Vision, Language, Learning Communication, Participation: An Approach to AAC for Students with CVI

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Children with CVI and CCN

- At high risk: cognitive, sensorimotor, social, language, literacy, communication, participation.

Access to vision, language, learning communication, participation

- Need targeted interventions to develop functional vision, engage in meaningful interactions, & have consistent opportunities for learning.

- Need access to a range of assistive/AAC strategies, tools and technologies to participate actively in family, school and community and communicate effectively.
Challenges

• Are vision educators required & willing to meet the unique needs of students with CVI?

• Are communication specialists willing to make accommodations for students with CVI?

• If vision, communication professionals & teachers do not collaborate, how does the student with CVI who uses AAC gain access to language, communication and their education?

• Attention! There are likely many students with CVI in classrooms who are not diagnosed
What we Know: Research

• “Traditional” AAC displays (symbols in grids) place significant visual & cognitive demands on young, “typically developing” children with normal vision
  - difficulty identifying, learning, using even a small number of pictographic symbols arranged on a grid display.
  - children with and without disabilities find it easier to learn and use personalized photographs of familiar people, events and locations (“visual scenes”) than pictographic symbols in grids, especially before the age of 4-5 years.

• Children (and adults) seem to prefer looking at human/animal figures in photographs than other images

• “How” graphic symbols are arranged on a traditional grid display affects how fast and accurately children (with and without intellectual disabilities) can locate the target.

• Background color either has effect, or may even interfere with search

• Even small changes to physical features on AAC display can impact speech and accuracy

What we Don’t Know?

• No studies have included children with CVI

• Limited evidence. Awareness growing.

• Few case examples that provide guidance re: children with CVI who use AAC

• No longitudinal documentation

• Increased attention (& frustration/angst) from professionals and parents
OUR JOURNEY:
From Pittsburgh to Mexico City
...to Big Sur, CA
Vision, Language, Learning, Communication, Participation: A Synergistic Framework

Children are WHOLE beings, NOT a sum of their parts
Assessment and Intervention

- Removing professional silos

- Focus on each individual and his/her ability to function: vision, learning, language, communication, mobility, participation
A “Synergistic” approach

Working together in a creative, innovative and productive manner
Challenges

Educational & medical “systems” continue to support us “practicing” in silos

Children with CVI and CCN deserve access to the accommodations, over time, that reflect a convergence of our collective knowledge and skills.
Breaking down Professional Silos

- Vision services
- Education
- Speech, Language, Hearing
- Occupational therapy
- Physical therapy
- Medicine
- Etc.

Children benefit
Vision educators AND SLPs, OTs, teachers, family members need to understand

- How CVI impacts development, learning, communication and participation across domains
- What accommodations /strategies to make/use that are based on
  - Valid/reliable assessment data
  - Longitudinal measures of outcomes/ intervention strategies that support children with CVI who use AAC
Interprofessional teams can track changes, make adjustments, and measure the impact of interventions on individual children longitudinally, across domains:

- Vision
- Language
- Learning
- Communication
- Participation
NOT EASY
Guiding principles

Vision- Learning-Language-Communication-Participation: A FRAMEWORK

• No child with CVI and CCN should be denied access to language, learning, communication and full participation.

• Vision, language, learning, mobility, and communication are developmentally intertwined.

  • Improvement in functional vision for children with CVI and CCN should be expected and can result in improvement across other developmental domains.

  • If you can’t talk and have CVI, incidental learning, joint attention are limited. If vision improves, other areas can be positively impacted.

  • The nature of the language input children with CVI receive may actually assist them to interpret what they are seeing and should be approached mindfully.
• Access to language (and sufficiently large vocabularies) is essential to the long-term cognitive, educational, social and communication development and participation of children with CCN.

• Children with CVI and CCN require an integrated, dynamic, early intervention approach that specifically addresses their development across domains and their participation and ability to function in the world.

• Vision, language, communication and participation goals must be considered concurrently, however, they are NOT always be addressed simultaneously.
SUPPORTING CHILDREN WITH CVI AND CCN

GOALS
VLLCP

SYNERGISTIC STRATEGIES
Phase I, II, III

CHARACTERISTICS OF CHILD

COMMUNICATION PARTNERS

ENVIRONMENT
Where to begin?

