## Effects of a Visual Immersion Experience on Communication in Autism

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# Overview of Talk

Introduction to the Visual Immersion Program (VIP)
• Development, rationale, core principles, tools

Introduction of the field study
• `Goals, design, procedures, participant

Discussion of intervention techniques and preliminary results

Discussion of conclusions and implications for clinical practice

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## Introduction to the Visual Immersion Program (VIP): Development and Rationale

Documented difficulties with spoken language (Boddaert et al. 2003; Wetherby & Prizant 2000)

Relative natural strengths in visual processing (Althaus, de Sonneville, Minderaa, Hensen & Til 1996)

Natural preference for visual input, especially electronic screen media (ESM) (Shane & Albert 2008)

Current use of visuals limited to teaching of isolated operations

*The Visual Immersion Program represents an attempt to move beyond current instructional norms by providing maximum access to language through the visual modality.

## Introduction to the VIP: Core Principles

**Environment is visually immersive**

**Visuals support comprehension and expression**

**Visuals support 7 distinct communicative functions**

- Protesting
- Organization/Transitions
- Requesting
- Directives
- Commenting
- Questioning
- Social Pragmatics

## Introduction to the VIP: Tools

**Scene cues**
- Dynamic scene cues (video clips)
- Static scene cues (photographs)

**Mixed displays**

**Element cues**

- **Graphic symbols**

**Topic Displays**

**Software**

**Hardware**

## The Field Study: Goals

**Actualize the core principles**

**Expand and refine instructional program**
- Teaching techniques
- Tools – role of technology

**Evaluate effectiveness of approach on an ongoing basis**

**Teach and train others to implement the program: Train the Trainer model**
- Initial evaluation done by the field worker
- Field worker provides modeling and training in use of visual supports
- Field worker "steps back" and mentors "step up"

## The Field Study: Design

**Case study design (Yin 2009)**
- Two-year study
- Focused on one primary subject (BC)

**Implemented across all key environments**
- Home
- School
- Community

**Trained multiple mentors**
- Parents, home aides, family friends
- Teachers, school aides, classmates

## The Field Study: Procedures

**Baseline assessment**
- 7 functions
- Formal testing, record review, observation, interview

**Developed Instructional Program**
- Determined goals
- Design an instructional approach

**Created and implemented visual materials**

**Provided training**

**Evaluated progress and modified goals/materials as needed**

## The Field Study:  Participant (BC)

**Age:** 17 years

**Gender:** Female

**Diagnosis:** Autism

**Medical status:** gross and fine motor difficulties

**Educational status:** Substantially separate classroom; Vocational transitional program

**Preferences:** electronic screen media, art, reading…

## The Field Study:  Participant (BC) cont.

**General Communication Skills at Baseline**

**Overall**
- Difficulty establishing and maintaining joint attention
- Long processing delays
- Echolalic speech
- Able to decode; reduced comprehension
- Increased attention with visual supports – photographs, videos, text

**Comprehension**
- Difficulty with abstract lexical concepts encoded in verbs, prepositions, descriptors
- Relies heavily on context cues, physical and gestural support

**Expression**
- Infrequent
- Primarily physical; occasional use of scripted phrases

## The Field Study:  Intervention Techniques and Preliminary Results

**Data from Year 1 Presented:**
- Directives
- Commenting
- Questioning

**3 sources of data:**
- Video analysis
- Progress notes
- Social validation

**Directives:
Definition**

- **Language used to control the behavior of another.**

- **Directives are both receptive and expressive in nature**

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**Directives:
Assessment and Baseline for BC**

- **Comprehension best within routines**

- **Difficulty with comprehension of novel directives**

- **Did not direct others**

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**Directives:
Goals and Strategies**

**Goal: Increase knowledge of concepts and syntax through direct instruction**
- Teach the concept
  - Concept in <u>plausible directive</u>
  - Concept in <u>nonsense directive</u>
  - Contrast with <u>other concepts</u>
- <u>Integrate into routines</u>
- <u>Graphic symbols</u> for opportunities where personalized supports not available

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**Directives:
Goals and Strategies**

**Goal: Promote participation in common routines\***
- Improve comprehension
  - <u>Example</u>: preparing to go to the beach
- Improve attention
  - <u>Example</u>: dressing

