day to reinforce communication at any time.
    - Patterns will vary depending on the language organisation

Graded practice to develop partner fluency

- Be careful that the suggestions of vocabulary or patterns for partners to practice do not become intervention targets for the individual learning to use AAC.
  - Individuals get to choose the vocabulary they want to use!

Suggestions to develop partner fluency using AAC

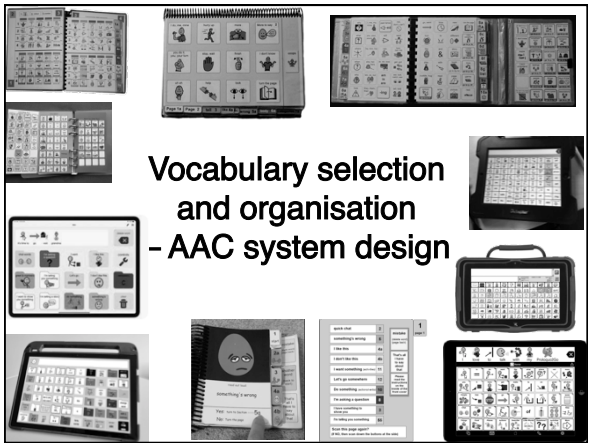
- Use sensory motor learning strategies
  - Learn to use an AAC system by using an AAC system
  - Massed practice of similar patterns develops automaticity
- Avoid detailed instructions and explanations
  - AAC instructions get really complicated
  - Focus shifts to remembering the instructions
  - Easier to understand when see it used
- Model and coach new partners during genuine interactions
  - Scaffold their interaction with the individual

p. 9

Practice builds fluency

- Guided practice to develop competent use of AAC
  - Sufficient knowledge, judgment and skills
    - Linguistic
    - Operational
    - Social
    - Strategic
  - Model and coach in the mess of the real world
- Practical ideas and support for juggling it all

Coach during interaction



The challenge!

"A child who uses speech will independently select the words she wishes to use from the vast array of words she hears/sees used everyday.

A child who uses AAC will independently select the words she wishes to use from the vocabulary other people have chosen to model and, for aided symbols, made available for her to use."

Porter & Kirkland, 1995, p.93-94

We have to make the words available in aided language systems

The challenge!

"Graphic symbol communication presents a range of unique challenges for early communicators. One compelling example relates to the sheer volume of words and utterances that are relevant within early communication. Children who are typically developing use approximately 1,000 words and a wide range of grammatical markers by the time they reach their third birthday (Owens, 2016), with thousands more words soon to follow."

Binger, Kent-Walsh, Harrington & Hollerbach, 2020, p. 318.

Whole word / graphic symbol vocabulary

- Vocabulary needs to be presented spatially in a 'hard copy' physical form.
- Limitations on the number of items that can be included on one page.
  - The complexity increases when physical and/or sensory impairments limit the number of items which can be presented at one time.
- Finding ways to effectively and efficiently store and retrieve this range of graphic symbol vocabulary.
- Need appropriate strategies to organise vocabulary in aided systems to provide the individual and their communication partners with easy access to the broad range of vocabulary items they require to communicate.

Sufficient vocabulary to support autonomous communication

- Vocabulary to say, what I want to say, to whoever I want to say it, whenever I want to say it, however I choose to say it!
- Vocabulary to generate own messages
  - Learning to spell to generate own words
  - Whole word / symbol AAC systems
    - Degree of autonomy will be influenced by the size and diversity of the vocabulary pool
    - Larger the pool the more likely it is that the word I'm thinking will be there
    - Efficient organisation supports more frequent autonomous communication

Vocabulary to create an aided language learning environment

Providing vocabulary to create an aided language learning environment

- For learning and use
- Partners to model
- Individual to use
- Express a range of meanings
- Throughout the day
- For a range of functional purposes
- To stimulate language development
- Enable individual to (learn to) meet their varied communication requirements

Varied communication functions

greet manipulate **relate information**
agree / disagree answer ask questions
instruct others ask for things joke
express an opinion share information
express feelings protest describe
discuss interest "make social contact" bargain
comment request / attract attention complain

Purpose of AAC

To enable the person to meet all of his/her varied **communication requirements** as

- intelligibly
- specifically
- efficiently
- independently
- in as socially valued a manner as possible

To understand others and to be understood.

Porter, 1997

Different types of vocabulary

Beukelman & Mirenda, 2013

- Coverage and developmental
- Core and Fringe (extended)
- Messages of conversation
  - Greetings
  - Small talk
  - Narration: story telling & Public speaking
  - Procedural descriptions
  - Content-specific conversations
  - Wrap up remarks and farewell statements

Selecting Vocabulary for AAC systems

- Core vocabulary approach
- Developmental approach
- Environmental approach
- Functional communication approach

Banjee, DiCarlo & Buras-Stricklin (2003)

Core Vocabulary

- Frequently used across contexts
  - Needed throughout life
- Approx. 70 - 80% of what we say uses the same 200 core words
  - Depends on size of core and sample
  - Range of word types
- Common core / individual core

Core vocabulary approach

- Use common core vocabulary lists, e.g.
  - Grove & Walker (1990) Makaton key word sign
  - Banagee, DiCarlo & Stricklen (2003) Toddlers
  - Marvin, Beukelman & Bilyeu (1994) Preschoolers
  - Balandin & Iacono (1999) Adults at mealtimes
  - Stuart, Beukelman & King (1997) Seniors
  - Hill (2001) Fluent Adult Augmented communicators
  - Boenisch & Soto (2015) School age children
  - Etc, etc, etc
- Need to consider the similarities of the sample group to the individual
- Use other approaches to determine individual core and fringe vocabulary

Australian English – pre-school Core Vocabulary

you	I'm	**get**	**here**	**up**	**out**
I	**in**	**what**	**he**	just	**big**
the	**this**	**look**	gonna	can't	**did**
it	**me**	yeah	**not**	well	**down**
a	to	**there**	**hey**	I'll	**of**
no	**one**	**we**	it's	that's	were
and	**do**	**is**	**got**	c'mon	**like**
can	**go**	**your**	**are**	um	**where**
that	**on**	don't	**oh**	**now**	ah
my	**have**	let's	**put**	**out**	**be**

Trembath, Balandin & Togher (2007).
Vocabulary Selection for Australian children who use AAC
Journal of Intellectual and Developmental Disability 32:4, 291-301

Australian English – pre-school Core Vocabulary

Typical spoken language development 4 years

- Mean Length Utterance **MLU = 5.00 plus**
- **% of complex sentences 20% plus**
  - Expansion and increase in diversity of vocabulary continues throughout life.
  - Tense and number for verbs auxiliary and copula continues to develop.
  - Conjunctions expanding to include because, when, so
  - Sentences containing more than one type of complexity

Toddler US English Core Vocabulary

First 30 Words:

1. again	11. I	21. out
2. all done	12. in	22. put
3. away	13. it	23.some
4. big	14. like	24. stop
5. do	15. little	25. that
6. down	16. mine	26. there
7. get	17. more	27. up
8. go	18.my	28. want
9. help	19. off	29. what
10. here	20.on	30. you

Banajee, M., DiCarlo, C., & Buras-Stricklin, S. (2003).
Core Vocabulary Determination for Toddlers,
Augmentative and Alternative Communication, 2, 67 - 73.

