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AAC for Adults With Acquired Neurological Conditions: Today & Tomorrow

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Disclosure Statement

- We have the following relevant financial relationship relative to the content described in this presentation.
  - Financial – Author and editor of books referenced in this presentation. I will receive royalty payments from these books. Some of the work has been support by the AAC-RERC (NIDRR—USDE)
  - Nonfinancial – No relevant nonfinancial relationship exists.

Organization of Presentation

- Contexts in which AAC has evolved
- AAC for people with minimal movement due to acquired health conditions
- A framework for aphasia intervention
- The emergence of shared "communication spaces"

The Overall Context: It is all about COMMUNICATION

Face – to-face interaction

Social media

- E-mail
- Texting
- Tweeting
- Social media sites

Distance commerce, learning, volunteering,

Context: The Emerging Focus on Communication Support for Participation

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Braum (2011)

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Context: More People With AAC Needs & Access

- 1. Larger overall population
- --Longer life expectancy for overall population
  --Longer life expectancy of those with developmental disabilities
- 2. Larger number of children with disability
- 3. Larger population of people living with intubation and other temporary or permanent medical conditions
- 4. Changing international access to technology with AAC potential

The People: General Population Trends

- Increased Lifespan—Burgeoning Older Population
- People who live to 65 years of age are expected to live 18.6 more years
- (Women – 20 years; Men – 17.3 years).
- (Over 65 years: 2000--12.9% of U.S.; 2030 -19.0%
- Life expectancy for people who live to 85 years is 6.8 more years for women and 5.7 years for men.

Administration on Aging –based on U.S. Census

Context: Technology Shapes Ability & Disability

- New Technologies can Either Mitigate or Exacerbate Disability

Context: Rapid Technical Change

- Rapid technical change tends to emphasize universal design.
- However, rate of change impacts the functionality of technology:
  - Elderly
  - Those who require facilitator support
  - Those with highly unique technical requirements

Technological Changes: AAC

- Mobile technology
- Creating communication spaces with shared technological access
- Dynamic information gathering sharing to support AAC
- New access Strategies
  - Eye-Head tracking in universal design
  - Integrating eye tracking and physical access
  - Supported speech recognition of disordered speech signals
  - Brain Computer Interfaces that incorporated AAC strategies

Context: Use of Technology to Develop Capability

- Physical access
- Visual access and organization of information
- Language and cognitive capability

- Strategies
  - Gaming
  - Incremental increase in complexity
  - Sharing “space” with partners

Context: Service Delivery/Policy Changes

- Mobile technology influences
- Change in support from commercial providers of AAC apps
- Declining rural populations
- Reimbursement Per Diem Caps
- Instructional support networks
- Distance instruction and practice support

Need AAC Services (2 Examples) Amyotrophic Lateral Sclerosis

- 5,600 diagnosed with ALS annually, 300,000 prevalence
- 80-90% people with ALS unable to speak at time of death
- Median survival rates are 32 months from onset and 19 months from diagnosis
- Nebraska database 93% required AAC at or before time of death
-
-

(Ball, Beukelman, Pattee, 2004)

Amyotrophic Lateral Sclerosis

Bulbar Signs

Resulting from brain stem involvement

Spinal Signs

Resulting from spinal cord involvement

Mixed Signs

Resulting from brain stem and spinal cord involvement

Symptoms and Natural Course Progressive Disease

As ALS progresses, upper and lower motor neurons are involved

Mean age of onset--56 Years

Male to female ratio--2:1

Bulbar ALS--women demonstrate more severe speech symptoms than men

Spinal ALS--men demonstrate more severe speech symptoms than women

Language usually intact

Cognitive--10% fronto-termporal dementia (more on tests)

No important means of drug intervention

Survival

--14 to 39% survive 5 years

--10% survive ten years

--A few survive twenty years

--Those with primary bulbar symptoms survive a median of 2.2 years

--Death is usually from respiratory failure due to infection

--Life is extended by invasive ventilation

--Quality of life is improved with alternative nutrition

Communication Characteristics

Gradual progression speech symptoms

Dysarthria of mixed flaccid and spastic types (Because of upper and lower neuron involvement

--Spastic dysarthria (upper)

--Flaccid dysarthria (lower)

Most cannot speak for some time prior to death

Now----Routine Intervention Strategy

Intervention Phase 1: Monitor, Prepare, and Support

- Monitor Performance
- Make Timely Referral

Intervention:

Confirm normalcy

Answer questions

Identify service providers

Identify attitude patterns toward

communication impairments & technology

Share speech monitoring results with PALS and other decision makers

(Ball, Beukelman, & Bardach, 2007)

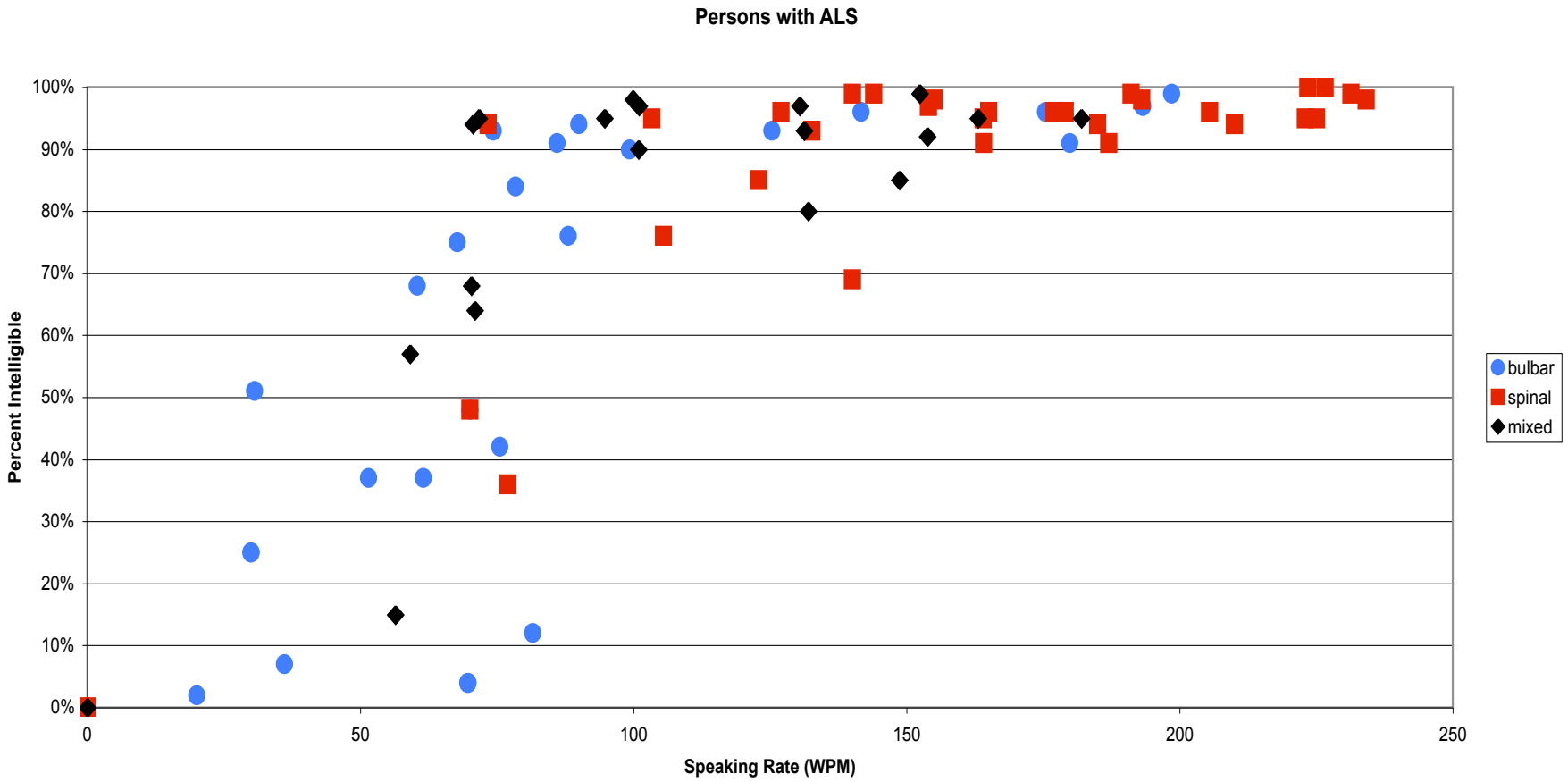
Monitoring Speech Performance

AAC interventions are difficult when person cannot speak

Speech intelligibility is a poor predictor, because deterioration of speech can be very rapid

Once speaking rate is 60% of normal, move toward AAC system (120-125 WPM).

All Types of ALS (Bulbar, Spinal, Mixed) Intelligibility and Speaking Rate



One Person's Experience

Sept.: 97% intelligible, rate 90 wpm

Nov.: 75% intelligible, rate 68 wpm

Feb.: 33% intelligible, rate 52 wpm

May.: 6.8% intelligible, rate 36 wpm

Late AAC Assessment Project

- Purposes:

(1) To identify persons with amyotrophic lateral sclerosis (ALS) for whom the AAC assessment was delayed