**\*Progression from scene cues to element cues mirrors instructional format as detailed previously**

## Directives:
## Goals and Strategies

**Goal: Promote ability to direct others**

– Using single concepts
  - Identify opportunities (open, drive)
  - Place visuals and model
  - Visuals remain available to support word-finding

– Gradually increase complexity of directives expressed
  - Using TLC (Example: Open the water)
  - Using Topic displays (Example: Drive fast)

## Directives:
## Preliminary Results

**Evidence from video analysis**

– Increased accuracy in following directives delivered using language
  - Data

– Increased frequency of expression
  - Increase in rate of directives given by learner from 0/hour to 1/hour in random video sample

## Directives:
## Preliminary Results

**Evidence from progress notes**

– Demonstrated increase in comprehension of concepts taught
  - Selected data sample

– BC now an active participant in more common routines

– Expressive use of combinatorial semantic relations emerging
  - Example: TLC data

## Directives:
## Preliminary Results

**Social Validation**

– "BC is definitely responding better to language/commands.  She knows much sooner what is being asked of her than she did previously.  The effect is very noticeable, maybe more so for [her sister] and me because we see the dramatic and not gradual changes." –BC's brother in law

– "Knowing how to best teach BC has allowed us to ask more of BC and increase her age appropriate abilities and independence.   As an example, BC now clears her place from dinner independently, with either no or 1 prompt." –BC's stepmother

– "She learned from the visuals" –BC's mother

## Commenting:
## Definitions

**Objective comment - exchanging information that describes someone or something by including some or all of its relevant characteristics or qualities that are also perceivable by others (e.g., who, what, where, when, etc.).**

**Subjective comment - a remark intended to share one's internal state e.g., thoughts, feelings, opinions, or reactions to an event, activity, object or person.**

## Commenting:
## Assessment and Baseline for BC

**Objective Commenting**
– Able to label people, objects, some actions when prompted
– No spontaneous labeling noted

**Subjective Commenting**
– Use of behavior and facial expressions
– Occasional use of scripted phrases

**No specific supports in place**

## Commenting:
## Goals and Strategies

**Goal:  Increase overall commenting (frequency, spontaneity, variety, complexity)**
– Identify interests
– Provide visuals and model use
  • Individual symbols (low tech, high tech)
  • Topic displays
– Include varied vocabulary (descriptors, phrases)

## Commenting:
## Preliminary Results

**Evidence from video analysis**
– increase in frequency of commenting from 3 at baseline to 7 at follow-up
– Increase in use of generative (unscripted) language

## Commenting:
## Preliminary Results

**Evidence from progress notes**
- Spontaneous use of combinatorial semantic relations emerging – <u>video</u>
- Increased modeling of comments on the part of mentors observed
  - Increase in instances of immediate echolalia with simultaneous pointing to the visuals observed in many instance – processing/practicing/attending

## Questioning:
## Definition

**Interrogative sentences, phrases, or gestures that are spoken or written**

**Questions are directed to someone in order to receive information in reply.**

**Questions have both a receptive and an expressive component**

## Questioning:
## Assessment and Baseline for BC

- **Response to Yes/No questions unreliable**
- **Able to answer:**
  - "who" questions (labeling)
  - "what + be" questions (labeling)
- **Unable to answer:**
  - What + do questions
  - Where questions
  - Open-ended questions
  - Other question forms (e.g., How, Why)
- **Does not currently use symbolic means to ask questions**
- **Yes/No questions and open-ended questions asked frequently; no supports or instruction currently in place**

## Questions:
## Goals and Strategies

**Goal: Increase ability to respond intentionally to yes/no questions**
- Direct instruction
- Transition to daily interactions
  - Preferences
  - Basic needs

## Questions:
## Goals and Strategies

**Goal: Provide support for responses to open-ended questions**
– Visual choice displays
– Use of distracter

## Questions:
## Goals and Strategies

**Goal: Teach use of "I don't know"**
– Video modeling

## Questions:
## Preliminary Results

**Evidence from video analysis**
– Ability to respond correctly/intentionally to a greater variety of question types during ongoing interactions
  • Chart
– Mentors now asking questions to gain real information
  • chart