Top 10 first words
(excluding "mama" & "dada")

CDM	MTurk	Psycholinguists	Wordbank
Ball	**Dog**	Up	Baa Baa
Hi	No	More	Uh–Oh
Dog	**Ball**	**Hi**	Yum Yum
Uh–Oh	Bottle	**Cat**	**Woof Woof**
Duck	**Hi**	**Bye**	**Hi**
Car	**Bye**		Vroom
No	Kitty		This
Cat	Baba		Meow
Bye	**Cat**		Bottle
Up, More	Milk		**Ball**

Schneider, Yurovsky & Frank (2015).
Large scale investigations of variability in children's first words
First published: annual meeting of Cognitive Science Society 2015
https://langcog.stanford.edu/papers/SYF_underreview.pdf

Developmental approach

(Fristoe & Lloyd, 1980; Holland, 1975; Lahey & Bloom, 1977; Reichle, Williams, & Ryan, 1981)

- Developmental vocabulary lists
- Words chosen from developmental language inventories that have been developed on the basis of language acquisition principles.
- Development of different word forms (e.g., nouns, verbs), phrase and sentence structure
- Number of words that children typically use at a certain age or developmental level
- Typical development of semantics, syntax and morphology

Developmental vocabulary

Bloom (1993) suggests 3 main principles guiding word learning in spoken language development.

1. Relevance (relevant to current interests)
2. Discrepancy (enable description of events not known or evident to listener)
3. Elaboration (as children's mental representations expand, need words to express the complexity of the ideas that are represented).

Development of semantics & syntax

Core vocabulary	One word
• You have to go now	• go
• I can do it	• Me
• I see a dog	• dog
• You will do it	• you
• I will not do it	• no
• What is that?	• that?
• The lawnmower is on	• lawnmower

Development of semantics & syntax

Core vocabulary	Two words
• You have to go now	• you go
• I can do it	• me do
• I see a dog	• see dog
• You will do it	• you do
• I will not do it	• no do
• What is that?	• what that?
• The lawnmower is on	• lawnmower on

Fringe, extended Content* vocabulary

- Thousands of specific words, each specific word used less frequently
  - Includes coverage vocabulary
- Vocabulary related to the content of the message, topic or activity
- Content vocabulary is needed to:
  - to establish topic
  - be specific
  - express personality (via word choice)

Content* Musselwhite & Hanser

Environmental approach

(Beukelman & Garrett, 1988; Blau, 1983; Fried-Oken & More, 1992; Karlan & Lloyd, 1983; Mirenda, 1985)

- Ecological inventory process
- Looks at individual's communication requirements in the context of his or her life and lifestyle (activities)
- Words appropriate for individual's specific communication environments (i.e., fringe vocabulary) are identified
- Fringe (content) vocabulary is specific to each communication environment

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Communication competence for people who use AAC

(Light, 2003; Light & McNaughton, 2014)

Sufficient knowledge, judgment and skill

- linguistic competence
- operational competence
- social competence .
- strategic competence

Psychosocial factors

- Motivation
- Attitude
- Confidence
- Resilience

Goal: "to be more interesting"

- Varied vocabulary and messages
- Personality
- Style
- Relatedness

Need both core and content

"I want to go there"

"I want to go to Canada"

Vocabulary organisation core and content

- Fast access to core vocabulary for use
  - within context, established topic
  - combined with content in multiple messages

AND

- Content vocabulary to express a range of messages
  - Frequently used content (coverage)
  - Occasionally used content
  - Rarely used content

Functional communication approach

- Select vocabulary to express a range of pragmatic functions
  - people need to communicate for same purposes using AAC as for speech
- Specific vocabulary, related to individual, brainstormed by the team for each function
  - E.g. Complain – what may this individual want to complain about?
- May use typical development of pragmatics to guide the functions included at earlier stages of development

Development of Pragmatics

- 18 months spoken language development
  - attention seeking
  - request objects, action,
  - request information
  - reject, protest
  - greet
  - name
  - responds/ acknowledge
  - inform (draw attention to something)
  - comment on action / object (opinion)
  - answer

Pragmatic approach

(Porter, 2007)

- Uses a combination of developmental, ecological, functional communication and core vocabulary approaches.
- Vocabulary for autonomous communication
  - Selecting vocabulary for partners to model – individual selects the words they want to use from the vocabulary modeled and made available by others
- Strategies to "collect vocabulary" during interactive communication
  - Use of generic templates, LISTS, blank spaces
- Considers multi-model communication & influence of the AAC form on vocabulary requirements
  - Efficiency, pragmatic use, strategic competencies

Aided language form

- No intonation
- Cannot produce actions / gesture at same time as say WORD
  - Would have to do sequentially
- Voice output? (electronic / non-electronic)
- Vocabulary has to be predicted and made available in physical form
- Vocabulary has to be laid out spatially
  - Cannot access all words on one level
- Speed of communication

Single words

- Single words to produce spontaneous, novel messages
- Single words needed for language development
  - Combining words to create different meanings
- Single words –can be used more flexibly
  - Meaning interpreted from the context
  - Partner expands for language development
- SNUG Spontaneous Novel Utterance Generation
  - http://www.aacinstitute.org/Resources/Press/AssessmentModelpaper/aacsucc.html

Phrases and prepared messages

- Phrases to increase rate for commonly expressed messages
  - Sentence starters
  - Social messages, communication control
- Preparing and storing whole messages "ahead of time"
  - For a particular situation
  - Presentations
  - Current messages
  - Personal Stories

Long term outcomes – aim of AAC

Generic templates

Porter, Tainsh & Cameron (2008)

- Saves time!!
- Experienced designers - incorporate vocabulary and layout features found to be effective
- You can begin providing language stimulation immediately
- Collect individual specific vocabulary during ongoing interactions
- Provide opportunities to observe and learn with the individual.

Vocabulary, page sets

p. 11– 14

AAC system design for efficient, autonomous communication at ANY TIME

- Vocabulary pool

- Organisation of vocabulary

- AAC system features

See Porter & Burkhart (2012)
ISAAC Preconference Seminar handout
lindaburkhart.com/wp-content/uploads/2016/06/precon_ISAAC_12_handout.pdf

p. 18– 21

Vocabulary pool supports autonomous communication

- **Full range of functions**
- **All types of vocabulary (core, content, coverage, developmental, messages of conversation)**
- **Language acquisition & use**
  - Semantics, syntax, morphology
  - Efficiency for combining words
    - Navigation and page layout
  - Partner models and expansion
    - Planned for efficient use for discourse (multiple turns using aided language)
  - Supports development over time
    - Without completely changing system

Vocabulary & Organisation for language development

Big enough to grow into (learn),

but not so big

they trip over it

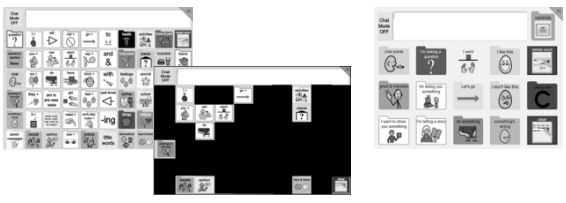
Goossens', Crain & Elder (1992)

Big enough to grow into (learn), but not so big they trip over it

- Development
  - Pragmatics
  - Semantics, syntax, morphology
- Aided language Stimulation
  - Supports others to provide receptive input using AAC to express genuine messages during interactions in any situation.
  - Conversational discourse using AAC
- Partner vocabulary requirements to support understanding

Big enough to grow into (learn), but not so big they trip over it

- Visual and motor access
  - Successful without concentrated effort on the operation
  - Juggling – When visual motor access is easier, individual can focus on communicating



Within PODD

- Aided language development is supported through the provision of multiple page sets (communication books).
- The range of page sets reflects a developmental process as reported in the literature on both typical and aided language development.
- Page sets are selected to enable the use of aided language stimulation that leads the individual's development.