(2) To document the factors that result in a late AAC assessment

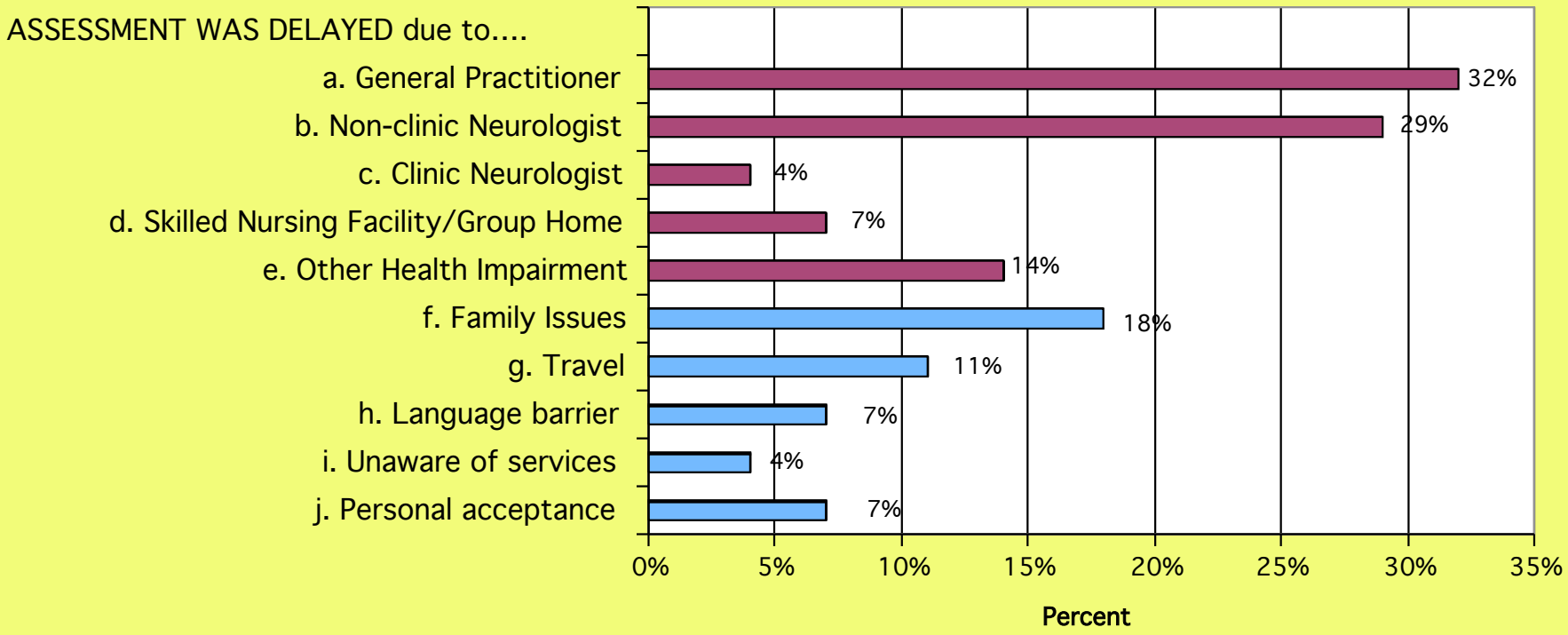
Nordness, Ball, Fager, Beukelman, & Pattee, (2010).

Participants

28 of 280 people with ALS were identified as receiving a late referral (10%)

	Demographics
Gender	Male = 11 (41%) Female = 16 (59%)
Onset Typ e	Bulbar = 16 (59%) Spinal = 9 (33%) Mixed = 2 (7%)
Age at Onset	Mean = 59.87 years Range = 41 - 79 years

Reasons for a Late AAC Assessment



Intervention Phase II: Assess, Recommend, & Implement

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AAC Acceptance

Initial Acceptance--PAL completed an AAC assessment, decided to obtain AAC Technology and used AAC technology.

Delayed Acceptance--PAL initially rejected AAC

Reject—never accept

ALS: AAC Acceptance & Use

Nebraska ALS Database (N = 140)

- 95% unable to speak prior to death
- 96% accept AAC (6% delay; 4% reject)
- All, who accept, use until within a month or two of death
- Length of use is remarkably similar for those with initial spinal (23 months) or bulbar symptoms (26 months) (under-estimates because 15% continued to use while ventilated)

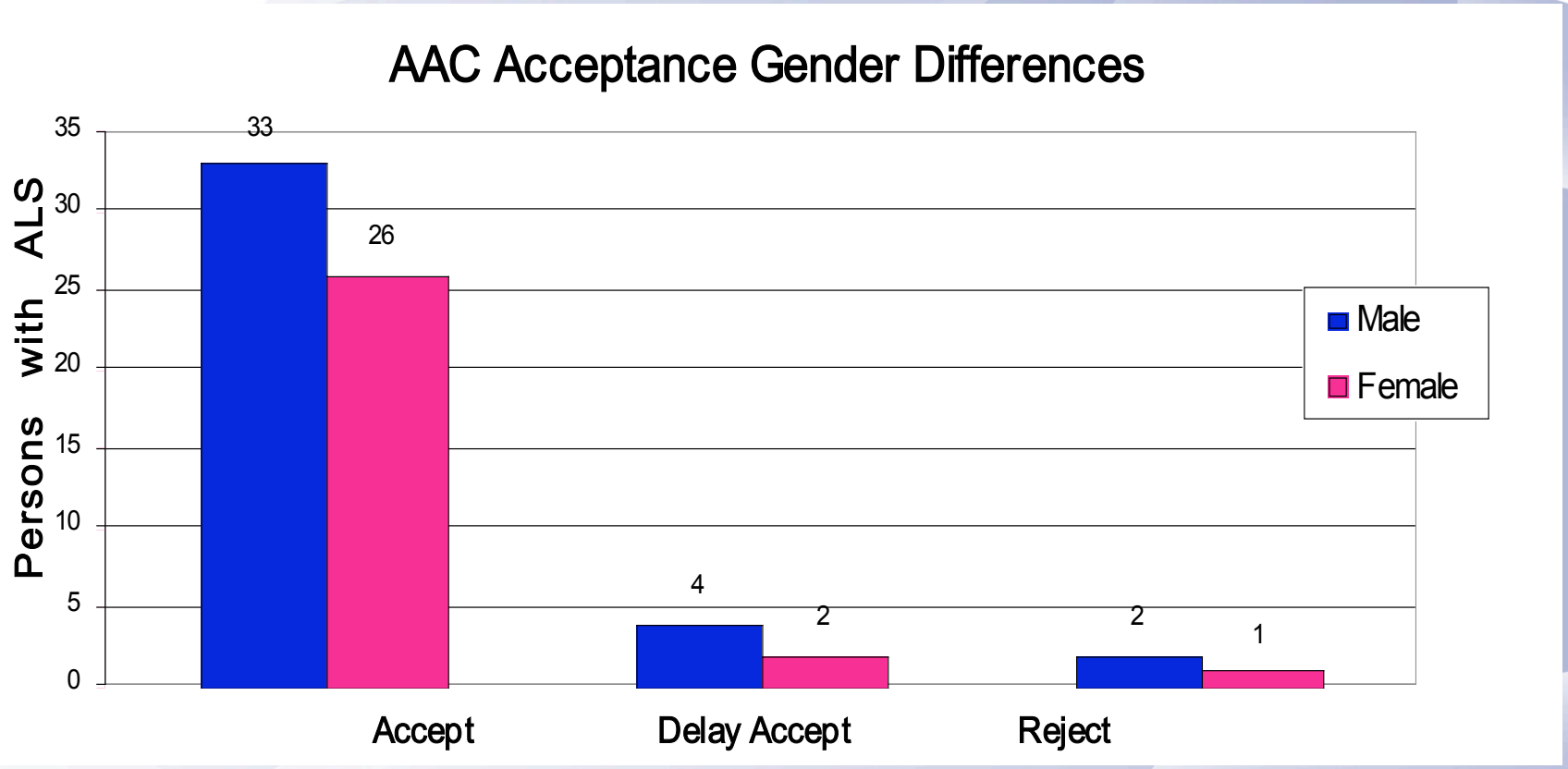
Ball, L, Anderson, Bilyeu, D., Pattee, Beukelman, & Robertson (2007).

Reasons for Rejection

1--Cognitive Limitations of PALS (FTD)

2--Multiple health conditions: Cancer & ALS

AAC Acceptance by Gender

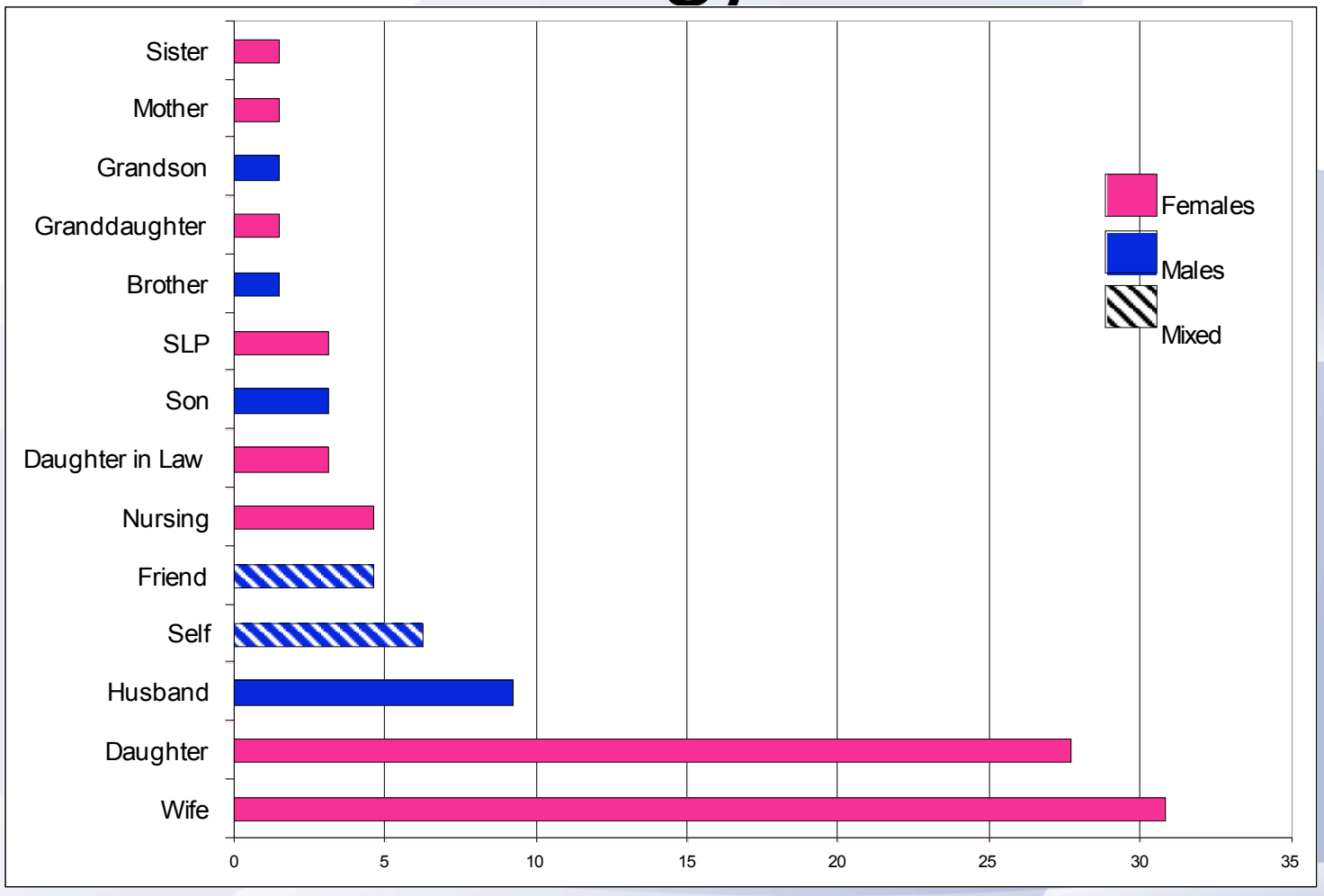


Reasons for Delayed Acceptance

1. Resistance of family member
2. Resistance of family member
3. Resistance of physician
4. Initial resistance of PALS
5. Initial resistance of PALS
6. Initial resistance of PALS