## Questions:
## Preliminary Results

**Evidence from progress notes**
– Consistent response to yes/no questions
  • At the tabletop
  • During real time interactions
– Generalization to yes/no questions pertaining to opinions
  • video
– Emerging use of "I don't know" as a response
  • Graph
– Ability to respond to open-ended questions pertaining to preferences
  • Baseline and current performance

## Questions:
## Preliminary Results

**Social Validation**

– We used the yes/no symbols a lot this weekend – she is really good with them! I really trust her answers!" -BC's mother

## Conclusions

**Intensity of an immersive environment may contribute to better results**

- Multiple environments
- Multiple mentors

**Technology crucial**

- Access to materials
- More effective materials

**Confirmed attraction to media (Shane and Albert 2008)**

## Conclusions cont.

**Train the Trainer model offers new opportunities - progression in nature of participation:**

- Acceptance
- Joint ownership
- Joint goal development
- Creation and programming of devices

**Continued development needed**

- Instructional strategies
- Tools

## Implications

**Current service delivery model may need to be expanded – how to make this a reality?**

- Multiple mentors involved
- Multiple environments involved
- Need for a point-person (SLP)
  - Establish goals
  - Model instruction
  - Monitor learner's progress
  - Coordinate the "team"
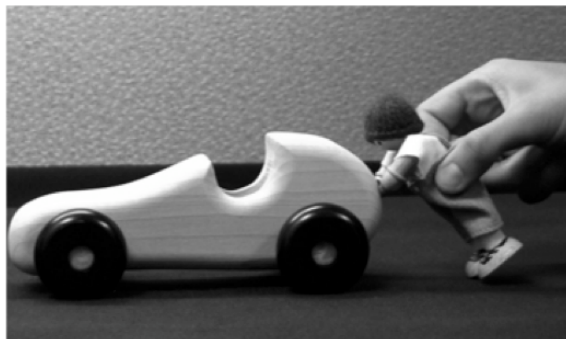- Need for intuitive, affordable tools

## Questions?

**Thank you!**

## Dynamic scene cue targeting the concept "push"

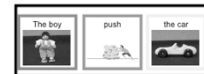## Static scene cue targeting the concept "push"



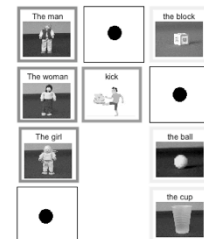## Mixed Display Targeting the Concept "Push"



Static Scene Cue:
Still frame photographic images that capture a prototypical moment in the full-motion dynamic scene

Sentence Strip:
Directives may be constructed here by affixing Corresponding language elements to the sentence Strip through the use of Velcro

| The boy | push | the car |

| The man | ● | the block |
| The woman | kick | ● |
| The girl | | the ball |
| ● | | the cup |

Language Elements:
Graphic icons representing the individual linguistic components comprised in the action scene (e.g., subject, verb, object, preposition, etc.).
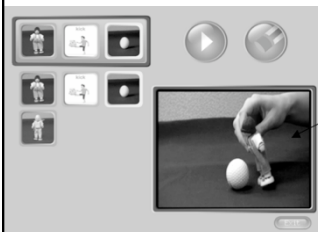
## Element cues targeting the concept "push"



## Graphic symbols

## Teaching Language Concepts (TLC) Software



## Directives:
**Plausible Directive**

**Directives:**
**Nonsense Directive**



**Directives:**
**Contrast with Other Concepts**



**Directives:**
**Integrate into Routines**



**Directives: Aided Language**
**Stimulation**

## Directives:  Support for Comprehension
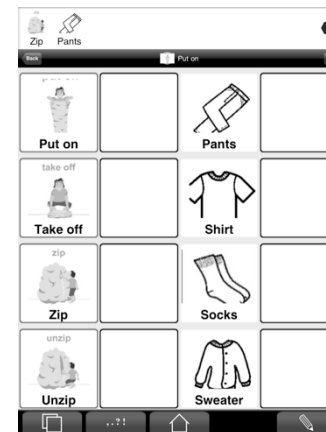
## Directives:  Support for Comprehension