Full range of vocabulary and language complexity using different access methods and presentations

- Increasing complexity of pragmatics, semantics, morphology and syntax.
  - Early functions
  - Expanded functions
  - Key word
  - Expanded key word
  - Complex syntax

Full range of vocabulary and language complexity using different access methods and presentations

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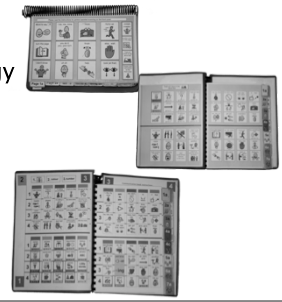

Full range of vocabulary and language complexity using different access methods and presentations

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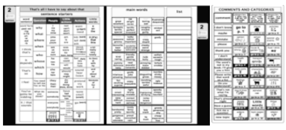
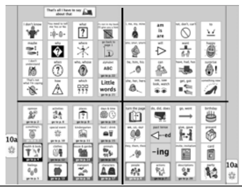


Visual presentation

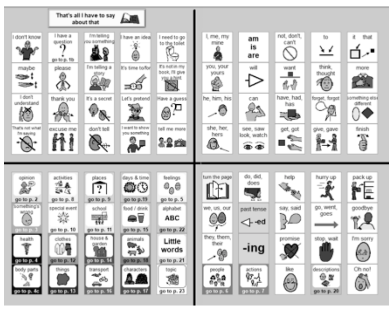
- You do not need to process all the other (unwanted) items presented on the display, to locate and select the required item.
- With practice, develop visual-motor automaticity
  - Know where to look for items
  - Automaticity for which section-column the item is located
  - Supported by organized, consistent page layout



Auditory presentation

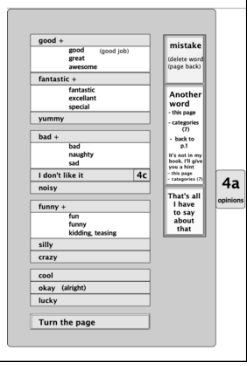
- Temporal (sequential) and Transient
- Communicator must hear every item in order until the desired item is located.
  - can not skip over unwanted items
- Only one or small group of words can be presented simultaneously
- Extra time to present each item using auditory cue (increasing demands on working memory)
- Partner-assisted auditory scanning - the "symbols" are the partner's speech

Not feasible to read out loud all words in a section during scanning or all words on this page!

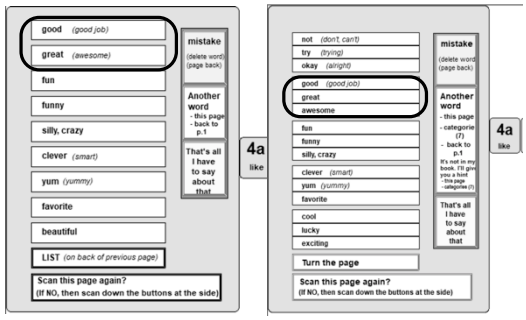


Associated vocabulary groupings

- Reduces number of items in "first level scan"
  - hierarchy of levels for a temporal rather then spatial layout
  - Increases speed of access to a larger vocabulary
- Vocabulary "hidden" under Key word auditory cues
  - Larger vocabulary
  - Do not have to read out every word
  - Skip over words
- Need opportunities to learn the associations



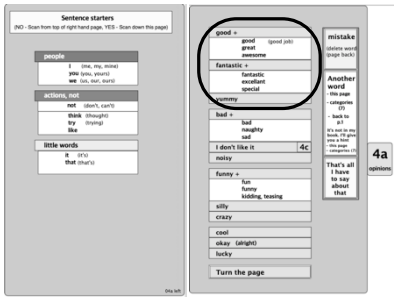
Building associated vocabulary across language levels



Early Functions PAAS **Expanded Functions PAAS**

Building associated vocabulary across language levels

Expanded Functions PAAS



Expanded Functions with sentence starters PAAS

Building associated vocabulary across language levels

Expanded Functions with sentence starters PAAS

good	
good great awesome	yummy
fantastic excellent special	

Key Word PAAS

good	
good great awesome agree	yummy delicious tasty true
fantastic excellent special terrific	

Expanded Key Word PAAS

good	
good great awesome agree	yummy delicious tasty happy
fantastic excellent special terrific	perfect innocent honest true

Complex syntax PAAS

Vocabulary Organization to scaffold communication at earlier stages of development and compensate for the limitations of AAC:

- Pragmatic branches
- Predictive links
- Tense clues
- Yes/no question marker
- Information chunking for narrative
- Vocabulary to manage interaction – provide feedback to partner (OOOPS)

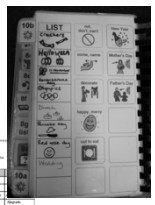
Vocabulary pool supports autonomous communication

- Enables individual to **select** the words they want to say from the words they hear/see used around them
- Allows for **individual style**
- Strategies to **collect new vocabulary** "on the spot"

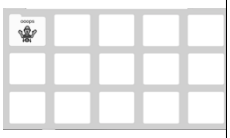
Porter & Burkhart, 2012

Strategies to collect vocabulary

PODD Books
- LISTS



Electronic PODD
- Blank spaces to collect vocabulary



Vocabulary pool supports autonomous communication

- Communication management, breakdown and **repair strategies**
- Strategies to manage **limitations** of aided AAC, e.g. I'll give you a hint
- Considers individual's **multi-modal** communication strategies
- Able to (learn to) **spell** own messages

Porter & Burkhart, 2012

p. 18– 21

Vocabulary organisation supports more efficient, autonomous communication

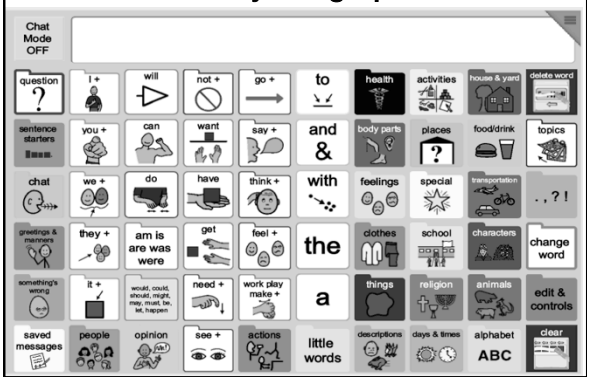
- Access to vocabulary ALL THE TIME for communication at ANY TIME
- Considers pragmatic use
  - Discourse patterns for different functions
  - Real world interactions
- Supports both individual and partner use (interaction)

Porter & Burkhart, 2012

Vocabulary usage patterns

- Vocabulary usage patterns also influence the most efficient organisation of large vocabularies within personal AAC systems.
- Different approaches to vocabulary organisation in AAC systems are more (or less) efficient for different vocabulary usage patterns.
- The purpose (pragmatic function), current language skills and environment will all influence the most efficient organisation for individual to generate their autonomous message.

Vocabulary usage patterns



Vocabulary Organisation

- Accommodate for differences in aided form
  - Non-electronic PODD book & Electronic PODD page set on speech generating device

Similarities (transparency) support ease of use / learning

No one taught me to communicate

"I just learned it"

(Kim at 13 years old).

How?:

Aided language stimulation during genuine interactions

- **multiple environments**
- **multiple partners**
- **robust language system**

•Development over time

- **pragmatics**
- **semantics**
- **syntax**
- **morphology**

When considering the range of approaches to vocabulary selection and organization we need to remember the purpose of AAC to enable the individual to autonomously communicate to meet all of their varied communication requirements.

Combining multiple approaches for vocabulary selection and organisation are needed to enable the individual to efficiently select the words they require to say what I want to say, to whoever I want to say it to, wherever, whenever I want to say it, however I choose to say it!

Two main developmental paths in aided language learning

see von Tetzchner & Grove 2003

1. Individuals who understand (spoken) language
   - Can map new form onto existing meaning system
   - Similar to second language learning
2. Individuals who have a very limited or no comprehension of spoken language
   - Need to acquire a communication system without reference to spoken language.
   - Independent creation of a meaning system with AAC language forms.
   - Similar to first language learning.

