

Analysis of the Therapeutic Application of Lingraphica Communication Software on the Production of Nouns

Purpose

Many persons with aphasia (PWAs) have trouble naming items. Pictures are used to convey messages that they are unable to verbalize. This investigation aimed to determine the effect that repeated trials using a TouchTalk (TT) device has on the production of nouns in persons with chronic expressive aphasia.



Research Question

What is the effect of repeated trials during confrontational naming using a speech-generating device on the production of nouns in persons with chronic expressive aphasia?

Participants

The participants were three Caucasian males, ages 76, 72, and 61 years old. They were 6-, 2-, and 8-years post diagnosis with anomia, Broca's, and conduction aphasia types, respectively. These individuals participated in an ABAB study to examine their ability to verbally produce five repeated trials of 20 nouns daily. These nouns were presented on a TT device using personally photographed icons, two times a week, for four weeks via remote video meetings.

Method

An ABAB withdrawal design was used to examine the effects of the participant's ability to verbally produce repeated trials of a stimulus word presented on the TT device using personalized photographed icons on the vocal production of 20 frequently used nouns. Care partners were asked to provide 20 pictures of commonly used nouns, which could include proper nouns. For this study, dosage refers to repeated trials of a stimulus word or the act of verbally producing each presented stimulus icon for five trials. All sessions were conducted via telepractice.

Baseline – Phase A1

Baseline sessions occurred until the baseline was considered stable, as defined by Ledford and Gast (2018) when 80% of the data points fell within 25% of the median baseline score. All technological multimodal stimulation of the image using an AAC device was removed, and the participants simply completed confrontation naming via photographs presented using a PowerPoint slide deck. All 20 probes were randomly administered to each participant. No cues were provided during baseline.

Intervention – Phase B1

Following baseline (Phase A1), the same 20 stimuli pictures were presented in random order for a dosage of five times, using a TT device. This phase used multimodal stimulation from the device, including the icon projection feature which projects toward the participant when the icon was selected. The device was previously set up to have only one icon per page. Each participant

touched the one icon that appeared on the device screen, repeated after the device's voice output, then the screen automatically went to the next page. The next page included the same pictured icon for a total of five times per word until all 20 words had been selected and repeated by each participant.

Withdrawal – Phase A2

The purpose of this phase was to withdraw the intervention and collect data to assess the learning of the task. During this phase, participants repeated the identical probes completed in A1, confrontationally named photographs without the TT device.

Intervention – Phase B2

The same 20 stimuli pictures presented in Intervention - Phase B1 were presented again using the TT device. Stimuli were presented, and data was collected using the same methodology of Phase B1.

TABLE 1
Participant Demographics

Characteristics	Participant 1	Participant 2	Participant 3
Gender	Male	Male	Male
Age	76	72	61
Diagnosis	CVA/Stroke	CVA/Stroke	TBI
Status Post Diagnosis	6 years	2 years	8 years
Ethnicity	Caucasian	Caucasian	Caucasian
Expressive Language Level	Anomic aphasia	Broca's aphasia	Conduction aphasia

Note. The Expressive Language Level was determined using the Bedside Aphasia Classification Criteria as identified by the Western Aphasia Battery-Revised Bedside form.

Results

Participant 1

Baseline – Phase A1

Participant 1 (P1) named 12/20 pictures of nouns for 60% proficiency for the first baseline session. The second baseline was 15/20 pictures named correctly for 75%. The third baseline session was 14/20 pictures named correctly for 70%. **The mean for these scores was 68.33%.**

Intervention – Phase B1

The data point for the fourth session was 100/100 for 100%. The data point for the fifth session was 100/100 for 100%. **The mean was 100%.** The immediate level change between adjacent conditions went from the last data point in the previous baseline phase (70%) to the first data point in the intervention phase (100%), a 30% increase in an accelerated direction.

Withdrawal – Phase A2

For the sixth session, P1 named 16/20 pictures correctly for 80%. The data point for the seventh session was 16/20 for 80%. **The mean of both sessions was 80%.** From the last data point in the intervention phase (100%) to the first session in this withdrawal phase (80%), there was an immediate level change between adjacent conditions of 20% in a decelerating direction.