Sunscreen    in    The bag

## Directives:  Support for Attention



Zip  Pants

Put on

Put on          Pants
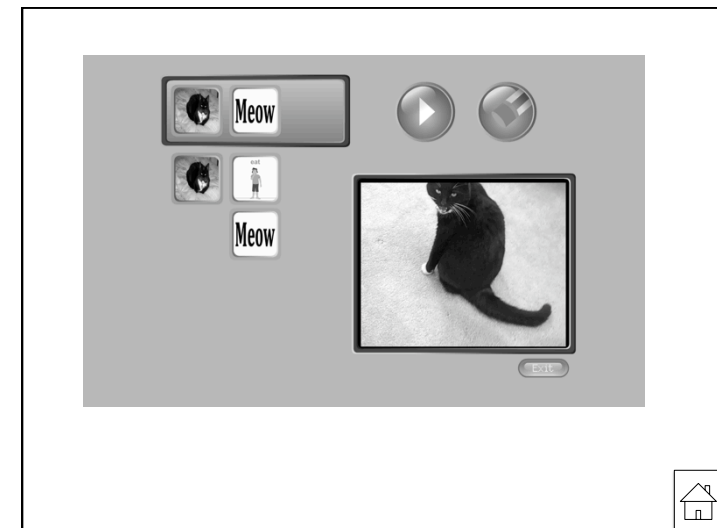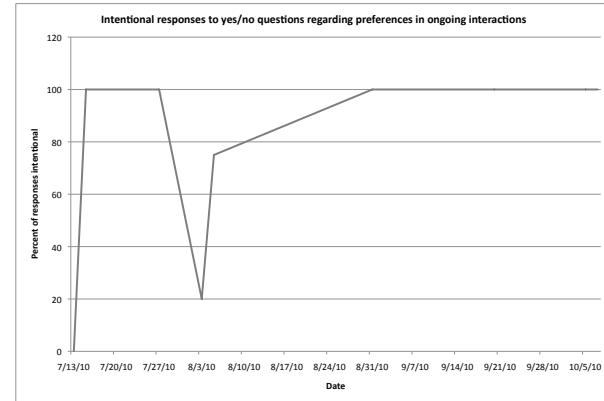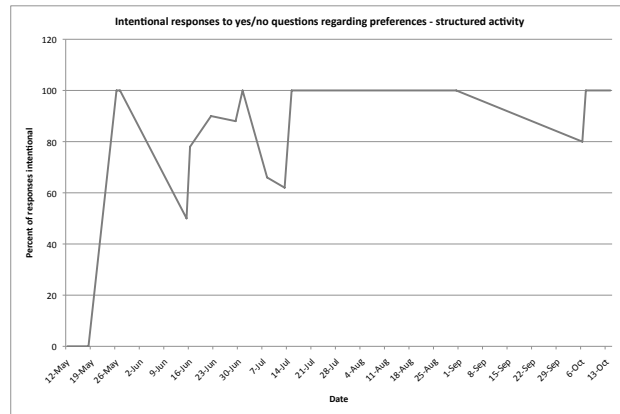
Take off        Shirt

Zip             Socks

Unzip           Sweater

| Concept | Most abstract level of support used successfully by mentors to supplement speech (quiet, non-distracting environment) | | |
|---|---|---|---|
| | Baseline | 6 Months | 12 Months |
| **Wipe** (Action + Object Phrase) | Physical or Gestural | Visual Element Cues | None |
| **Hang up** (Action + Object + Location phrase) | Gestural | Dynamic Scene Cues | Visual Element Cues |
| **On** (Agent + Preposition + Object Phrase) | Gestural | Static Scene Cues | Static Scene Cues/Mixed Displays |

# Comprehension of Directives

| % Directives Followed Accurately During a Random 1-Hour Period | | |
|---|---|---|
| | Baseline | 1-Year |
| Routine | 18% | 51% |
| Novel | N/A | 29% |

Intentional responses to yes/no questions regarding preferences - structured activity



Intentional responses to yes/no questions regarding preferences in ongoing interactions

| Number of Intentional or Correct Responses During Random Video Sample of Daily Interaction | | |
|---|---|---|
| | Baseline | 1 year |
| Yes/No questions | 0/10 | 1/7 |
| Open-ended questions | 0/1 | 1/3 |
| What + be questions | 0/1 | 1/1 |

| Number of Correct/Intentional Responses Providing New Information Compared to Total Number of Correct/Intentional Responses | |
|---|---|
| Baseline | 1 year |
| 0/2 | 2/3 |