Understands spoken language <u>First</u> language learning path

- Needs less examples of graphic symbol use before using expressively
- Other people use graphic symbols during interactions to support the individual learning to expressively use the AAC system

Does not understand spoken language <u>Second</u> language learning path

- Needs lots of examples of graphic symbol use in multiple contexts to work out language meanings before using expressively.
  - May take years of use of graphic symbols in natural environments
- First focus needs to be on supporting the individual's understanding of others.
  - Vocabulary for partners to use
  - Reports of feeling unsafe, anxious, confused
  - Behaviours observed include avoidance & distress,

Imagine not understanding speech

Kustreba & Porter (2018) Graphic symbols as a first language revisited: When AAC is needed for receptive language. ISAAC conference, Gold Coast

Confusing!

Kustreba & Porter (2018) Graphic symbols as a first language revisited: When AAC is needed for receptive language. ISAAC conference, Gold Coast

Sabrina, 2018

"*This type of situation can lead to upset.*

I remember how confusing it was when people would do things I didn't expect because I was relying on what I saw, not understanding what they said. "

Kustreba & Porter (2018) Graphic symbols as a first language revisited: When AAC is needed for receptive language. ISAAC conference, Gold Coast

Sabrina, 2018

"How I learned and achieved the language of graphic symbols was a very long confusing and frustrating time.

Just because people pointed to a picture didn't mean I magically understood what they meant. I had to learn the meaning of the symbols."

Kustreba & Porter (2018) Graphic symbols as a first language revisited: When AAC is needed for receptive language. ISAAC conference, Gold Coast

Sabrina, 2018

"This took a long time to do. It did not happen just because someone showed a picture to me once or twice but rather because people used the displays all the time modelling to me. It takes repetition and time to work out what the symbols and words mean. "

Kustreba & Porter (2018) Graphic symbols as a first language revisited: When AAC is needed for receptive language. ISAAC conference, Gold Coast

Sabrina, 2018

- "Using activity display pages seems a good way to start because they do not have much on them. It helped me slowly understand the symbol to the object. However, because there were not many symbols people would say lots of other words they didn't have a picture for. They would talk, laugh be funny have facial expression but only point to one symbol. That was confusing and made no sense to me."
- "Also the activity displays were only used during those activities so there were lots of times when people just talked."

Sabrina, 2018

- "At 2 years of age I got my first communication book. This book was used to communicate at any time throughout the day. Seeing the same symbols used in lots of different situations helps you work out what the words mean."

Kustreba, 2018

- "These early years were so hard for me because nothing made any sense or meaning."
- "When I didn't understand I would cry, and I mean lots of crying, and I just didn't want to do it all because it was just so hard and, at the time, I did not understand it. I would kick the pages away, not look at what is going on, try and turn and throw my body backwards. Because I did not know what I had to do or what was happening. I felt very unsafe and not sure of anything or anyone. People touching me, holding and helping my body stay in a position and then expecting me to understand and use display pages it was all too much to understand at the time."

Kustreba, 2018

- "My family and other people never gave up even though it was frustrating for them too. They just kept on trying and showing me and I am glad now that they all did that. Though this took a long time I eventually started understanding and using it myself to tell people simple things."

Behaviours observed in children who are learning graphic symbols as a first language

- Crying
- Anxiety (tense body, breathing)
- "clowning around" – attempts to distract partner with a smile
- Increased looking towards symbols when partner talking with display held away from child
- Increased avoidance of looking, close book, hit/kick book away, turn body/ run away when book brought close (especially if there is an expectation that they will say something)

Behaviours observed in children who are learning graphic symbols as a first language

- More difficulty managing novel situations and changes in routine (reduced natural environmental visual cues)
- Responds to environmental visual cues (not spoken language)
- "Deaf nod" – social reciprocity in facial expression and body language

Gimme more words!

"Once I was more familiar with the symbols and understood them better I started trying to point to other words that were on a friend's communication book that had lots more words.
People started adding in more symbols and words to help put the symbols I know into more of a sentence."
Kustreba, 2018

Early language development
Children who are learning graphic symbols as a first language

- Initial observations are a reduction in anxiety and avoidance behaviours (even before indications of understanding the graphic symbols)
  - Will attend to someone you have a chance of understanding/able to process
- Early signs of understanding language (the same behaviours we observe as understanding spoken language)
  - E.g. following instructions (if physically able to), calming when someone points to the graphic symbol FINISH, before the activity has actually finished.

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Early language development
Children who are learning graphic symbols as a first language

- Early expressive use of graphic symbols often appears sporadic
  - Based on frequency of previous models of that language in context
  - May use a more complex "sentence" / pathway they have frequently modelled
  - Often will use a word in one situation (where it has been frequently modelled) but will not generalise it's use to another activity/situation
- 2 years of receptive input common before more general expressive use

More words and sentences

"I finally got a communication book with lots more pictographs and words and started putting them into simple sentences."

- Aided language stimulation during genuine interactions
  - Model
  - Expand and recast
- Language develops as we try understand others and be understood

Recommendations for children who are learning graphic symbols as a first language

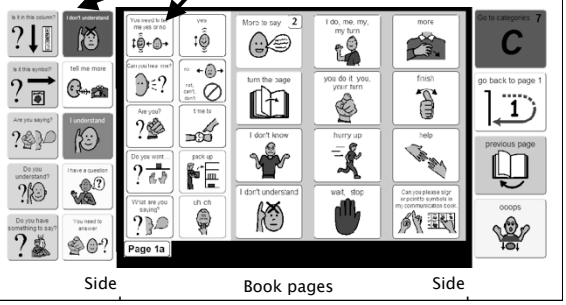
- The first aided language (graphic symbol) system needs to be designed with sufficient vocabulary for partners to interact
- Partners need to model with opportunity, but no expectation or demand of expressive use
  - First messages initiated by child
  - No questions or demands to use expressively

Recommendations for children who are learning graphic symbols as a first language

- Need a personalised system for communication "at any time" across all environments.
  - May supplement this with other displays for efficient communication in specific activities/situations
- Extra vocabulary required for operation of non-electronic system

Extra vocabulary for receptive input to support understanding & operation

p. 124



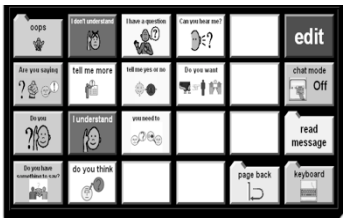
Recommendations for children who are learning graphic symbols as a first language

- Early introduction of an electronic device with graphic symbols in the message window (for partners to use to support understanding)
  - Can read whole sentence in message window
  - PODD page sets have a large message window page so individual can read whole message (all software except TD Snap)

Useful features in electronic page sets

- Being able to bring up a temporary message window (chat mode, TD Snap, Mind express)
- PODD 15+ extra vocabulary for partners without significantly increasing

If using to support understanding may need to add partner vocabulary to 15+



Supports for unfamiliar partners to talk to child with graphic symbol supports

- A partner keyboard with symbol prediction spaces added to page set
- Keyboard (external or on-screen) with symbolate function
- These work best if can limit the symbol options, select priority symbol sets in the software (so the individual's symbol choices are displayed first).

Sign Kustreba, 2018

"To help me even more my mum went to learn signed English because she and the speech therapist thought it would help me understand language better, and it did."

Why Signed English not Auslan?

- Easy to access classes for mum at that time.
- Little involvement with deaf community at that time
- Her expressive language was English (in graphic symbols, later speech and written language)
  - Physically only able to produce a limited range of hand shapes

Sign language

Now

Children and families more likely to learn Auslan

- Some families interact in deaf community to learn Auslan grammer
- Children may attend deaf schools / units with more immersion in Auslan
- Others use more Pigeon language with Auslan signs and have limited interaction with deaf community

Sign language

When child's expressive language uses English word order and grammar in aided system (graphic symbols, text)

- Auslan grammar relies on spatial and other cheremes of sign – does not directly translate for English speech output
- Tend to sign in English word order when modelling, readitorising or reading message window of an aided language production
- Auslan signs, finger spelling, using some grammatical markers from Australasian Signed English as required.