Intervention Phase III: Adapt and Accommodate

AAC Technology Facilitators



Ball, L., Schardt, Kim, & Beukelman, D. (2005)

Eye-Tracking Follow-up

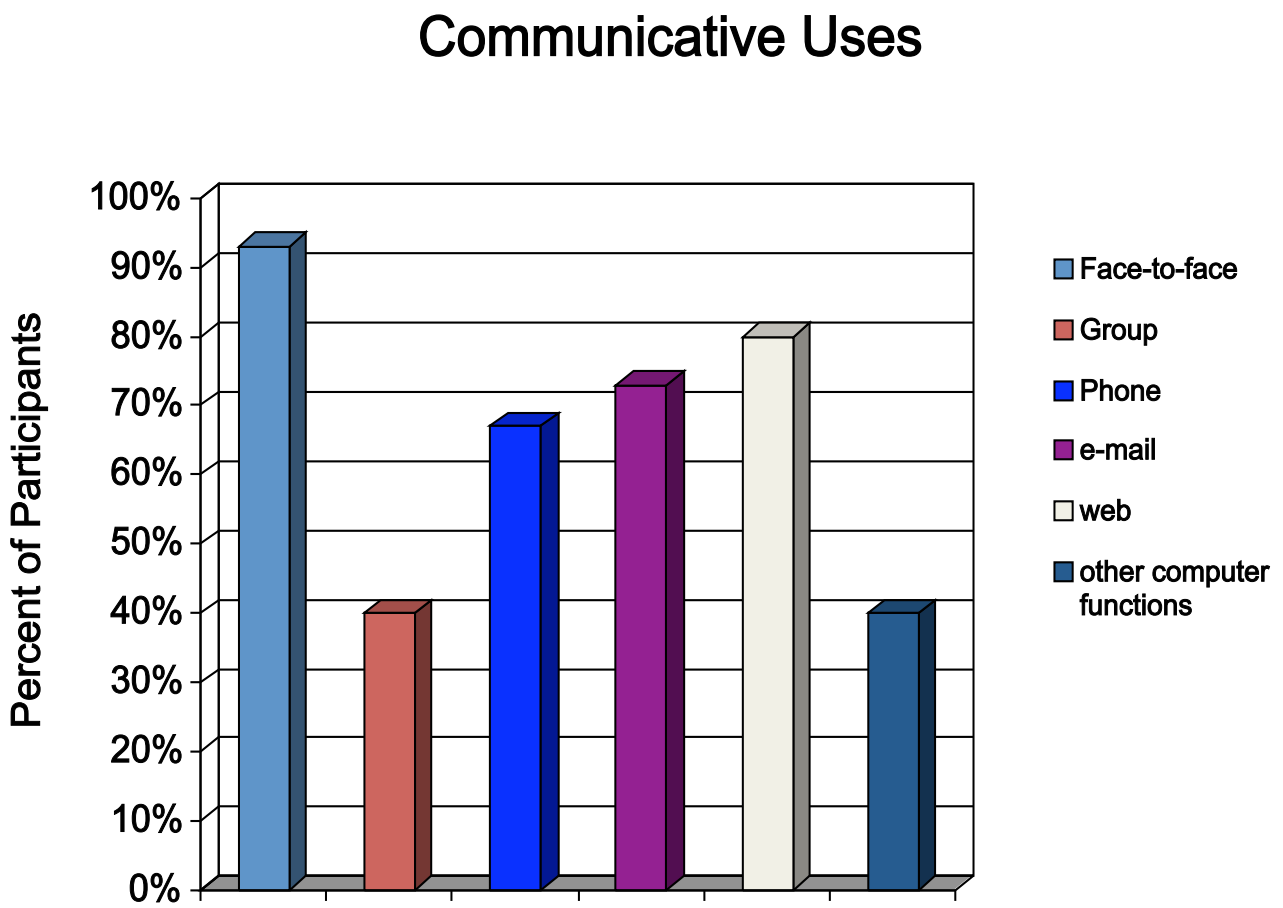
- 15 Persons with ALS
- 14 Continued to use eye tracking technology
- 1 Discontinued--Eye-lid Droop

Ball, Fager, Nordness, Kersch, Mohr, Pattee, Beukelman, (2010)

Reasons for Eye-Tracking

- 58% Eye gaze access only
- 27% Multiple access preferred
- 13% Unable to scan
- 7% wanted eye & head access

Communicative Uses



Patterns of AAC Use (Routine Practice)

- Survey of family members and caregivers in 8 states (215 respondents—44.7%)
  - 79% reported difficulty communicating with others (65% with family member or caregiver).
  - 45% reported having an AAC device.
  - Communication topic
    - Personal needs – 73.3%
    - Caregiving issues--43.1%
    - Family issues –39.8%
    - Comments about day—33.1%
    - Pain--32.2%

(Brownlee & Bruening, 2012)

Future Directions

- 1. Expand routine practice
- 2. Integrate AAC into routine medical care
- 3. Clarifying the role of mobile technology for ALS
- 4. Integrating evolving eye-tracking technologies and strategies
- 5. Brain Computer Interface

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Brainstem Impairment

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Brainstem Impairment Etiology

- Brainstem stroke (basilar artery occlusion)
- Traumatic brain injury
- Brainstem tumor
- Demyelination
- Guillain Barré
- West Nile / Guillain Barré syndrome

Clinical Profiles

1. Complete Locked-In Syndrome (LIS)
2. Incomplete LIS
3. Transitioning from complete LIS to incomplete LIS
4. Top of the Basilar Syndrome

Complete LIS

- Early stages of recovery from brainstem impairment
- Quadriplegia with intact or near-intact language/cognition
- Vertical eye movements
- Small number of individuals remain chronically locked-in

Incomplete LIS

- Severe physical impairments, but not "locked-in"
- May have ability to move head or other body parts (control and stamina for these activities remain limited)
- Have more eye control or normal eye control compared to complete LIS

Complete to Incomplete LIS

- Gradual gain of physical movement control over time
- Speech recovery possible but severe dysarthria common in those who do regain some ability to speak

Top of the Basilar Syndrome

- LIS with impaired attention and arousal
- Challenging characteristics for effective AAC intervention

Early/Acute Intervention

- Medical instability
  - Intervention needs to be flexible and occur secondary to medical care needs
  - Adjustments in intervention schedules (shorter but more frequent sessions)
  - Education of care providers extensive component to early intervention

Establish Consistent Response Mode

- Reliable yes/no response mode
  - Motor assessment
    - Physical movement control profile (head control, facial muscle control, hands, arms, feet, etc.)
    - Focus on least fatiguing and most reliable movement
  - Informal vision assessment
    - Visual motor control (vertical eye movement, horizontal eye movement, eye blinks, visual tracking)
  - Attention/arousal capabilities
    - Opening eyes to command, physical motor responses to command, length of time able to follow commands accurately, etc.

Establish Consistent Nurse Call System

- Identify consistent/reliable motor response (needs to be 100% for nurse call system use)
  - Head switches, light touch switches, infrared eye blink switches can all be adapted to interface with many hospital nurse call systems
  - Take into account positioning issues
  - Switch may only be accessible in certain positions
  - Nursing staff may still need to increase patient checks to ensure switch is working and accessible
- Alternative plan for those without reliable/consistent motor response
  - 15 minute nurse checks
  - Needs to be communicated clearly to patient to decrease anxiety

Education

- Education is an extensive component to early intervention
  - Care staff, therapy staff, family members, friends and visitors
- Alternative therapy and AAC modality use schedule to minimize fatigue and maximize participation
- Structured communication approaches for basic needs
  - Word lists of common needs for staff
  - Keeping interactions brief
  - Limiting number of questions asked

Increasing Medical Stability

- As medical stability increases, so does tolerance for longer communicative interactions
- Time to trial options for communicating longer messages (e.g., spelling)
  - **Eye linking**, eye gaze, partner-dependent scanning
  - Further assessment of cognitive/language capabilities if questions remain
  - Develop and train care givers on appropriate low tech communication strategies that best match visual capabilities, motor response capabilities, and cognition/language

Formal AAC Assessment

- May be appropriate after reliable low tech method established due to persistent, long-term physical deficits
- Goal: evaluate for SGD to support more independent communication
- Key considerations in formal SGD assessment
  - Establish communication advocate (individuals that will support the patient over time and when transitioning into new living environments)
  - Assessment of communication needs, environments and capabilities
  - Formal trials with SGDs with access options that match physical capabilities of patient (eye gaze, head movement, etc.)
  - Once SGD identified, provision of initial training as well as on-going support over time necessary

Direct Access Methods to Support AAC

- Safe-laser technology
- Absolute head tracking technology
- Eye gaze technology

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Safe-laser Access System

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Safe Laser Access System

- Components:
  - Laser pointer
  - Laser sensing module
- Features:
  - Eye-safe laser
  - Low power except when pointing at a laser sensing surface

3 Areas of Exploration

- Primary Communication System
- Head Movement Training
- Transitional System

Initial case study

(head training and primary communication system)

- Merle
  - Sustained brainstem stroke
  - Locked-In Syndrome
  - Introduced Safe-laser Access System 2.5 months post onset
  - Used as low tech pointing system

Safe-laser Access System as Primary Communication Device

- Bob
  - Acute exacerbation of Myasthenia Gravis
  - ICU transitioned to acute hospital rehab setting
  - Able to utilize Safe Laser Access System mounted on foot to communicate all needs until natural speech recovered (6 weeks)