- Children with CVI and CCN: Asynchronous development across domains.
- Limited incidental learning opportunities; difficulty establishing joint attention
- Age, language skills, preferences, tasks, contexts social networks...often call for very different accommodations to environment, materials, methods/strategies
- Myths and misinformation abound in clinics, educational settings and homes
Collaborative team with training

Begin with Assessment

Goals

Characteristics of Child
- DX
- Disabilities
- Health/Medical status
- Interests
- Social networks

Environment
- Accommodations to Contexts
- Activities
- Materials

Communication Partners
- Trained/untrained
- Mindfulness
- Use of AAC/AT

Strategies/Methods
- Phases I, II, III

(Roman-Lantzy, 2018; Newcomb, 2010).
Integrated Goals

1. Build stable visual responses

2. Provide multiple learning opportunities for children to
   - use their vision
   - learn – explore, develop concepts, language/communication and other skills across domains
   - participate in meaningful ways in activities throughout the day (people, activities, objects, contexts, routines)
Characteristics of Children with CVI and CCN

- Interests/Preferences
- Scores on CVI Range: Phases I, II, III
- Language comprehension/ expression, cognition
- Mobility & stability
- Sensory/motor issues
- Medical Issues - Health, medications

- Social Networks (family friends, etc.)
- Settings: school, home, community
- Communication challenges
- Learning challenges
- Participation challenges
- Access to AAC/AT
Environment

- Objects
- People
- Routines
- Visual complexity
- Accommodations to Environment/Context
- Adaptations to materials, activities, tasks
- Sensory input (auditory, smell, taste, touch, lighting, clutter, ambient noise)
- Positioning
- Mobility
- Language used by partners and in environment
Communication Partners

- Trained vs. untrained
- Expectations
- Ability to read child’s signals
- Ability to provide accommodations on the spot
- Mindfulness!

- Language use during interactions with child
- Language use with others when child is present
- Expectations for language use

Social networks
1. Family
2. Friends
3. Acquaintances
4. Paid Workers
5. Unfamiliar partners
Strategies

- Vision
- Learning
- Language
- Communication
- Participation
Use of Functional Vision Across the Day

Phase I

Phase II

Phase III
Identify at least 2 opportunities in each quarter of the day to focus on supporting use of functional vision

Frequency is important
We should expect improvement across domains when . . .

Multiple partners use appropriate language input

Signals are recognized and acknowledged during activities

Social interactions are supported

Targeted contexts are made accessible for learning

Access to growing vocabularies

Child can participate in target activities/tasks across contexts

Appropriate use of AT/AAC to support learning, language access, communication, participation across contexts
We need Research!

Can teams implement strategies that can support vision, language, learning, participation/social interaction in a classroom setting?

- What we know
- What we don't know
Improving Outcomes for Children with CCVI who rely on AAC

Grant awarded to The Bridge School, Hillsborough, CA by the Disability Communications Fund in California

- Retrospective Longitudinal study (2012-2019)
- Scoping study: Gap analysis (schools, university/college training programs, community clinics/agencies)
The Bridge School Project will

- Document longitudinal associations between students’ functional vision, uptake of AAC technology/tools and strategies
- N=13; 2012-2019
- Investigate relationships among improvement in functional vision & student outcomes across domains
- Will identify intervention strategies that support positive outcomes
- AND....we will quantify unmet training needs (gap analysis)
- AND ....Identify collaborative partners.
Team

THE BRIDGE SCHOOL

- Sarah Blackstone, PI
- Fei Luo, Research Assoc
- Aileen Arai, Director of Education
- Vickie Casella, Executive Director
- Professional Staff

RESEARCH COUNCIL

- Christine Roman-Lantzy, Ph.D.
- Mary Ann Romski, Ph.D.
- Rose Sevcik, Ph.D.
- Frank DeRuyter, Ph.D.
- Jill King, M.S.
- Jesse Conchola, Statistician
A FRAMEWORK
SUPPORTING CHILDREN WITH CVI AND CCN

GOALS
VLLCP

SYNERGISTIC STRATEGIES
Phase I, II, III

COMMUNICATION PARTNERS

ENVIRONMENT

CHARACTERISTICS OF CHILD

Cortical Visual Impairment
Advanced Principles
Christine Roman-Lantzy
APH Press
Integrated Goals for Phase I

CVI Range

1. Build stable visual responses
2. Provide multiple learning opportunities throughout day to use vision
3. Attach meaning to familiar/preferred objects/activities/people in environment
4. Develop concepts for objects, actions, locations, etc.
5. Enable child to produce language and communicate with familiar partners
Characteristics of children
Phase I

Do not look at people
Do not establish joint attention
Eye to object contact rare
Visual responses intermittent/ rare
May turn to target using peripheral vision. All dorsal stream
May need physical supports to maintain position

Parents may report
• Children attend mostly to auditory information
• Child may have a “favorite” color (often red or yellow).

