Clinical and Functional Use of a “Processing Prosthesis” for Aphasia

Marcia Linebarger, PhD
Psycholinguistic Technologies, Inc.

Ruth Fink, MA-CCC/SLP
Moss Rehabilitation Research Institute

Denise McCall, MA-CCC/SLP
University of Maryland School of Medicine
Potential conflict of interest

Dr. Marcia Linebarger serves as Director of Psycholinguistic Technologies, which has released SentenceShaper™ as a commercial product.

Therefore, she has not participated in testing or in scoring of raw data in the studies reported here.

No one else involved in this research has a financial interest in the software.
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The work reported here reflects the efforts of many people:

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Outline of Symposium

1) Introduction (Marcia Linebarger)

2) *SentenceShaper* studies at Moss Rehabilitation Research Institute (Ruth Fink)

3) *SentenceShaper* studies at the University of Maryland (Denise McCall)
PART I

Background & Review of Previous Studies

Marcia Linebarger, PhD
Psycholinguistic Technologies, Inc.
Why a “processing prosthesis” for aphasia?
Knowledge of language may be well-preserved in aphasia

But language processing is slowed down:
- It takes longer to think of words
- Words vanish from memory before they can be combined into sentences
A New Approach to Assistive Technology for Aphasia

SentenceShaper™
Psycholinguistic Technologies, Inc.
www.SentenceShaper.com
How does SentenceShaper work?
On and Off Buttons (below) control a sound recorder.
- A crystal **shape** immediately appears on the screen.
- Clicking on this shape **replays** the recorded speech.
Shapes are dragged to slots in the **Sentence Assembly Area** to be ordered from left to right into sentences.
- Button on left replays entire sequence of shapes in Sentence Area.
- Shapes can be reordered within Sentence Area
- Clicking button marked with red arrow moves entire sequence up to Narrative Assembly Area (white arrow)

- Sequence is now represented by a single “purple bean”.

![Diagram of Sentence Shaper interface with a red arrow pointing to the left and a white arrow pointing upwards]
Word-finding help is provided by the Side Buttons displaying printed words. Clicking on a button plays the word’s pronunciation; the user repeats the word to record it. Side Buttons typically play prepositions, pronouns, and high frequency verbs, but can be customized.
Another source of word-finding help is the WordFinder, a list of printed words organized loosely by semantic category.
Is SentenceShaper effective?
Aided Effects

Are spoken narratives created on the computer more structured, well-formed, informative, or otherwise “better” than unaided narratives on the same topic?
Aided effects in a video retelling task

Six agrammatic participants

15 hours of independent home practice
  - Retelling TV and movie plots, personal stories

Spoken narratives then elicited:
  - AIDED (using SentenceShaper)
    - Word-finding tools disabled
  - UNAIDED (without using SentenceShaper)

Test videos never viewed during training or home practice
UNAIDED: The, the maid, the maid, the maid, uh, uh, upstairs and she, uh, the maid upstairs and ‘scuse me’ and um ... go around but now uh the .... the policeman, she she?, no, the man, two men, and the uh, oh, she, uh, her, she...knock them out, knock them out, um hum, knock them out, two men

AIDED: The man goes around them. She did not do it. The nurse goes around the baby carriage. The policeman, she fights the, the two men.
Participant 2

UNAIDED: “Ooh! A fish! Ah, water” and....uh mmm and attendant, “here,” and bumped his head. “Oh boy, oh my hand, my hand, my hand.”

AIDED: The boy and the fishmonger is taking the fish. The boy hit his hand.
How to use *SentenceShaper* as an assistive aid?

**Problem:** Message construction on the system is time-consuming

**One solution:** “offline” applications

- Email *(Linebarger et al., 2002)*
- Play over the telephone
- Web postings *(Linebarger & Schwartz, 2005)*
- Speeches *(Fried, 2002)*
SentencePartner™

Carrying *SentenceShaper* messages into real-life situations on a handheld computer
Do *SentenceShaper’s* “aided effects” carry over into spontaneous, unaided speech after using the system for a period of time?
Published treatment studies:

- Linebarger, Schwartz, & Kohn (2001)

- Schwartz, Linebarger, Brooks, & Bartlett (in preparation; some results reported in Linebarger & Schwartz, 2005)


- Linebarger, McCall, Virata, & Berndt (in press, *Brain and Language*)
How does *SentenceShaper* fit into existing technology for communication assistance?

Two **core features** of *SentenceShaper*:

1. It provides processing support
2. Its medium is the user’s own voice
SentenceShaper is a word processing system for speech
Advantages of building on the user’s residual speech:

1) Exploitation of word associations

2) Expression of emotion
“the girl”

“hits”

“the teddy bear”
CONCEPT

WORD
“the girl”

CONCEPT
WORD
“hits”

CONCEPT
WORD
“the teddy bear”
“Now my reign is through and next year, young people, and good people... New rabbi, but never, never try and imitate Rabbi. I love Rabbi and I love family. A lucky girl, a lucky family. Now we're through, but wherever we go, I'm here, and Rabbi's here. Goodbye, goodbye.”
REFERENCES - 1


REFERENCES - 2


FOR MORE INFORMATION

AT ASHA CONVENTION:

Psycholinguistic Technologies, Inc.
ASHA EXHIBIT BOOTH #1007

INTERNET:

www.SentenceShaper.com

EMAIL:

M. Linebarger: linebarger@SentenceShaper.com
D. McCall: dmccall@umaryland.edu
R. Fink: fink@shrsys.hslc.org