AAC in Medical Settings

- Need for communication options that are easy to use, maintain, and operate
- Early work with eye safe laser prototype demonstrated potential of system to support communication for those with minimal movement due to brainstem stroke and to "train" head control capabilities to access AAC

Prototype Design Features

* using Delphi Prioritization Procedures

- Access with minimal head, hand, or foot movement
- Support low-tech communication boards without speech output
- Support communication boards with digitized speech output
- Support letter-by-letter text generation on a conventional laptop or desktop computer
- Support environmental control with X10

- Support “environmental pointing”
- Lightweight (less than 5 lbs)
- Approximately 12”x12” front profile
- Stand upright on flat surface with or without additional mounting support
- Mountable to wheelchair, bed, or chair
- Moveable with one hand by staff and/or communication partners

- Laser pointer mount on base unit for battery charging and transport
- Battery powered (at least 6 hours)
- Battery rechargeable for the base unit and the laser pointer simultaneously with a single power cord
- Sealed surfaces for easy cleaning/infection control

Safe-Laser Keyboard

Data Collection

- Following introduction of the Safe-Laser Keyboard, data were collected on the following:
  - Amount of physical ability required to use device
  - Communication functions served by device
  - Rate and accuracy
  - Ease of use, fatigue, and ease of set-up
  - Impact of environmental lighting and positioning on use
  - Use of laser pointer to facility communication regarding environmental information

Case Illustration 1

- 46-year-old female-diagnosis of paraneoplastic syndrome (mimics the degenerative path of ALS)
- Tetraplegic , mechanical ventilation
- Difficulty using eye gaze and head tracking (Vmax with Eye Max accessory and HeadMouse Extreme)
- Safe Laser Keyboard prototype was introduced as simplified method for AAC

Movement Excursion

- <u>Safe Laser Keyboard prototype:</u>
- 2” left/right 1” up/down
- <u>Vmax/HeadMouse:</u>
- 4” left/right 3” up/down
- *additional “quick” 2-inch movements required to recalibrate

Rate and Accuracy

- dwell time was set for 1 sec. for both devices
- <u>Safe Laser Keyboard prototype</u>:
- 16 self corrections, average of 1.15 minutes per sentence
- <u>Vmax/HeadMouse:</u>
- 65 self corrections, average of 2.53 minutes per sentence

Communication Functions

- 1. Spell messages related to care, detailed needs, and social communication with family.
- 2. Communicate basic and detailed needs and ask questions regarding medical condition to staff (nursing and respiratory).
- 3. The participant, family, and staff indicated that the effectiveness of communicative interactions was greater using the Safe Laser Keyboard compared to low-tech AAC strategies (e.g., less frustrations, less misinterpreted messages, less repetitions required).
- 4. Used the prototype to point to objects in environment on several occasions during trial (e.g., pointing to a picture on the wall to clarify topic of conversation, pointing to calendar on wall to clarify appointment).

Ease of Use, Fatigue, and Ease of Set up

- Ease of use (1= very easy, 5= very hard)
  - Safe Laser Keyboard prototype= 1
  - Vmax/HeadMouse= 4
- Fatigue (1= no fatigue, 5= very fatiguing)
  - Safe Laser Keyboard prototype= 2
  - Vmax/HeadMouse= 4
- Ease of Set-up (1= very easy to set up, 5 = very difficult to set up)
  - Safe Laser Keyboard prototype= 1
  - Vmax/HeadMouse= 3

Safe-Laser Button

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Absolute Head Tracking

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Absolute Head Tracking Case Illustration

Participant

- 60 year-old male chronic Guillian Barré
- Initial onset locked-in syndrome
- 4 months post onset- used minimal head movement to activate light-touch switch
- 6 months post onset- increased activity tolerance and head movement to trial head tracking technology

Challenges

- Required head tracking for minimal head movement
- Unable to use head tracking that required frequent recalibration
- Required access to computer while in various positions throughout the day (up in wheelchair, supine, etc.)
- Required simple technological set-up in skilled nursing environment

AccuPoint Prototype

- Two infra-red digital cameras
- Three reflective dots on forehead
- Conventional computer monitor
- Conventional computer to compute head location and align it with the computer cursor

Results

- **Calibration**
  - Full computer access with scaling of 10:1
  - Minimal head excursion (measured from tip of nose) was ¼ in left/ right and up and 1/8 in down
- **Positioning**
  - Successful with calibration and use regardless of position (wheelchair, bed, supine, side-lying)
- **Communication Functions**
  - Written communication throughout the day when one-way valve in use
  - Email communication
  - Internet use
  - Face-to-face communication at night when one-way valve not in use

Results

- **Set-up/Staff Training**
  - One training session with patient and staff
  - Patient trained all other staff independently on set-up
- **Duration of Use**
  - Email/internet 2 hours/day
  - Face-to-face communication 8-10 hours in evening and over-night

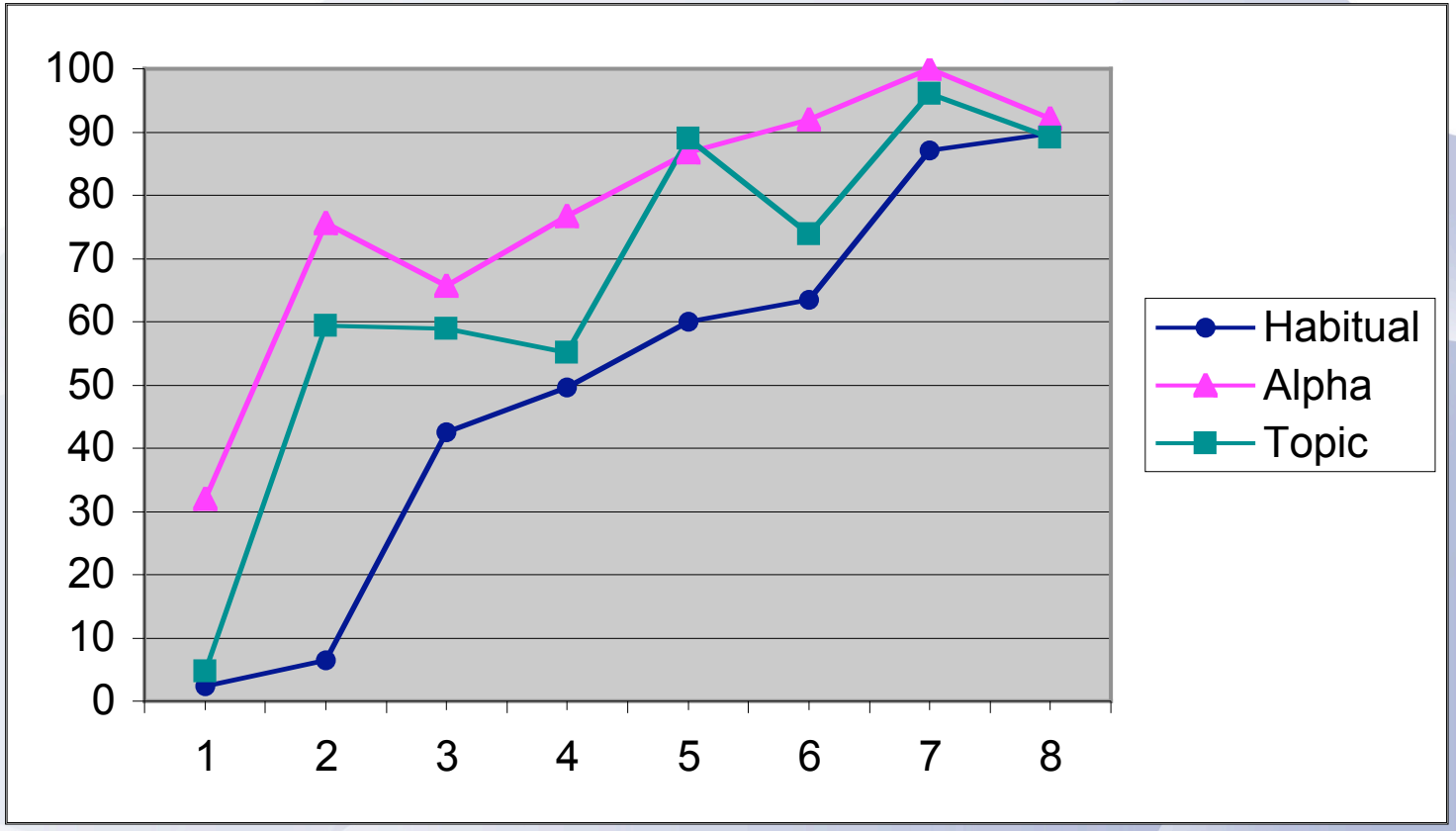
Relative Head Tracking Technology

- 28 year-old female
- Basilar artery occlusion
- Incomplete LIS
- HeadMouse Extreme by Origin Instruments for computer access (http://orin.com/index.htm)
  - Email
  - Internet (blogging)
  - Text messaging with ipipi.com (allows husband to leave house and stay in touch with patient if any emergencies arise)

Speech Recovery and AAC

- Can be slow and long-term process
- Re-evaluations for potential for speech recovery or speech improvement important
- Strategies and techniques
  - Prosthetic intervention (nasal obturator, palatal lift)
  - Supplemented Speech
    - Alphabet, topic, etc.

Supplemented Speech



Future Directions

- Access options that change with the individual (for those recovering and for those with degenerative conditions)
  - E.g., eye tracking, head tracking, combined use of eye and head
- Long term speech recovery
  - Providing ongoing support beyond traditional therapy schedule
  - Distance support/monitoring of recovery
  - Computer speech practice

Supporting Communication for People with Aphasia

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Communication Support Framework

- The outcome focus of this framework is on supporting communication and successful participation in desired activities at all stages of recovery for acquired aphasia and degeneration for primary progressive aphasia (PPA).
- The specific focus of the intervention is the communication interaction rather than individual speech and/or language skills.

Communication Support

- Defined: "anything that supplements residual language to improve access to or participation in communication events or activities for people with aphasia" (Simmons-Mackie, King, & Beukelman, 2012)
- Supports include any tool, strategy, technique and/or therapy procedure that facilitates successful communication.
- Supports can be AAC strategies and techniques as well as traditional therapy procedures.