Children who can talk: When vision is engaged, children may label familiar objects. Echolalia. Concrete (“I see it” / “I want that”).
Phase I – Environment & Materials

- Familiar, shiny, favorite colored objects
- Movement
- 3-dimensional objects
- Short frequent sessions
- Light box, tablet with apps, flashlight to draw attention

Minimize sensory input
Phase I
Communication Partners

Use limited, targeted vocabulary (label objects, actions, attributes)

Stable positioning for seeing and communicating

Use AT backlit technologies

Use partner assisted auditory scanning

Select activities and materials that match language comprehension abilities

Language OUTPUT MULTI-MODAL
Use language mindfully to support vision, learning, communication, participation.

Acknowledge use of signals.
Sample Script – Phase I

1. Partner sets up activity
2. Partner presents favorite, bright colored, shiny object. Uses light (backlit device, lite box, spotlight) and movement to highlight object.
3. Partner waits. Latency can be quite prolonged. Partner is silent.
5. Partner labels, confirms/expands. Key to building concepts, attaching meaning to language, and learning about world.
# AAC/AT tools and strategies

## PHASE I

<table>
<thead>
<tr>
<th>NO TECH (body-based)</th>
<th>Non-Electronic</th>
<th>Electronic</th>
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</thead>
</table>
| Encourage            | • Highlight objects  
• Partner Assisted Auditory Scanning card to help partner(s) present vocabulary | • Tablet (without sound/voice)  
• Simple voice output messages to accompany familiar routines |
Integrated Goals for Phase II - CVI

Range

- 1. Improve use of vision with intent (functional vision)
- 2. Increase ability to have impact on objects, events, activities, interactions with partners
- 3. Develop concepts by identifying salient features. Encourage comparative thought....“it’s got a handle, like your cup”
- 5. Provide access to increasing complex language, both expressive and receptive
- 6. Support participation in academic/ pre-academic activities by modifying materials and the environment

Phase # II

Requires ongoing adjustments
Characteristics of child
Phase II

Has begun to use vision functionally (reaches, moves toward).

Still requires significant accommodations

Still may be necessary to control sensory input

Can introduce 2-dimensional materials...need to teach meaning

Need multiple opportunities to USE vision functionally each day and across environments

Children who talks may label, describe, request, questions, etc.

Parents may report

- Children recognize more colors and familiar objects and may begin to look at faces
- Begins to understand that what child can see can impact what happens.
**Phase II**

**Environment & Materials**

- Can introduce 2-D photos
- Add colors on object surfaces

- Variability: Early-late.
  Across environments/tasks.
  Increased complexity.

- LANGUAGE can support vision. Ask child to sort (e.g., red things; Find more cups; This is your doggy, here’s a picture of it.)

- Early->late phase II.
  Able to function with increase in sensory input
Phase II
Environment & Materials

POSITION so can use vision and interact with objects and participate in activities.

Increasing INDEPENDENCE.
Exploring environment

Increase COMPLEXITY while maintaining visual attention

Use TECHNOLOGY to make something happen

Use LANGUAGE to support learning (concepts and language)
Phase II
Communication Partners

Support active engagement in routines

Language Input (objects, actions, descriptors, etc). Describe salient features

Make small group activities accessible in familiar environments

Support communication access across contexts (multiple modes & methods)

Help mediate new or more complex settings
Sample Script – Phase 2

1. Partner sets up activity
   Can present objects more towards midline
   May say, “See if you can find...look at...when you look at...we’ll begin, etc.”
   May introduce 2–dimensional photographic images

2. Label object and describe 2 to 3 features. “Here’s your red cup. It’s got a handle so you can hold it.”
   Incorporate comparative language. “This cup is like your yellow cup except it is a small.”