Intervention – Phase B2

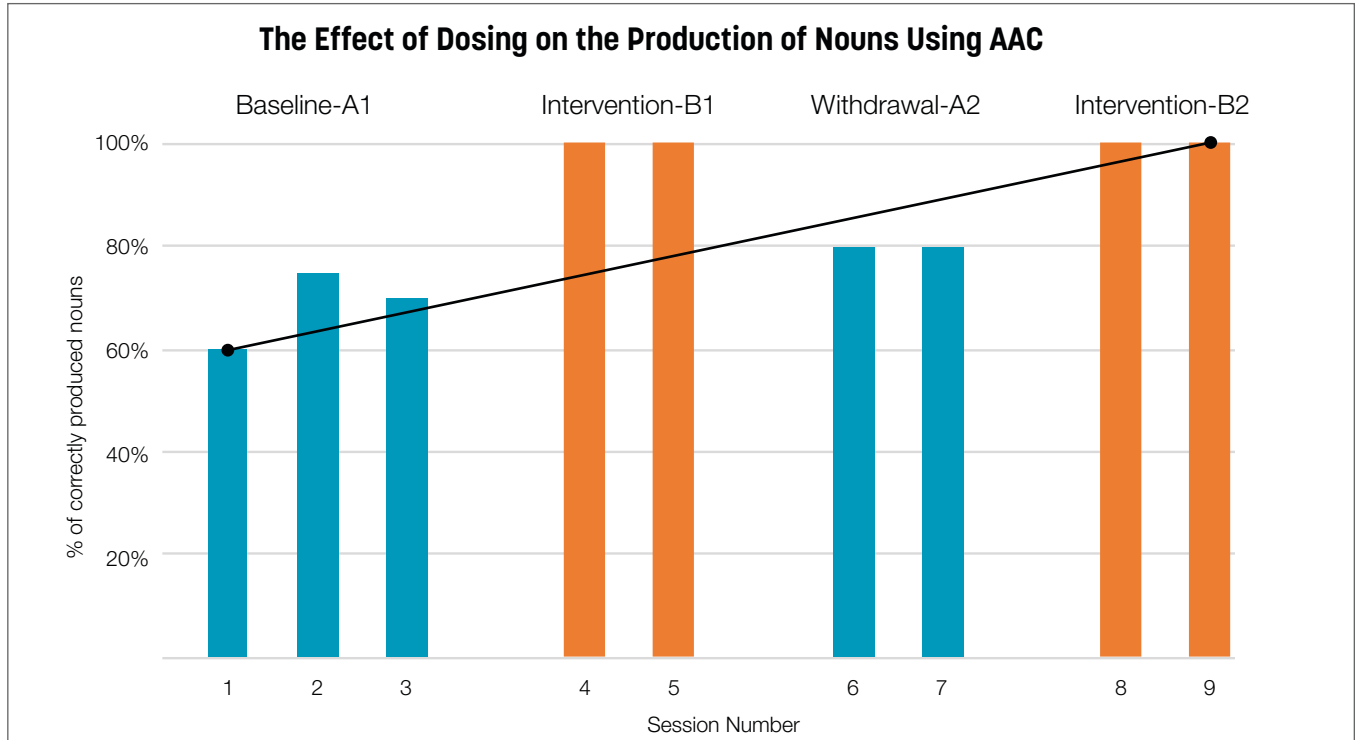
The data point for P1's eighth session was 100/100 for 100%, meaning given the device's voice output, P1 said each noun correctly 100 times. The data point for the ninth session was also 100/100 for 100%. **The mean was 100%.**

FIGURE 1

Participant 1: Slope per Phase

Patient: Participant 1

Intervention: ABAB



Participant 2

Baseline – Phase A1

Participant 2 (P2) was unable to name any pictures correctly. The baseline for the first session was 0/20 for 0%. P2 correctly named 1/20 pictures for the second baseline for 5%. Data for the third baseline session was 1/20 for 5%. **The mean for these scores was 3.33%.**

Intervention – Phase B1

P2 was able to produce word for word, given the device’s voice output 31/100 for 31% in the fourth session. In the fifth session, P2 produced 32/100 for 32%, given multimodal stimulation. **The mean of both sessions was 31.5%.**

Withdrawal – Phase A2

The data point for the sixth session was 1/20 for 5%. The data point for the seventh session was 0/20 for 0%. **The mean of both sessions was 2.5%.** From the last data point in the previous intervention phase (32%) to the first data point in this withdrawal phase (5%), the immediate level change between adjacent conditions was 27% decelerating.