**% "What + do" questions answered correctly with visual support**



**Use of "I don't know" in response to "wh" questions**
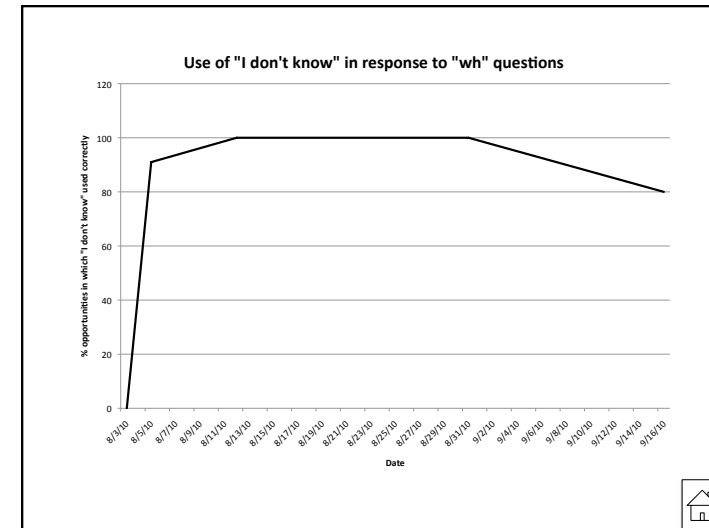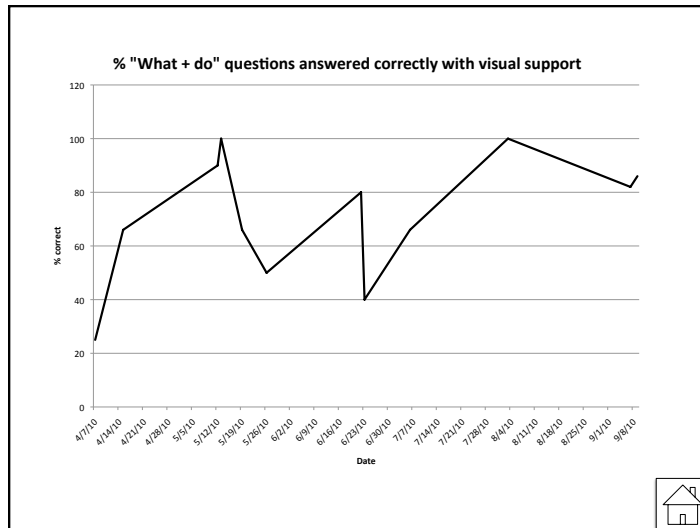


| Performance summary: Video description task used to teach combinatorial semantic relations used within common directives ||
|---|---|
| 1/21/2010 | 5/13/2010 |
| "(BC) required hand-over-hand assistance in order to select elements corresponding to the scene shown in the media window." | "(BC) was able to successfully and independently describe 16/18 dynamic scene cues (containing the concepts "open" and "dance") by selecting 'agent + action' or 'action + object' elements." |

# References

Althaus, M., de Sonneville, L.M., Minderaa, R.B., Hensen, L.G., & Til, R.B. (1996). Information processing and aspects of visual attention in children with the DSM-III-R diagnosis "Pervasive Developmental Disorder Not Otherwise Specified" (PDDNOS): II. *Child Neuropsychology*, 2(1), 17-29.

Boddaert, N., Belin, P., Chabane, N., Poline, J-B., Barthelemy, C., Mouren-Simeoni, M-C., Brunelle, F., Samson, Y., & Zilbovicius, M. (2003). Perception of complex sounds: Abnormal pattern of cortical activation in autism. *American Journal of Psychiatry, 160,* 2057-2060.

Shane, H.C., & Albert, P.D. (2008). Electronic screen media for persons with autism spectrum disorders: results of a survey. *Journal of Autism and Developmental Disorders, 38 (8)* 1499-1508.

Wetherby, A.M. & Prizant, B.M. (2000). Autism spectrum disorders: A transactional developmental perspective. Baltimore, MD: Paul Brooks Publishing Company.

Yin, R. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks: CA: Sage Publications.

## Example: Directing Others

## Example: Symbols for Commenting