3. Partner waits.
   Latency is decreasing

4. Looking precedes action
   May reach/swat, say something
   Eye-to-object contact
   Makes choices
   Begins to sort

5. Partner confirms/expands
   “You found all the pictures of ducks.”
   “You put all the blue blocks in the box.”
   “You found the dog in the picture of room.”
   “You found the switch and told me what you wanted.”
## SUGGESTIONS FOR AAC TOOLS AND STRATEGIES – PHASE II

<table>
<thead>
<tr>
<th>NO TECH (body-based)</th>
<th>NON-ELECTRONIC</th>
<th>ELECTRONIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Skilled partners. Access to vocabulary beyond objects &amp; actions.</td>
<td>• Objects</td>
<td>• Tablet (with sound) and Apps</td>
</tr>
<tr>
<td>• Partner assisted auditory scanning with branching</td>
<td>• 2-dimensional materials with meaning established</td>
<td>• Switches that activate toys or speech output</td>
</tr>
<tr>
<td>• Uses recognizable signals/language (gestures, signs, head shakes, etc).</td>
<td>• Communication display/book</td>
<td>• Computer with software (photos and other meaningful graphics)</td>
</tr>
<tr>
<td>• Makes choices, etc. using a few objects/photos</td>
<td>• Simple visual scanning system</td>
<td>• Communication devices</td>
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<tr>
<td></td>
<td>• Simple Etran system</td>
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<tr>
<td></td>
<td>• Card for partner(s) with vocabulary for PAAS with branching</td>
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</tbody>
</table>
PARTNER ASSISTED AUDITORY SCANNING – enables access to larger vocabulary -

TABLET
Monitor whether can visually attend while sound is present

AAC STRATEGIES: body based, non-electronic, electronic

Partner input:
Consider when and how to provide language input. WAIT TIME

LANGUAGE REPRESENTATION
Objects - Making Meaning Accessible.
PHASE II

<table>
<thead>
<tr>
<th>LOW TECH (non-electronic)</th>
<th>HIGH TECH (electronic)</th>
<th>Being Mindful to</th>
</tr>
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<tbody>
<tr>
<td>• Objects</td>
<td>• Tablet (with sound) with aApps</td>
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<tr>
<td>• Card for partner(s) with vocabulary for PAAS with branching</td>
<td></td>
<td>• Value ALL communication modes</td>
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<tr>
<td></td>
<td></td>
<td>• Select representations (graphic, object, verbal) that are meaningful to child</td>
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<tr>
<td></td>
<td></td>
<td>• Use displays/tools that child can easily ACCESS (vision, motor, linguistic, frequency, preferences, ease of use).</td>
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<td></td>
<td></td>
<td>• Consider how to arrange display, navigation based on individual child and usability across contexts</td>
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ABIGAIL: Preparing a project
Partner assisted auditory scanning
Assessment to Success: Integrating CVI Interventions, Strategies, and Accommodations into the Instructional Program at The Bridge School

Aileen Arau, M.A., Special Educator; Janelle Meynihan, M.S., CCC-SLP; Caitlin Sale, M.A., Special Educator; Sarah Blackstone, Ph.D., CCC-SLP

What we've learned:
- Results from The 3D Range assessment
- Participation increases
- Communication opportunities increase
- Academic engagement increases

Background
- The Bridge School serves students with severe speech and language impairments (SSLI) and contains a program for students with CVI
- CVI is a neurodevelopmental condition
- CVI affects how an individual perceives and interacts with their environment

A Case Study: Abigail
- Abigail is very socially engaged with peers and adults in her school
- CVI Range Score: 4.75 (age 7, grade 2)
- Recommendations & Strategies:
  - 3D Range objects
  - Reduce complexity of 3D objects
  - Visual cueing
  - Visual cueing
  - Visual cueing
  - Reduce visual clutter

Outcomes
- Abigail's CVI Range Score:
  - 2013: 4.75 (age 7, grade 2)
  - 2016: 3.5 (age 10, grade 3)

Interventions: examples of modifications and accommodations designed for Abigail:
- Reduce font size and color contrast
- Use visual cueing
- Library instruction
- Using a laser pointer to highlight features

Questions, Challenges, Next Steps
- Strategies for training team members within the Bridge School
- Changing and adapting interventions over time as vision improves
- Teaching social skills
- Teaching academic skills

Planning
- The educational team identifies intervention objectives for specific times of day, curriculum, and environmental modifications
- Collaborate with classroom staff, families, and professionals to develop a comprehensive plan for Abigail's educational needs

References

Acknowledgments
- Thank you to The Bridge School staff and administration for supporting students with CVI and providing opportunities for academic growth and success.
Literacy skills
Integrated Goals for Phase III - CVI