Learning to lip read Kustreba, 2018

"As my understanding of graphic symbols grew and I became more interested in language I would watch people modelling, watch their face for facial expression and how they moved their mouth. This is how I learnt to lip read. All of this helped me understand pictograph symbols to written words to spoken language."

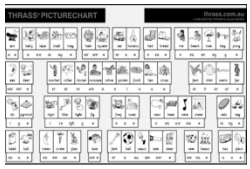
Learning to read and spell Kustreba, 2018

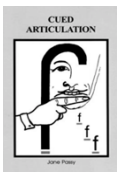
"I learnt to read and type from using pictographs with the written word. I understood the symbols meaning and I remembered the written word above each symbol so I could type it and spell it. Because I am deaf I did not learn the symbols and words from hearing it but instead from visually seeing the symbol and understanding its meaning to remembering the written word. Sometimes if I had forgotten how to spell it I would find the symbol in my communication book and then spell it. When I got better at using DynaVox and remembered more words, if I did forget how to spell the whole word I would use my prediction words to help me."

Learning to speak

- "When I was younger and understood more pictographs and written words my speech therapist would help me say the words by doing mouth exercise and showing me how to make the sounds for the the letters for different letters and letter combinations we were learning at school. "
- "My class was using THRASS to learn spelling and my speech therapist added cued articulation and PROMPT to learn how to say these sounds. This was a big help to because I learnt better what to do with my mouth and tongue. I could then say the words much better."
- "I used this to help me learn to talk by reading the words above the symbols out loud as I pointed in my communication book."

Learning to Speak





The PROMPT INSTITUTE

Kustreba, 2018

"From everything I have learnt when I was younger I now have language and am able to communicate with people. I use an iPad with Predictable, computer, can read, write and speak verbally a little."

Relying on AAC to understand Kustreba, 2018

"As an adult now I still need and will always need AAC written words and sign to help me understand spoken language. I know that it is much easier for people just to speak to me, because that is how people talk to each other and it's what everyone knows and does, and I wish I could do the same back to them, because it would be so much quicker, easier and more enjoyable. But I can't. This is when it becomes difficult for me because then I am trying to speech read or guess from visual cues what they might be saying which some of the time I get wrong or have not understood what was said. When this happens, I will ask someone to type it on my IPad, sign or depending on who I am with I might just not be bothered with it and just say yes, ok and nothing more back."

Group conversations Kustreba, 2018

"When I am with lots of people and everyone is talking at the same time it is difficult to lip read everyone or for someone to type it on my IPad because the conversation is going so fast and some of the words and language used I still may not know and understand. Someone will try to tell me what was said by types on my IPad or signing but they will explain it to me in a shorter way which means I have missed out on lots of the conversation and language used."

Group conversations Kustreba, 2018

"Even though this is sometimes difficult, and I feel a little frustrated and left out using my IPad and sign for my communication is the best and easiest way of expressing myself and having a conversation. It works the best when I am talking to someone one to one because I have more time to understand them and more time to respond back."

Learning Language – What did I miss?

"People learn language from listening to other peoples conversation, watching TV or listening to the radio. I did not and that's why I have missed out on learning a lot of the language and its meaning.

People will try to explain to me what was talked about but they will simplify it because it takes extra time to type. So that means I will not get much chance to learn other words.

Sometimes people do use words that I may not know and when this happens I will ask them what does it mean depending on who I am with or I will try and work it out by everything else they have said, Google it or look it up in the dictionary."

Social Media Kustreba, 2018

"Social media over the internet like facebook and Instagram which I am a big user of is a great way of me making friends and keeping in touch with people. I can see from the photos and read what everyone are doing, good or bad things and I then can type my own opinions on things. It is a helpful way for me to understand more language by seeing what others have written."

Suggestions

Porter & Kustreba, 2018

- **Sabrina**
  - Keep modelling all the time using their communication books and devices
  - Help the children to learn to understand the pictograph symbols and words
  - Give them lots of time to do it themselves
- **Gayle**
  - Long period of receptive input before expecting consistent expressive use
  - Early AAC systems designed with sufficient vocabulary for partner receptive input.
  - Use device with message window to support understanding
- **Sabrina's mum**
  - "Start earlier with a book with more words and signing"

Extending Language

- Semantics
  - Word meanings
  - Expand range of vocabulary used
- Syntax
  - Sentence structure
  - Developmental process for learning
  - Expand range and complexity of sentences
- Morphology
  - Making new words using prefixes and suffixes
  - Developmental process for learning
  - Expand range of morphology markers used

DEVELOPMENT OF PRAGMATICS / SEMANTICS / SYNTAX (AN OVERVIEW!)

Approximate Age of stage	Communicative Intentions	Response to communication	Interaction and conversation	Language (semantics/ syntax)
Stage 1 **0 - 9 months**	Unintentionally communicates using signals such as eye-gaze, smiles, vocalisations (including cooing, babble later in stage) and actions on the environment ADULT assigns intent eg: request for attention, food, action, reject, protest, greet.	Infant pays attention to human voice and face. Responds by looking, smiling and laughing. Enjoys action games and begins to smile in anticipation of the action or in recognition of familiar words.	Interactions involve ⇨ turn taking and temporally linked behaviours ⇨ may be initiated by infant looking at caregiver and terminated by looking away. ⇨ repetitive games involving turn taking ⇨ joint attention between infant and caregiver, which expands to include objects and events.	Pre-expressive language stage of development
Stage 2 **9-18 months**	Gesture combined with vocalisation, then words to express a range of intentions: ⇨ attention seeking ⇨ request objects, action, ⇨ request information (???) ⇨ reject, protest ⇨ greet ⇨ name ⇨ responds/ acknowledge ⇨ inform (draw attention to something) ⇨ comment on action / object ⇨ answer	Begins to understand gesture, pointing; first to near objects, then distant objects Responds appropriately to simple directions (? better in context)	Interactions initiated using informal modes eg: giving, pointing, showing and vocalisation Child may terminate interaction by moving away. Responds to questions with gesture and vocalisation. Interactions limited to 1 or 2 turns each.	**MLU = 0 - 1** first words, predominantly single words (referential nouns; verbs; function words) **Semantic roles:** (up to approx 20 mths) Announce / Agent Greet / Action Vocative / Object Existence / Recurrence Rejection / Cessation Disappearance Possession Non-existence Location May over extend / under include meanings in words eg: Dad for all men; cat only my cat (working out precise meanings for words).

G. Porter (1997) page 1

DEVELOPMENT OF PRAGMATICS / SEMANTICS / SYNTAX (AN OVERVIEW!)

Approximate Age of stage	Communicative Intentions	Response to communication	Interaction and conversation	Language (semantics/ syntax)
Stage 3 **18mths - 3 yrs**	The range of intentions increases, to include the communication functions to ⇨ comment ⇨ express feelings ⇨ assert independence ⇨ request absent object / activity ⇨ request information Begins to use language imaginatively NB: using language more to express functions more specifically.	Begins to recognise and respond to a range of adult communicative intentions. Responds to speech with speech Responses compliment previous utterances (question - answer) Recognises true meaning of phrases such as "In a minute"	Begins to use speech in response to speech. Initiates interaction with vocative eg: "mmm". Responds to requests for clarification with repetition or revision of previous utterance.	**Early in stage (approximately 20 - 30 months)** MLU = 1 - 2.5 (two words utterances) **Semantic relations / syntax form** Existence - relational word + object name Negation - negative (no/not) + noun Recurrence - more + entity Attribution - attribute (adjective) + entity Possession - noun/ pronoun + noun Locative - verb (action) + pro/noun (locative) - noun / pronoun + verb - noun (entity) + noun (locative) Agent - object - noun/pronoun + verb Action - object - verb + noun/pronoun Agent - object - noun/pronoun + noun/ pronoun - ing" ; in & on appear Yes/no ? marked by intonation WH-? What this/that ;What (noun) do ;Where (noun) go (later maybe) What (noun) verb ; Where (noun) verb

Later in stage 3 (approximately 30 months - 3 years) **Language (semantics/ syntax)** **MLU = 2.50 - 3.00**

Noun phrase elaboration: Demonstratives: this, that, those, that,: Articles: a, the (not always appropriate) Modifiers: Quantifiers eg: some, a lot, two: Possessives: hers, his, mine & Adjectives
Verb phrase elaboration: Main verb always included; past -ed overgeneralisation begins : Auxiliary: can, will "be" - maybe marked incorrectly for tense
Negation: no, not, can't, don't, won't (NB -n't analysed as 1 element)
Yes/No ?: marked by intonation, Auxiliary begins to appear but is not inverted
Wh -? : frequent: what, what doing, where. less frequent: why, who, how
Morphemes: regular plural -s; maybe also (later) possessive 's; regular past -ed;

G. Porter (1997) page 2

DEVELOPMENT OF PRAGMATICS / SEMANTICS / SYNTAX (AN OVERVIEW!)