Communication Support Framework Guides Aphasia Assessment and Treatment

- Living with Aphasia: Framework for Outcome Measurement (A-FROM) (Kagan, Simmons-Mackie, Rowland, et al., 2008; Kagan & Simmons-Mackie, 2007; Simmons-Mackie & Kagan, 2007)
- World Health Organization's International Classification of Functioning, Disability and Health (WHO-ICF) (WHO, 2002)
- The Participation Model for AAC (Beukelman & Mirenda, 2013)

Supporting Communication for Susan

- Susan has a moderate non-fluent aphasia.
- Specific communication need for upcoming event: Her granddaughter is getting married this summer and she wants to introduce herself to guests.
- Support Options:
  - Introduction script as therapy stimuli to improve independent production of key phrases
  - Introduction script available to cue Susan's verbal expression or for communication partners to read
  - Program or record script utterances into a SGD or other form of technology
  - Change the environment to support introductions of all guests

Supporting an Introduction

Introduction Script for Wedding
Susan: Hello
Communication Partner (CP): Hello
Susan: I am Susan Rockwell. I am the bride's grandma.

Celebrating the Wedding of
Kevin and Jane
June 17, 2012

Susan

Bride's Grandmother

Celebrating the Wedding of
Kevin and Jane
June 17, 2012

Adam

Groom's Cousin

Support Outcomes

- Susan introduced herself to guests at the wedding.
- She is now more comfortable going to new places because she can introduce herself.
- She doesn't feel socially isolated because she is participating in social activities.

Why Support Communication?

- Study investigating the perceptions of people (n=13) with aphasia about their social participation.
- Using diaries and interviews, the researchers found that the people with aphasia perceived engagement in social activities more important than the number and type of activities.

(Dalemans, de Witte, Wade, & van den Heuvel, 2010)

Participation and Engagement

- Perceived engagement in participation defined by:
  - being involved
  - not being burdensome
  - knowing what is going on
  - taking part (volunteering or being part of the community in some way)
  - being respected

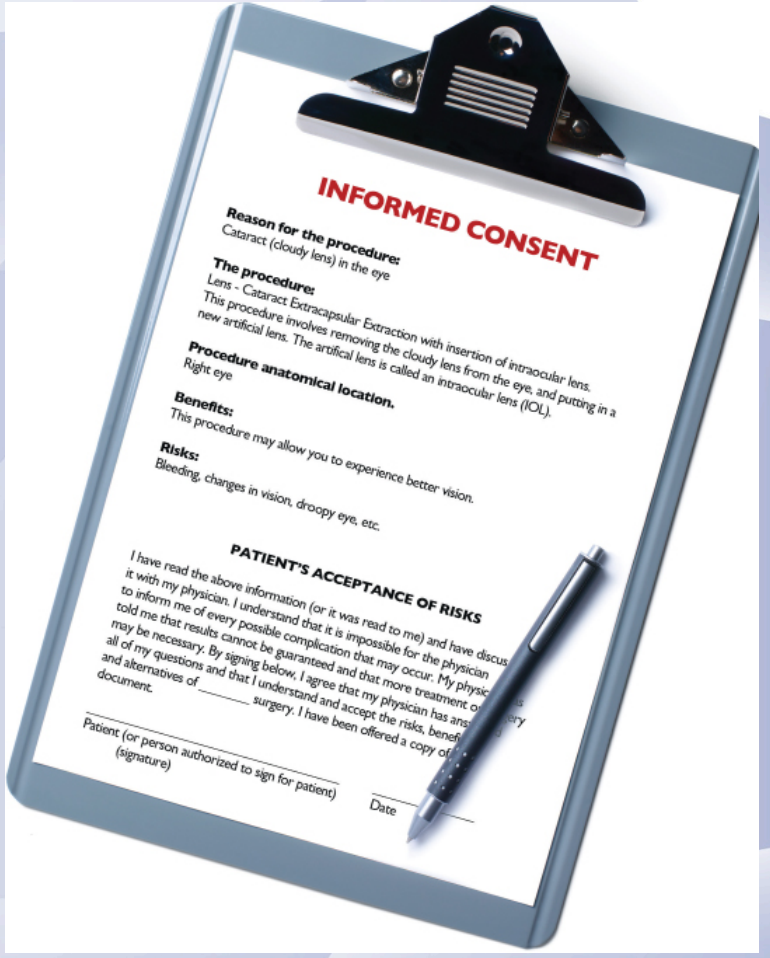
Dalemans, de Witte, Wade, & van den Heuvel (2010)

Staging Communication Support

- Emergency: First responders training from the National Aphasia Association (NAA)

Staging Support in Acute Care

- Support understanding of medical care
- Supporting medical decision-making



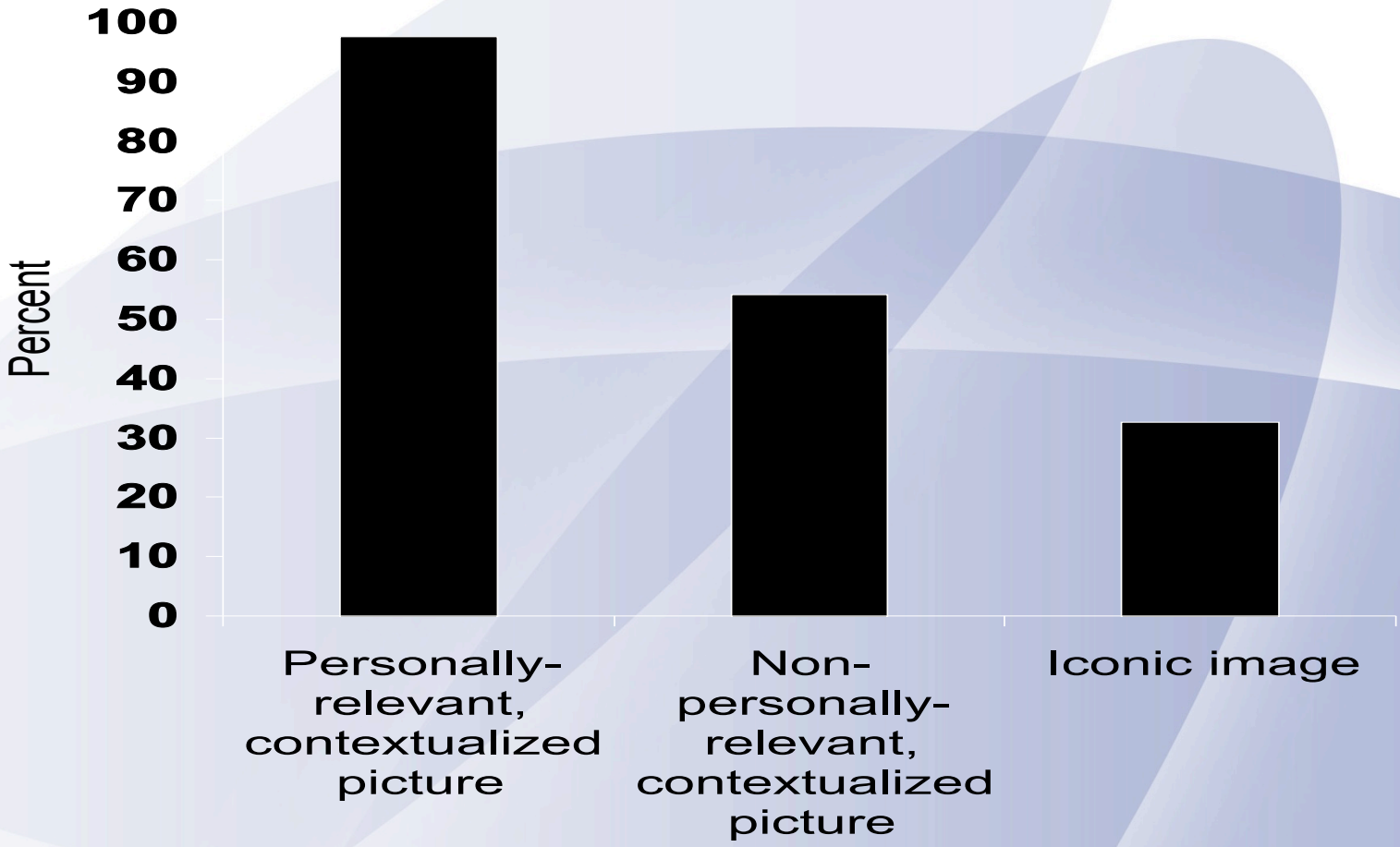
Supporting Communication during and after Rehabilitation Services

- Traditional aphasia therapy augmented with communication supports which address immediate communication needs and future plans
  - Personally-relevant stimuli
  - Context support
  - Supplemental support
  - Environmental support