Range

1. Refine and integrate use of vision for increasingly visually complex tasks.
2. Distance vision increasing. Support attention to actions, locations & persons.
3. Increase access to incidental learning opportunities
4. 
5. Increase access to robust/large vocabulary to support vision and learning
6. Support learning (academic/pre-academic), modifying instruction and materials as needed
7. Increase participation and independence during functional activities across familiar environments
Characteristics of child
Phase III

Can participate in activities, assignments, tasks
Continues to need accommodations to environment and materials
Contextual complexity interferes with performance across domains
Incidental learning occurs. May benefit from Orientation and Mobility services

Parents may report
- Child may appear curious in new environments, establish eye contact, engage with siblings, peers, adults/
- Contextual complexity matters

Children who can talk: May not have well-developed concepts. Children with CCN need access to large vocabularies and be able to access and use variety of AAC approaches to communicate with familiar (and unfamiliar) partners.
Phase III
Environment & Materials

INCIDENTAL LEARNING. More independence. Rely on salient features in new or complex environments.

HIGHLY COMPLEX AND NOVEL ENVIRONMENTS still difficult.

POSITION with back to complexity.

Orientation and Mobility. Maps
Moving to small group independently – Phase III
Construct environment to decrease complexity, support instruction, incidental learning, relationships and use of language/communication tools

2-D materials. SPACE between elements of 2-D materials, images, symbols

COLOR HIGHLIGHTING of salient features.

Adaptations important. Consider complexity, novelty and visual fields.
Phase III

Communication Partners

- Use of COMPARATIVE LANGUAGE. Draw attention to the similarities/differences of classes of objects, actions, environments. Use consistent vocabulary.

- WAIT TIME
  Latency may still be present.

Make sure attach meaning to 2-D representations

AAC Strategies. Partner assisted scanning;
Communication displays using 2-D representation; increase array, 4+

ACCESS TO LANGUAGE ESSENTIAL — No, low, high tech. ALL environments
Phase III Participation

Increasing independence

Expanding communication access across partners and environments

Increasing access to instruction and materials throughout the day.

Increased use of technologies across environments
**Sample Script – Phase III**

1. **SET UP**
   “Tell me what you see;”
   “Show me how these things go together.”
   “You’ve seen things like this before.” “Tell me what you notice while we are walking.”
   “Let me know when you see the__.”
   Which pictures are faces of girls”

2. **Incidental access**
   Describe object, event, activity, people.
   Use salient features and comparative language.

3. **Wait time**
   Ask child what they notice.
   “Let me know when you see the__.”

4. **Child output**
   More complex language (speech/AAC strategies/tools)
   - Express personal contributions
   - How objects, images, environments, people are alike/ different.

5. **Confirmation**
   Acknowledge child’s competence.
   Build depth and breadth of existing schema:
   Affirm ability to solve a problem
   - Base (O&M) based on salient features of routes
   - Flexibility in thinking
   - Connect novel experiences to past visual information
SUGGESTIONS FOR AAC TOOLS AND STRATEGIES – PHASE III

<table>
<thead>
<tr>
<th>PHASE III</th>
<th>NO TECH (body-based)</th>
<th>LOW TECH (non-electronic)</th>
<th>HIGH TECH (electronic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Same strategies- more</td>
<td>• Same as Phase II with more vocabulary</td>
<td>• Tablet (with sound/ voice) and apps</td>
<td></td>
</tr>
<tr>
<td>• Skilled partners. Access to large vocabulary. Create many types of messages.</td>
<td>• Possible use of coding (e.g., color/number)</td>
<td>• Computer with software (meaningful graphics).</td>
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</tr>
<tr>
<td>• Partner assisted auditory scanning</td>
<td>• Increased use of recognizable signals/</td>
<td>• Highlighting letters/words possible</td>
<td></td>
</tr>
<tr>
<td>• Increase use of language across environments/ communication partners</td>
<td></td>
<td>• Communication devices (direct select, switches for auditory scan)</td>
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<td>• Access to vocabulary/ partners/throughout day.</td>
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<td></td>
<td>• May be able to use eye gaze system or visual scan</td>
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</table>
VLLCP: A Framework for Synergistic Practice

Use your skills in ways that make a difference
Structured observations, longitudinal case studies, integrated approaches & measurable outcomes
REFERENCES AND RESOURCES
The Bridge School Website. https://www.bridgeschool.org

Get To Know Me: A training video for family members and friends of children with cortical visual impairment and complex communication needs. Featuring Diego, his family, friends, and CATIC professionals.