Approximate Age of stage	Communicative Intentions	Response to communication	Interaction and conversation	Language (semantics/ syntax)
Stage 4 **3 - 4 years**	Uses language to talk about past and future events gives information modal form used for requests eg: "would you ....."	Understanding of adult communicative intentions develops further Notices changes in wording of familiar stories and rhymes.	Can initiate conversation using words, eg: "guess what?" Increase number of turns in conversation. More able to communicate with strangers With peers, talk may alternate between social and self talk. Participates in pretend conversations (takes on roles) Responds to things "overheard"	MLU = 3.0 - 4.50 General expansion and increase in diversity of vocabulary. **Noun phrase elaboration:** Modifiers now include, some, something, other, another, etc. Number agreement continues to be a problem eg: "those my crayon" **Verb phrase elaboration:** be + ing appears (eg: am going) past modals begin to appear eg: should, would, must, might, could) **Negation :** auxiliary + not ('nt) eg: **can not, can't** auxiliary elements may include, can, will, do, "be" (am is are, include past "be"), does, did (maybe late stage) - wouldn't, couldn't, shouldn't) **Yes / No ?:** Auxiliary appropriately inverted - intonation continues as alternative form **WH - ?:** Auxiliary appropriately inverted Wham appears **Morphemes:** -ed; irregular past; regular 3rd person (eg: Jo hits) uncontractible auxiliary (eg: He is); Contractible auxiliary (eg: he's big); maybe: Irregular 3rd person (eg: does, has) contractible auxiliary (eg: Jo's going home) **Complex sentences: 1-20% complex sentences** (Millar, 1981) include conjunction "and"; Full propositional complements headed by verbs such as think, guess, wish, pretend, remember, wonder, know, sentences containing simple non-infinitive wh-clause marked by what; where; how; why; if Later in stage infinitive and relative clauses (Millar 1981) and conjunction "If"

G. Porter (1997) page 3

DEVELOPMENT OF PRAGMATICS / SEMANTICS / SYNTAX (AN OVERVIEW!)

Approximate Age of stage	Communicative Intentions	Response to communication	Interaction and conversation	Language (semantics/ syntax)
Stage 5 **4 year plus**	Learns to use forms to fit the listener and politeness constraints Begins to use indirect requests Uses language to ⇨ negotiate and bargain ⇨ state beliefs and opinions ⇨ state rules ⇨ tease ⇨ threaten ⇨ joke Meta linguistic use of language emerges	Understanding of indirect requests develops Begins to understand jokes, riddles and eventually sarcasm.	More efficient initiating, terminating and controlling timing of turns in conversation Uses contingent query to request clarification Learning to time entry into other people's conversations. May incorrectly assume that listener shares own background knowledge of the topic Gradually learns to adapt style to a variety of communication partners and situations. Shows awareness of social conventions for language use.	**MLU = 5.00 plus** **% of complex sentences 20% plus** Expansion and increase in diversity of vocabulary continues throughout life. Tense and number for verbs auxiliary and copula continues to develop. Conjunctions expanding to include because, when, so Sentences containing more than one type of complexity (see Millar 1981 or another syntax assessment for details).

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G. Porter (1997) page 4

Language development

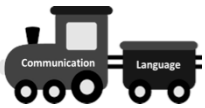
- Provide a linguistic map
  - Use their AAC system to map language onto their informal communication.
  - Show them how they can say something using language without demanding they say it.
- Recast and expand to develop language
  - Recast – repeat some of the individual's words and adds new information (maintains the basic meaning)
  - Expand –repeat what the individual says adding missing words to make it more grammatically correct

Recasting and Expanding

- Within conversational discourse partners respond to the individual's message using AAC
  - Done without interrupting flow of conversation
- Different types of recasts (see Clarke, Soto and Nelson 2017)
- Provides feedback and additional information
  - How to communicate the same intent more specifically or intelligibly
  - May correct or add to the message
  - Expanding on their language use

"Communication is the engine that drives language"

Martine Smith (2003)



- The purpose of language is to enable us to understand others and be understood
- The ability to use language is important in terms of how it enables us to meet our varied communication requirements

Purpose of AAC

To enable the person to meet all of his/her varied **communication requirements** as

- intelligibly
- specifically
- efficiently
- independently
- in as socially valued a manner as possible

To understand others and to be understood.

Porter, 1997

A common pitfall in intervention occurs like this:

p. 142

- a goal is set for the individual to learn ***X***
- modeling using the individual's AAC system is identified as an important teaching-learning strategy for the individual to achieve ***X***
- people in the environment use the individual's AAC to communicate genuine messages
- BUT the messages they model using the AAC system are full of **A, B,** and **C, not X.**

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Extending language

- Given the reality of more limited models of others using AAC modes it is vital that we **target our modeling to support individual's new learning**

To do this:

- Ensure all partners are aware of the current learning requirements
- Capitalise on natural opportunities to learn / practice specific, targeted skills
  - Targeted modelling, expanding, recasting
  - "Mini lessons"

Extending Semantics

- Life experiences with other people using modes of communication the individual will be able to learn.
- The individual understands spoken language
  (learning AAC as a second language)
  - Surrounded by spoken language
  - Need sufficient models of aided language symbols combined with speech to map the meaning of the graphic symbol onto their existing meaning for that word.
- The individual requires AAC to support understanding
  (learning AAC as a second language)
  - Will need sufficient, varied models of the aided language symbols in natural contexts to work out meaning of the words.

Extending Semantics strategies

- Need vocabulary available in aided form
  - Strategies to collect vocabulary
  - Teach individuals to ask for vocabulary to be added to system and/or add own words to their communication aids.
- Partners prioritize saying more unusual (new) vocabulary when using the AAC systems to interact
- Respond to the individual's messages with a recast, extending the vocabulary used

What about doing word definitions?

- We learn the meaning of words through contextual use
- There are many words we understand and use that we would have difficulty defining.
- Rarely remember word definitions for words we don't use or learn out of context
- Define – link to existing vocabulary knowledge – during ongoing interactions
- At later stages of language development, teach individuals how to look up the meanings of new vocabulary they hear/see used in daily life or written text.