Personally-Relevant Stimuli

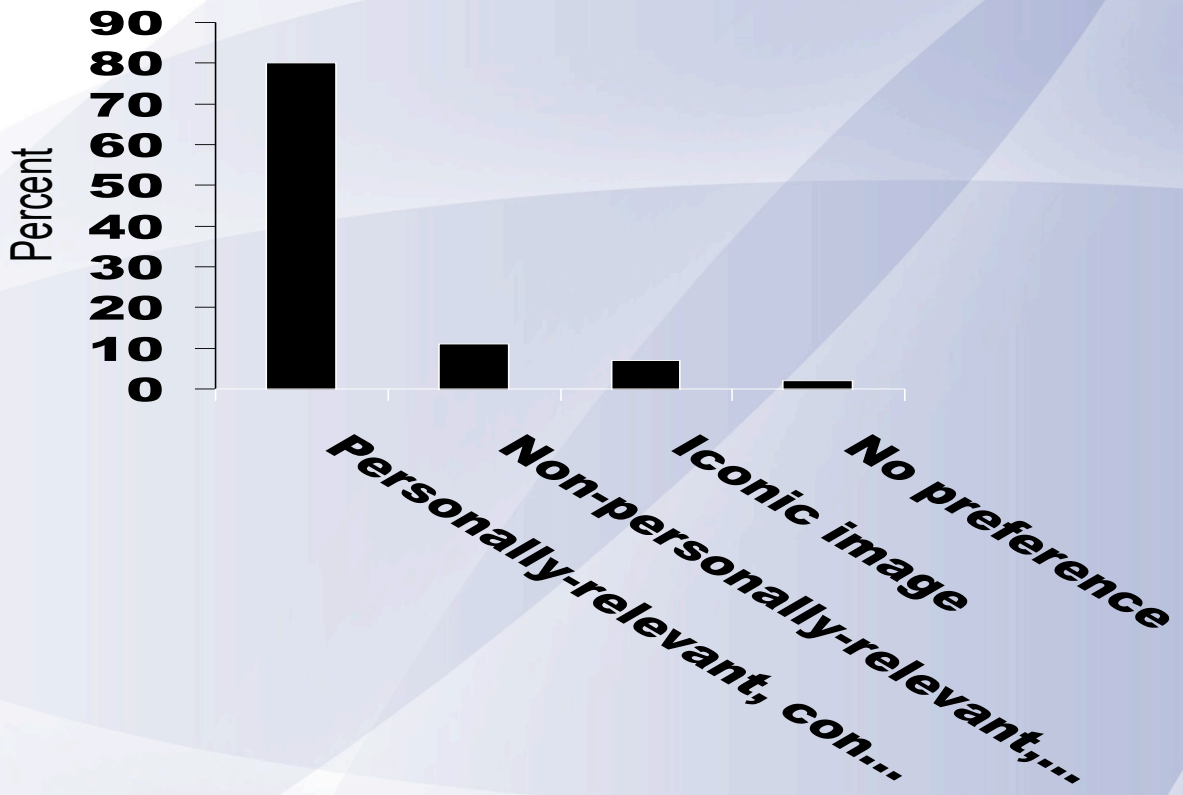
Personally-relevant	Decontextualized
bingo	window
exercise	table
cocktail	chair
movie	pencil
church	book
restaurant	cup

Accuracy: Across Personalization and Contextualization



McKelvey, Hux, Dietz, & Beukelman (2010)

Preference: Across Personalization and Contextualization



McKelvey, Hux, Dietz, & Beukelman, 2010)

Contextual Support

Contextual Support

- Support for a specific task resulted in a communication need being met and increased independence in ADLs for a woman with PPA (Cress & King, 1999)
- Supporting participation in conversation with graphics such as photos and key words resulted in an increase in:
  - the mean number of exchanges
  - the number of initiations
  - the level of success for each person with aphasia

(Garrett & Huth, 2002)

Contextual Support

- Use of personalized remnant books improved participation in conversation; specifically there was an increase in:
  - Number of initiations
  - Joint attention
  - The success of conveying messages
  - The level of enjoyment during the activity

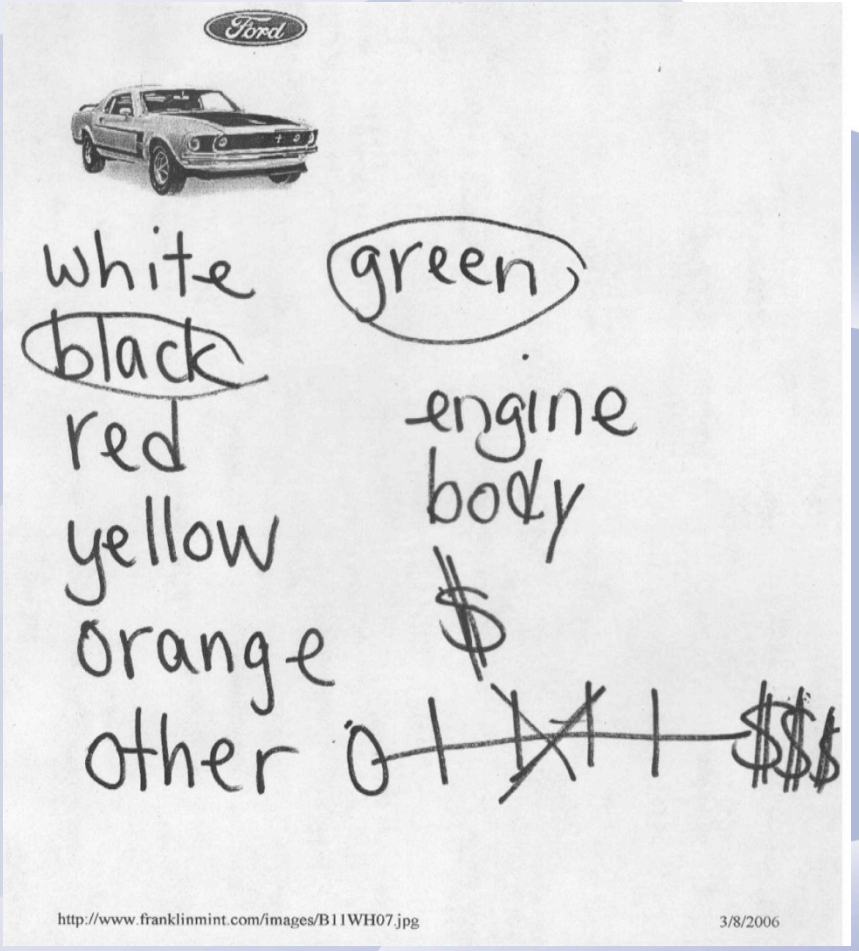
(Ho, Weiss, Garrett, Lloyd, 2005)

Supplemental Support

- Support supplements other modes of communication
- Examples
  - Aphasia ID card from the NAA supports communicative exchanges with new people
  - Word prediction in computer software supports spelling, writing and reading

Written Choice Communication Technique (Garrett & Beukelman, 1992)

- Written choices support authentic conversation
- A facilitator writes key words related to the topic of conversation
- The written words serve as augmented input as well as supplements the expression of preferences and opinions



Supplemental Support

Written Choice Communication Technique

- People with aphasia who scored poorly on formal reading measures, understood the written choices with 90% accuracy when the facilitator presented the words in the context of a conversation and said each word aloud (Garrett, 1995)
- People with moderate to severe aphasia scored significantly higher when reading was in a contextualized reading activity compared to a decontextualized reading activity

- (Smith, Garrett, & Lasker, 2007).

Environmental Support

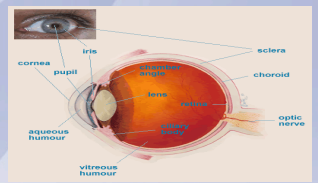
- Modify the environment to support communication
- Aphasia-friendly signage adds graphic support to text

Aphasia-friendly Documents

Simons-Mackie (2011); Rose, Worrall, Hickson, and Hofmann (2011)

- Use large print (>20 font)
- Easy to read font
- Underline or **BOLD** Key words
- Use simple sentence structures
- Leave white space between text
- Supplement text with simple photos/pictures

- Cataract Surgery



- **Why** do I need the surgery?
- Will you do **one** eye at a time?
- Will I need new **eyeglasses**?
- Does the surgery **hurt**?
- How **long** does it last?
- What happens **after** surgery?
- Are there **risks**?

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Communication Support and Technology

- Conventional technology
- Specialized technology
  - Nonelectronic
  - Electronic

Supporting Communication with Conventional Technology

- Cellphone
- Computer
  - Email
  - Word processing
  - Skype
- Camera
- Calendar/planner
- To-do lists

Example of Supporting Accessing Voicemail on a Cellphone

Contacts

Save a Phone Number

1. Press , enter a phone number, and touch **Save**.
2. Touch **New Entry** or **Existing Entry**.
3. For **New Entry**, select a type for the number (**Mobile**, **Home**, **Work**, **Pager**, **Fax** or **Other**), enter a name, and add other information as needed. For **Existing Entry** select the entry, select a type, and add other information.
4. Touch **Done**.

Find a Contacts Entry

1. Press and touch **Contacts**.
2. Scroll through the entries, or use your QWERTY keyboard to enter the first few letters of the contact entry.
3. To display an entry, touch it. To call a contact, touch Call.

Voicemail

1. Press and hold #1.
2. Enter your passcode.

3. Press #3 to listen to new message.

4. Delete message by pressing #7..

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Cell Phones and Aphasia

- The study participants with aphasia described the importance of access to cellular telephones for emergencies, as well as storing numbers, pictures, and medical information.
- Researchers identified features of cell phones that facilitated use:
  - The function of the button was written on it
  - One letter per button in alphabetical order
  - Predictive texting
  - Pre-programmed numbers
  - Calling or receiving calls from familiar communication partners
- Researchers also identified barriers to cell phone use:
  - Smallness of the mobile phone buttons and the size of the screen
  - Complexity of the phone
  - Inadequate written support
  - Unfamiliar communication partners

Greig, Harper, Hirst, Howe, and Davidson (2008)

Supporting Communication with Specialized Technology

- Talking photo albums
- Smartpens
- Apps and mobile technology
- Software to support written language, verbal expression, e-mail
- Speech generating devices (SGDs)

Benefits of Supporting Communication

- Authentic communication: support the process and purpose of communication rather than focus on individual skills
- Immediate participation in a self-determined goal: support communication at all stages of recovery or disease process (i.e., PPA).
- Increased independence and autonomy

(Simmons-Mackie, King, & Beukelman, 2013)

The World in Pictures

- Technology has changed:
  - Why we take photographs
  - How we access photographs
  - How easily we can access photographs
  - What photographs we keep
  - How and where we store photographs
  - How we use photographs to share information

Historical Framework for Taking Photographs

- 1800's – reality capturing to document important events that people could not personally witness

Historical Framework for Taking Photographs

- 1900's – personal photography emerged as a means of establishing a family record or preserving autobiographical memory
  - Often formal and posed portraits
  - Stored in albums
  - Displayed in homes and passed to new generations

Historical Framework for Taking Photographs

- 2000's – means of supporting immediate communication
  - Digital technology allows for transferring images to smart phones, computers, social networking sites
  - Photographs are part of face-to-face communication rather than a means of preserving a historical record

Photographs as Communication Supports

- Incorporation of images on Internet sites
  - Promotes interest
  - Enhances comprehension
  - Serves as a literacy support
- Incorporation of images on electronic devices
  - Convey up-to-the-minute information
  - Support communicative comprehension and production

Using Images to Supplement Communication

- Normal speakers use photographs when they cannot easily convey their content verbally
- Majority of communication acts involve speaking

(Engebretsen & Beukelman, in preparation)

Ease of Acquisition Effect on AAC

- No longer difficult to find images
- Promotes use of personalized rather than generic images
- Allows for establishment of shared communication spaces
- Allows for easy up-dating of information

