A MOBILE APPLICATION TO IMPROVE COMMUNICATION EFFICIENCY FOR PEOPLE WITH DISABILITIES

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INTRODUCTION

Challenge: Using an augmentative and alternative communication (AAC) spelling device to type out messages during spontaneous conversation is *very* slow. The rate of message production violates verbal interaction rules, leading to isolation or impoverished communication of AAC users.

Goal: To increase the speed of message generation in an AAC spelling device by relying on the knowledge of a familiar partner during conversation.

Research Question: Can we develop a novel dual-app AAC system that enables a person with severe speech and physical impairments to produce messages faster while still maintaining control over expression?

Targeted Users: Literate individuals with severe speech and physical impairments who use AAC devices, and their care or communication partners.

Proof of concept: CoConstruct-AAC is a proof of concept product that will drive the development of a more sophisticated app called Smart Predict.

CoConstruct-AAC APP

Materials:
2 Samsung Galaxy tablets connected by Bluetooth®
- CoConstruct-AAC app for the AAC user
- Partner app for the familiar partner

CoConstruct-AAC app interface:
QWERTY keyboard with two lines above the keyboard:
- Message line
- Word prediction from language model system

Partner app interface:
QWERTY keyboard and 2 lines:
- Message line
- Word prediction line from CoConstruct-AAC app

CoConstruct-AAC app functionality:
- As an AAC user types with the CoConstruct-AAC app, the text appears in the message line AND in the partner's tablet message line.
- The partner can suggest a word or phrase started by the AAC user by typing in the partner app. The suggestions are sent to the word prediction line of the CoConstruct-AAC app.
- The AAC user does not know which words are from the CoConstruct-AAC word prediction system and which are from the partner suggestions to maintain user autonomy.

Figure 1. CoConstruct-AAC in use.

METHODS

- **Design:** A single case alternating treatments (A-B) design
- **Dependent variables:**
  - Words per minute in 10 minute typing task
  - Selections per minute in 10 minute typing task
  - Content Information Units (CIU) in the picture description
- **Independent variables:**
  - Text generation with and without CoConstruct Partner App.
- **Subjects:** JS, a literate adult female with severe speech and physical impairments secondary to spastic cerebral palsy and her personal assistant.
- **Task:**
  - JS described two pictures:
    - Western Aphasia Battery Picnic Picture
    - Boston Diagnostic Aphasia Exam Cookie Theft Picture
  - Pictures were described twice:
    - Typing with language model word prediction only (CoConstruct-AAC app only)
    - Partner assisted word prediction (Partner app)

Figure 2. CoConstruct-AAC being used to communicate with a third person.

INITIAL DESIGN TRIAL

Condition	Picture	CIUs: Content Information Unit	Words	WPM: Words per minute	Selections	SPM: Selections per minute
AAC User Alone	Cookie Theft	39	40	4.0	151	15.1
AAC User with CoConstruct Partner app	Cookie Theft	54	55	5.5	149	14.9
AAC User Alone	Picnic	38	39	3.9	135	13.5
AAC User with CoConstruct Partner app	Picnic	51	52	5.2	156	15.6

- More Content Information Units with CoConstruct-AAC Partner app
- More words per minute with CoConstruct-AAC Partner app.
- Fewer selections per minute needed with CoConstruct-AAC Partner app while describing the Cookie Theft picture.
- More selections per minute made with CoConstruct-AAC Partner app while describing the Picnic picture.

IMPLICATIONS AND FUTURE PLANS

- The CoConstruct-AAC app and words provided by a knowledgeable partner *improves speed of message production* by:
  - Increasing rate of word production in 10 minute period.
  - Increasing number of CIUs and amount of information produced in a 10 minute period.
  - Reducing number of selections needed in a 10 minute period for one picture.
- Five additional participants with severe speech and physical impairments will participate:
  - Three will type using a direct selection method
  - Two will type using switch scanning.

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