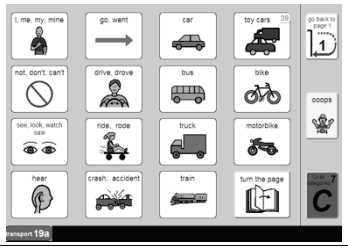
Extending Syntax & word morphology

- Partners prioritize using AAC system to produce sentence structures and word morphology the individual is learning
- Respond to the individual's messages expanding the sentence, adding missing words / word morphology markers to make it more grammatically correct
- Need vocabulary for the next stage of syntactical development in their AAC systems
- Vocabulary organisation supports efficient combining of words into sentences

P O D D

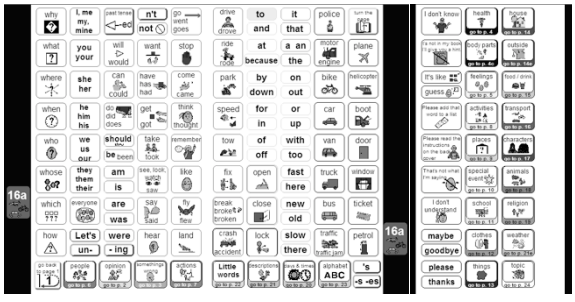
Predictably associated vocabulary in a transport section

- Main words
- Predictably associated vocabulary



The range of predictably associated vocabulary included in a section depends on

- the number of items on each page opening
- current stage of language development.



Extending Syntax & word morphology

- Time to produce sentence using aided language without interruption
- Partners interaction supports autonomous production of own messages

What is the purpose of syntax?

- To more intelligibly communicate your autonomous messages
- To more specifically communicate your autonomous messages in the words and style you choose
- To more independently communicate your messages (without the need for others to interpret)
- To produce more socially valued messages
- However, as each word takes time to produce for the aided language communicator – using full syntax compromises efficiency
  - Aided AAC users often reduce complexity of sentences produced during interactions, especially with familiar partners.

Communication goal

- (Name) will produce 3-4 word sentences including the subject, verb and object.
- Can lead to inappropriate focus in intervention on number of words, rather than meeting communication requirements as
  - Intelligibly
  - Specifically
  - Efficiently
  - Independently
  - Socially valued

Conversational discourse changes language

Partner question:
What did you do on the weekend?

Appropriate answer:
Nothing much

Emphasising the number of words produced can lead to a pragmatically unusual answer:

On the weekend I did not do much.

Write goals to develop pragmatically appropriate, autonomous communication

- ~~(Name) will produce 3-4 word sentences including the subject, verb and object.~~
- (Name) will relate information about past and future events providing sufficient information for the partner to understand their message without the need for repeated questioning/guessing or pre-existing knowledge of the information being related.

Time to complete sentence without interruption

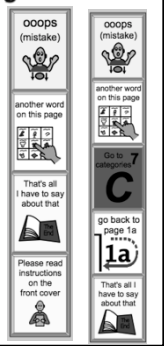
- "Helpful partners" may interrupt, guess at the message from key words
- Devices that speak every word
  - Partners hear a word and then jump in asking questions or interpreting or guessing at meaning (not allowing person to finish their sentence)
- Pauses between words using aided language
  - Partners hear enough to think they understand and guess
- Partner-assisted scanning
  - ? Partner controls the continuation of scanning for more words

Partner-assisted scanning

- How does communicator manage the partner's continuation of scanning and completion of message?
- Skilled partners often informally ask communicators
  - "Do you need another word?"
  - "Do you have more to say?".
- Limitations with this "skilled partner" strategy
  - Less knowledgeable partners do not immediately know what to do after a single word is selected.
  - Skilled partners may be inconsistent in their checking for more words based on when they think they have heard an intelligible message.

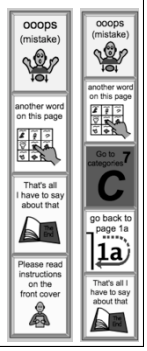
Operational commands and conventions to control partner scanning

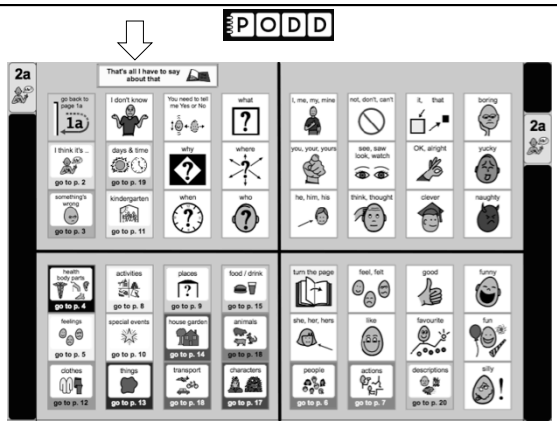
- Communicator needs strategies to control the partner's scanning
  - Continue scanning for more words
  - Operational command to go to another page and keep scanning
  - End of message



Operational commands and conventions to control partner scanning

- Need different operational buttons and conventions
  - After each WORD is said, scan operational column so individual can tell you what to do next
  - Whenever operational items are selected, follow the instruction and keep scanning on that page
    - GO TO PAGE NUMBER
    - TURN THE PAGE
    - GO BACK
    - GO TO LIST





Communication is co-constructed (Stadskleiv et al, 2022)

- Communication can be described as a "co-constructive act
- Successful communication requires the ability of both communication partners to take the perspective of the other
- Such perspective-taking involves mind understanding, inferring the intended meaning of others

Mind Understanding (Stadskleiv et al, 2022)

- Inference of the speaker intended meaning
  - More than linguistic decoding
  - Language interpreted within a contextual framework.
- Communicator takes the listener's knowledge and perspective into consideration
  - What information does the partner have?
  - What information does the communicator need to provide for this partner to understand their message?

Experience of communicator ? Understand the need syntax

- Familiar partners, who know everything about the individual's experiences
  - in the habit of interpreting key words
- "Helpful partners" take responsibility for understanding the message
  - 20 question guessing from key words
- Other partners do not understand the key words
  - Do not know enough about the individual to guess
- Individual may not have opportunities to learn why syntax is needed to support intelligibility or value communicating in own words

Expand / Recast (with options)

- Purpose of language is to communicate more specifically / intelligibly
- If intelligible, respond to individual's key word message with expansion in the same form
- If not intelligible (without guessing), Expand / recast with multiple options use the individual's aid/device to say
  - "I don't understand"
  - "That could mean (model 2-3 suggestions) or maybe something else"
  - "You need to tell me more"

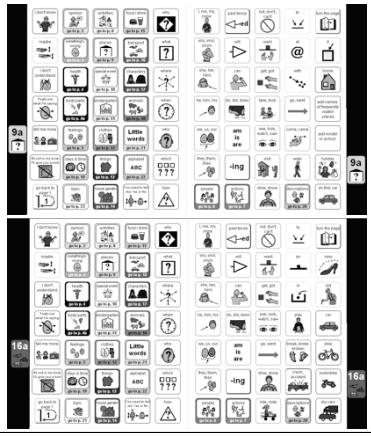
Practice: Expand / Recast (with options)

- One person produces key word sentence
- Other person
  - If intelligible, respond to individual's key word message with expansion in the same form
  - If not intelligible (without guessing), Expand / recast with multiple options use the individual's aid/device to say
    - "I don't understand"
    - "That could mean (model 2-3 suggestions) or maybe something else"
    - "You need to tell me more"

PODD 70 per page expanded Key word

Orientate to Page Layout

Hints: which category to use



Practice: Expand / Recast (with options)

- One person produces key word sentence
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  - If intelligible, respond to individual's key word message with expansion in the same form
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    - "I don't understand"
    - "That could mean (model 2-3 suggestions) or maybe something else"
    - "You need to tell me more"

How many different messages can you make with these words?

I movie

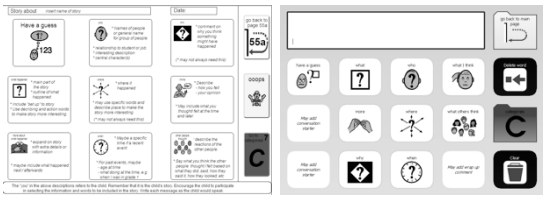
Adapted predictable chart writing

Oral Narrative

- Letter-by-letter or word-by-word production of aided language is slow.
- Oral narratives use lots of words and sentences
  - Need cohesion between words and sentences for intelligibility and interest
- Strategies to prepare and save oral narratives in AAC system for faster delivery.
  - Some breaks in longer narratives support listeners attention, understanding and participation.
- Green communication!
  - Will I reuse this story?
  - Strategies to organise stories in AAC system

Learning narrative

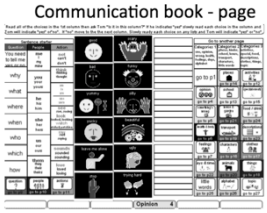
- Co-constructing oral narratives for individuals who currently do not have sufficient expressive language skills.