Characteristics of Photographs

- Most photographs are really portraits
  - People face the camera and pose – no engagement with background or each other
  - Background may or may not be contextual

Optimizing Images for Communication Purposes

- Clarity
- Contextualization
- Personal relevance
- Interaction between people and objects to convey information about relationships

Catching People in the Act

- Stop posing for the camera
- Capture "engagement"
  - Real-life engagement rather than posed engagement
  - Photograph should provide the gist of a story, event, or activity

Making Visual Scene Displays

- Use contextually-rich photograph(s) showing people engaged with one another or the environment
- Provide keywords
  - Establish timeframe
  - Label people, places, objects, or events
  - Add details

Using Visual Scene Displays to Create Shared Communication Spaces

- Shared communication spaces - locations in which communication partners have joint access to tools and support materials that provide platforms for information dissemination

Hux, Buechter, Wallace, & Weissling, 2010

Purpose

- To determine the effect on the content and quality of communicative interactions when a person with aphasia and unfamiliar partners use low-tech VSDs to create a shared communication space

Hux, Buechter, Wallace, & Weissling, 2010

Participants

- 61-year-old male with moderate anomic aphasia
  - Difficulties in word finding, reading comprehension, and writing
  - > 2 years post-stroke
- 9 neurotypical adult speakers serving as communication partners
  - Ranged in age from 33 to 62 years (*M* = 48)
  - Between 14 and 21 years of education

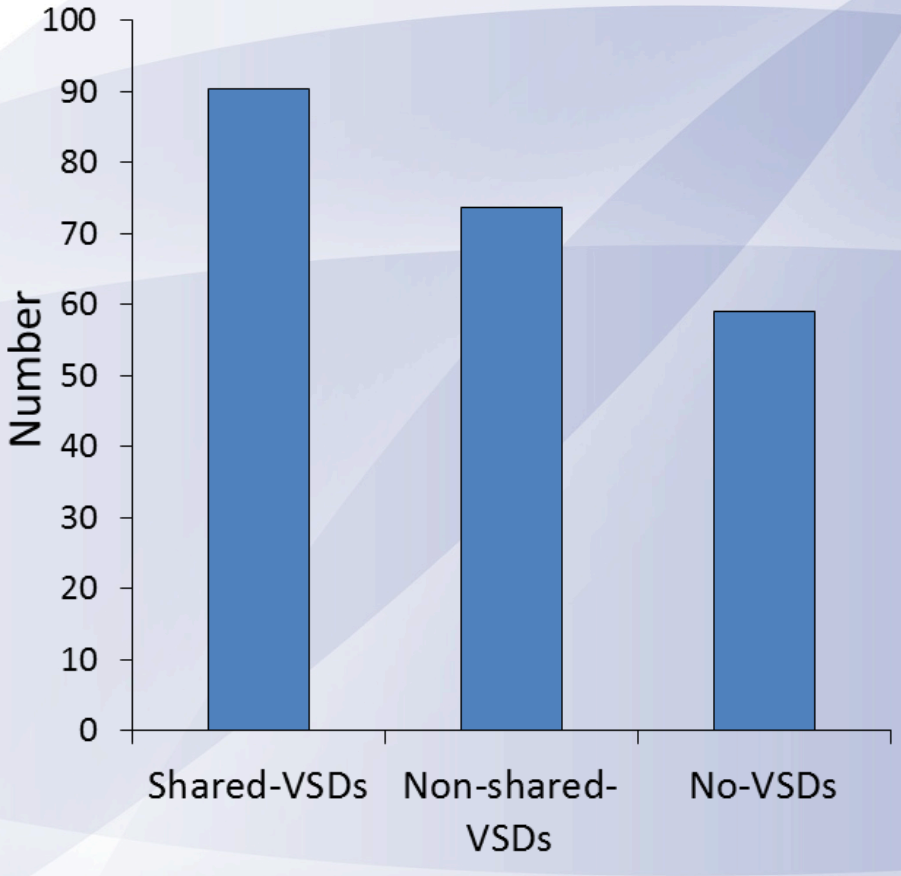
Hux, Buechter, Wallace, & Weissling, 2010

Experimental Tasks

- Engaged in 4.5 minute, 1-on-1 conversations about RL's antique car in one of three conditions:
  - Shared VSDs – both participants had access to low-tech VSDs in RL's communication book
  - Non-shared VSDs – only RL had access to his low-tech VSDs
  - No VSDs – neither participant had VSD access

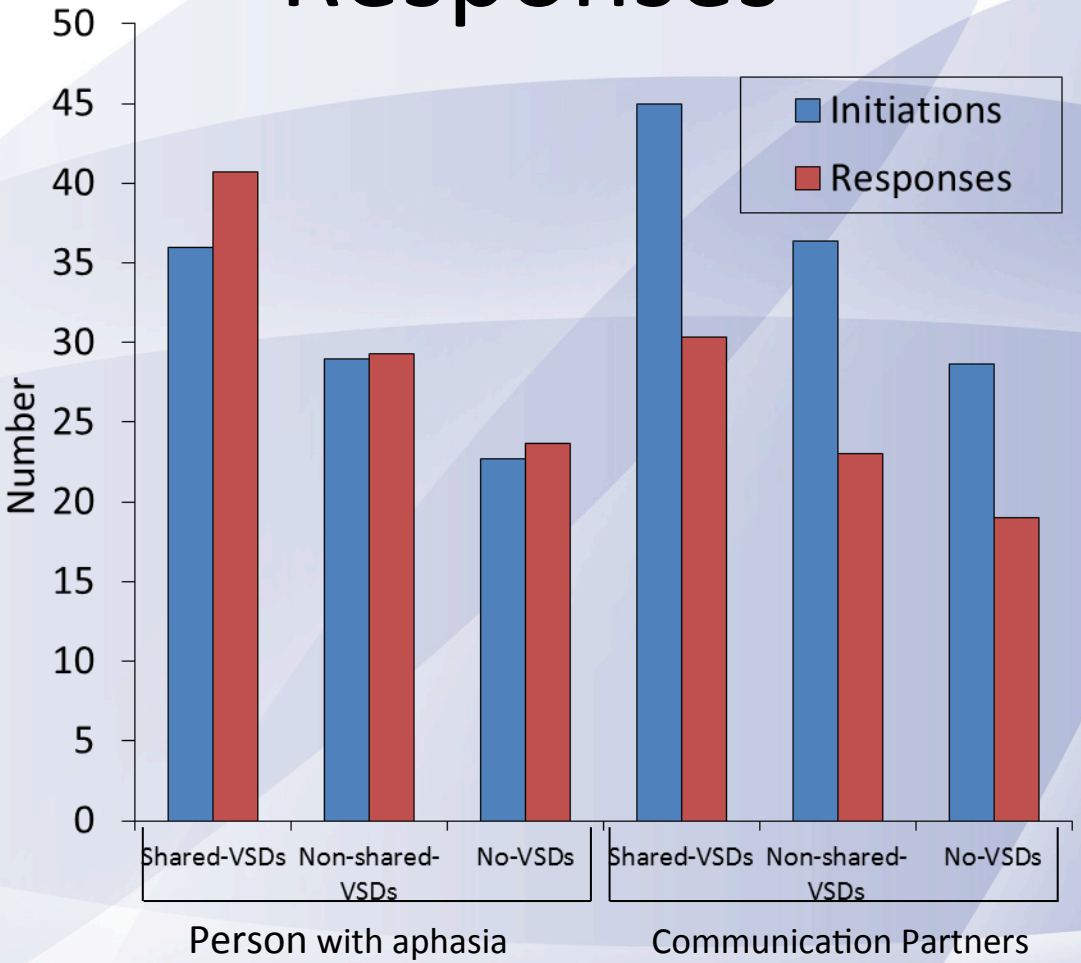
Hux, Buechter, Wallace, & Weissling, 2010

Number of Conversational Turns



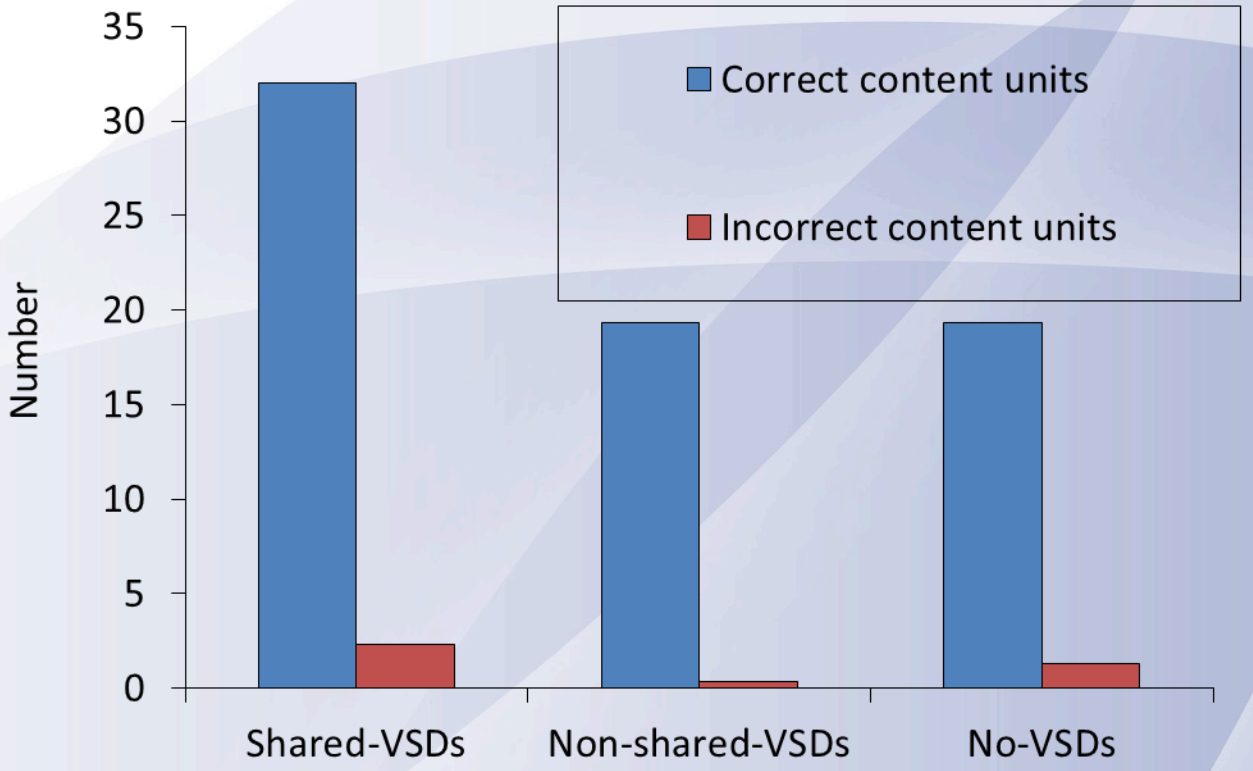
Hux, Buechter, Wallace, & Weissling, 2010

Number of Initiations and Responses



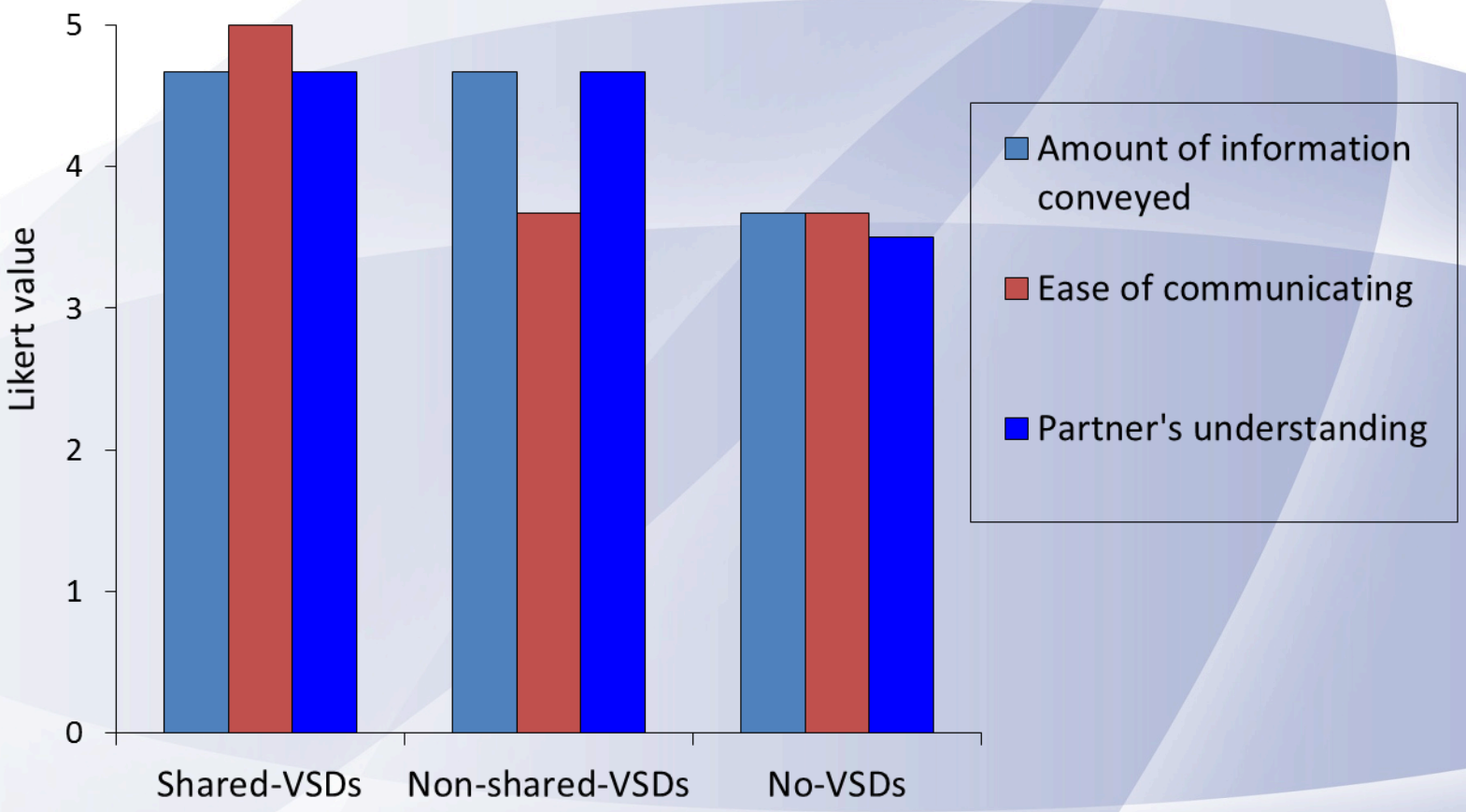
Hux, Buechter, Wallace, & Weissling, 2010

Content Units Conveyed



Hux, Buechter, Wallace, & Weissling, 2010

Likert Scale Responses



Hux, Buechter, Wallace, & Weissling, 2010

Benefits of Having a Shared Communication Space

- Changed manner and extent to which people contributed to conversational interactions
- Shifted leadership burdens during conversational interactions regardless of who had greater knowledge of the topic content
- Increased production of utterances and relaying of correct information by the person with aphasia
- Improved perceptions regarding communication ease and success

Hux, Buechter, Wallace, & Weissling, 2010

Visuographic Support for Reading by People with Nonfluent Aphasia

- Rationale: Contextually-rich photographs may facilitate reading comprehension of people with aphasia because
  - No symbolic processing required
  - Reliance on preserved functions
    - Visual-spatial processing
    - World knowledge
    - Recognition memory skills

Dietz, Hux, McKelvey, Beukelman, & Weisling, 2009

Purpose

- To determine whether photographic supplementation improves the reading comprehension accuracy of people with nonfluent aphasia
  - Three conditions
    - No visual supports
    - Photographs of isolated objects and non-engaged people
    - Contextually-rich photographs showing engagement

Dietz, Hux, McKelvey, Beukelman, & Weisling, 2009

Participants

- 7 people with Broca's aphasia
  - 3 males and 4 females
  - 28 to 79 years of age (*M* = 52.67; *SD* = 15.27)
  - More than 3 months post-stroke (*M* = 40; *SD* = 21.5)
  - *WAB-R* Aphasia Quotient scores ranged from 19.2 to 65.7

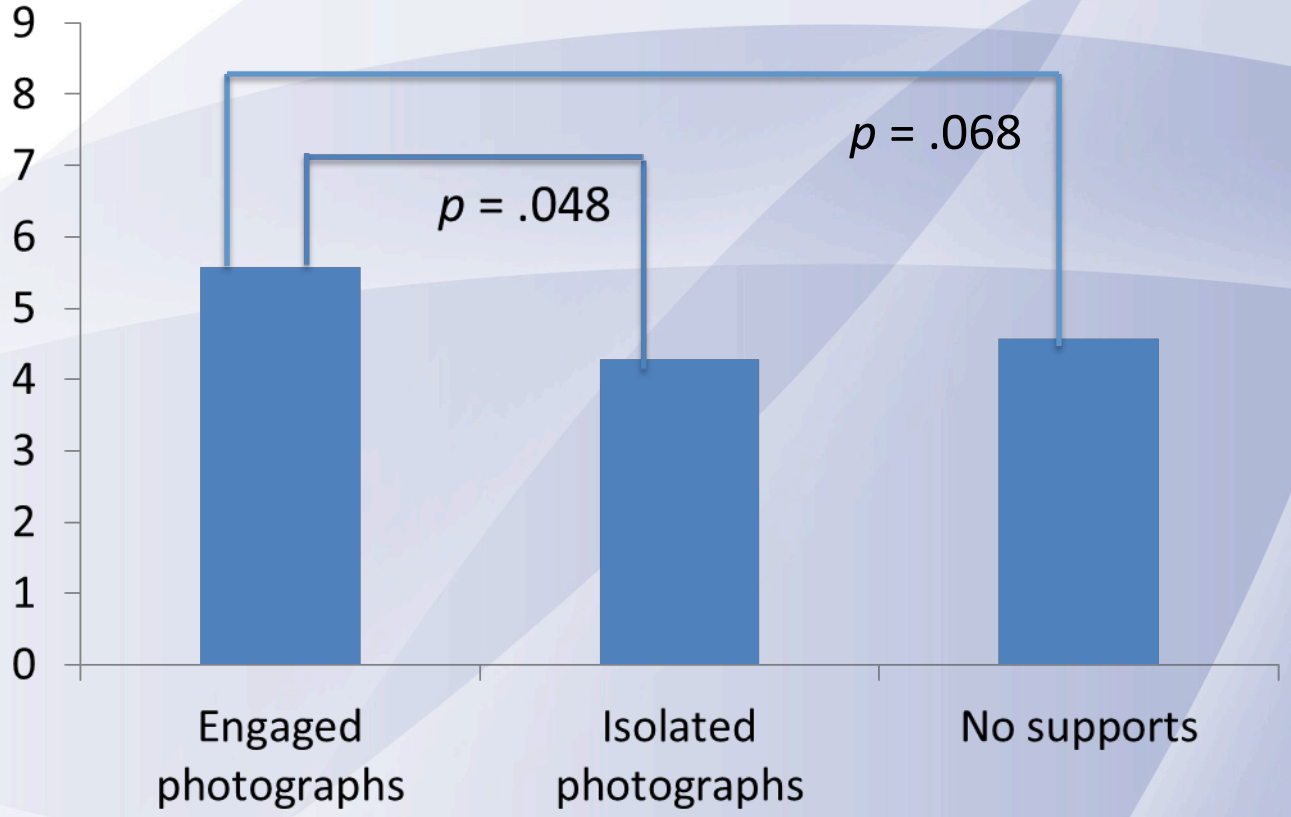
Dietz, Hux, McKelvey, Beukelman, & Weisling, 2009

Experimental Tasks

- Silently read 3 stories—one in each experimental condition (i.e., no support, isolated/non-engaged photographs, or engaged photographs)
- Respond to 9 multiple choice comprehension questions

Dietz, Hux, McKelvey, Beukelman, & Weisling, 2009

Comprehension Accuracy



Dietz, Hux, McKelvey, Beukelman, & Weisling, 2009

Benefits of Photographic Supplementation

- At least some subgroups of people with aphasia demonstrate improved reading comprehension accuracy given contextually-rich photographs depicting engagement

Dietz, Hux, McKelvey, Beukelman, & Weisling, 2009

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