Whole word writing

Need complete sentences for written text to be intelligible when read out of context

Communication book - page



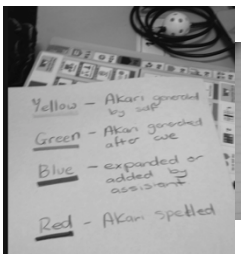
Letter to Lauren

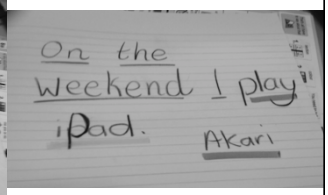
10.02.10

Why I think you good, great, excellent, fantastic and cool is because I feel horrible, strange trying hard when not here with me.

Syntax – writing

Coding: "Who did what"





Writing communication goals and measuring progress

- https://lindaburkhart.com/handouts/
- **Appendix 3: Writing IEP Goals and Objectives for Receptive and Expressive Communication for Children with Complex Communication Needs, By Linda Burkhart & Gayle Porter from the PODD Communication Books Advanced workshop Manual ©.2019,**

Collecting language samples

Language Sample Form

Name Date

Person	Language sample
Child	I want /to do something / play / categories / toys /ball
Teacher	Oh, you want to play with the ball, do you? Lets see what kind of balls we have.
child	categories / describing words / big
Teacher	That's a good idea, I love playing with the really big ball, now if I could just remember where it is….
child	(child points to closet)
teacher	You want me to look in the closet?
child	(child nods)

Code: Plain text = Speech
Interpretations / gestures = Enclosed in parenthesis
Aided Language use (PODD) = underlined
Capital letters = Sign Language
Italics or Cursive = list of choices and concrete items according to a context
/ / = phrase or word represented by one symbol or one activation in aided systems

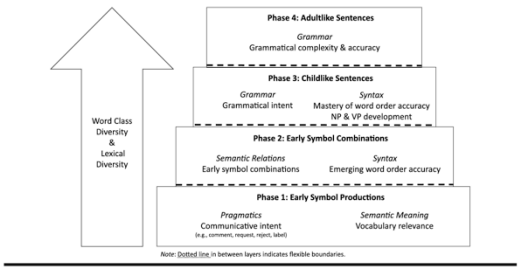
Tracking language Gains of Graphic symbol utterances

Binger, Kent-Walsh, Harrington & Hollerbach (2020).

- Range of tools for analysing graphic symbol language production
- In research study used target sentences
- Could apply to spontaneous language samples.
- Assumption – We are teaching the individual to adhere to the rules of spoken grammar in their graphic symbol utterance productions.

Binger, Kent-Walsh, Harrington & Hollerbach, 2020 p. 320.

Figure 1. Graphic Symbol Utterance and Sentence Development Framework. NP = noun phrase; VP = verb phrase.



Measuring aided utterance and sentence development

Binger, Kent-Walsh, Harrington & Hollerbach, 2020

- Communicative Intent
- Relevant Vocabulary
  - percentage of relevant symbols or PRSym
  - PRSym is a simple calculation of the number of symbols selected that are relevant to the known communicative context divided by the total number of selected symbols
  - (i.e., PRSym = # relevant symbols/total # symbols).
  - Example:
    - Target: THE DOG IS EATING
    - Child: DOG GO
    - PRSym: 50%
- Semanitc Relations
  - Can be difficult to determine in early graphic symbol combinations
  - At times, the context of an utterance clarifies the relationship, but often, it does not.

Word class diversity and lexical diversity

Binger, Kent-Walsh, Harrington & Hollerbach, 2020

- Word class diversity
  - Learning to use all parts of speech
  - Track the word classes in each utterance in a language sample (noun, pronoun)
  - Calculate the % of word classes used
- Lexical diversity: NDSym
  - Number of different symbols used per sample
  - Akin to NDW (number of different words)
- Example:
  - Target: THE DOG IS EATING
  - Child: DOG GO
  - Word classes: Noun, Verb
  - NDSym: 2

Syntax, Morphology and Grammar

Binger, Kent-Walsh, Harrington & Hollerbach (2020)

- Word order accuracy
- Grammatical intent – the listener clearly understanding the underlying sentence
- Mean Length of Utterance for Graphic Symbols (MLUSym)
- Number of different word classes (NDWC)
- Unique subject–verb combinations for Graphic symbols (USV-Sym)
- Number of different inflectional morphomes (NDIM)
- Percentage of grammatical utterances
- Percentage of complex sentences
- Brown's (1973) stages of sentence development:
  - declarative, interrogative, negative, conjoining, and embedding
- Noun phrase and verb phrase development
- Unique subject–verb (USV) combinations

Binger, Kent-Walsh, Harrington & Hollerbach, 2020 p. 322

Table 2. Suggested analyses to characterize a corpus of graphic symbol utterances.[a]

Targets and Measures	Child A	Child B	Child C	Child D
Target sentences				
1. I am hide –ing the dog –s	CAT HIDE	HIDE DOG	I HIDE DOG	I HIDE –ING THE DOG –S
2. The dog –s jump –ed on the bed	PIG BED	DOG JUMP	DOG JUMP BED ON	THE DOG –S JUMP ON THE BED
3. The pig is sleeping.	PIG HIDE	PIG SLEEP	PIG SLEEP –ING	THE PIG IS SLEEP –ING
4. I am wash –ing the big lion.	I LION	BIG LION	I WASH –ING BIG LION	I AM WASH –ING THE BIG LION
5. Lion's bed is dirty.	LION DOG	LION BED	LION 'S BED	LION 'S BED IS DIRTY
Measures				
Pragmatics: Communicative intents	Uncertain	All: Comments	All: Comments	All: Comments
Semantic meaning: PRSym	60% (6/10)	100% (10/10)	100% (18/18)	100% (30/30)
Grammar: MLUSym	2.0	2.0	3.8 (18/5)	6.0 (30/5)
Word class diversity: NDWC (up to 8[b])	3 Noun, pronoun, verb	3 Noun, verb, adjective	5 Noun, pronoun, verb, adjective, preposition	6 Noun, pronoun, verb, adjective, preposition, determiner
Diversity of verbs No. and type of different verbs	1 verb: transitive	3 verbs: 1 transitive (hide), 2 intransitive (jump, sleep)	4 verbs 2 transitive (hide, wash), 2 intransitive (jump, sleep)	5: 2 transitive (hide, wash), 2 intransitive (jump, sleep), 1 copula (is)
USV-Sym	N/A[c]	2 (Pig jump, Dog sleep)	4 (I hide, Pig jump, Dog sleep, I wash)	4[d] (I hide, Pig jump, Dog sleep, I wash)
Lexical diversity of inflectional morphemes: NDIM (up to 6[b])	0	0	2: Present participle *–ing*, possessive *'s*	3: Present participle *–ing*, plural *–s*, possessive *'s*

Note. Underlined symbols are not relevant to the communicative context. PRSym = percentage of relevant symbols; MLUSym = mean length of utterance in symbols; NDWC = number of different word classes; USV-Sym = unique subject–verb combinations for graphic symbols; NDIM = number of different inflectional morphemes.

[a]The five sentences here are used for illustration only; a larger corpus of utterances should be used in actual clinical settings. [b]The eight English word classes that are used to construct sentences are noun, pronoun, verb, adjective, adverb, preposition, conjunction, and determiner. [c]USVs are

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