Intervention – Phase B2

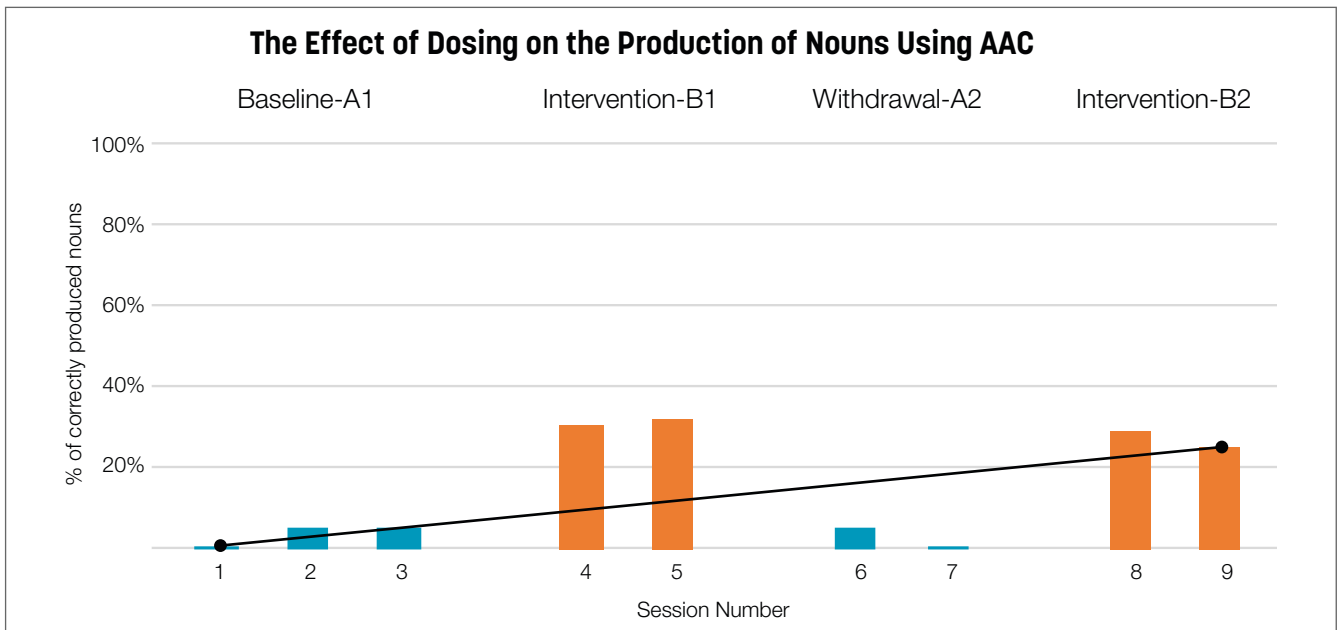
In the eighth session, P2 correctly named nouns given multimodal stimulation from the device 29/100 attempts for 29%. The data point for the ninth session was 25/100 attempts for 25%. Data revealed an accelerating trend across adjacent conditions in a therapeutic direction. **The mean was 27%.**

FIGURE 2

Participant 2: Slope per Phase

Patient: Participant 2

Intervention: ABAB



Participant 3

Baseline – Phase A1

Participant 3 (P3) was able to correctly name pictures only, with no audio or text, being shown via PowerPoint slides 5/20 times for 25% for the first baseline session. For the second baseline, he correctly named 6/20 for 30%. P3 correctly named 6/20 photos for 30% in the third baseline session. **The mean was 28.33%.**

Intervention – Phase B1

P3 correctly named 58/100 for 58%, given the device’s multimodal stimulation in the fourth session. The data point for the fifth session was 66/100 for 66%. **The mean of both sessions was 62%.**

Withdrawal – Phase A2

In the sixth session, P3 was able to name 9/20 photos correctly for 45%. For the seventh session, he correctly named 8/20 for 40%. **The mean was 42.5%.**

Intervention – Phase B2

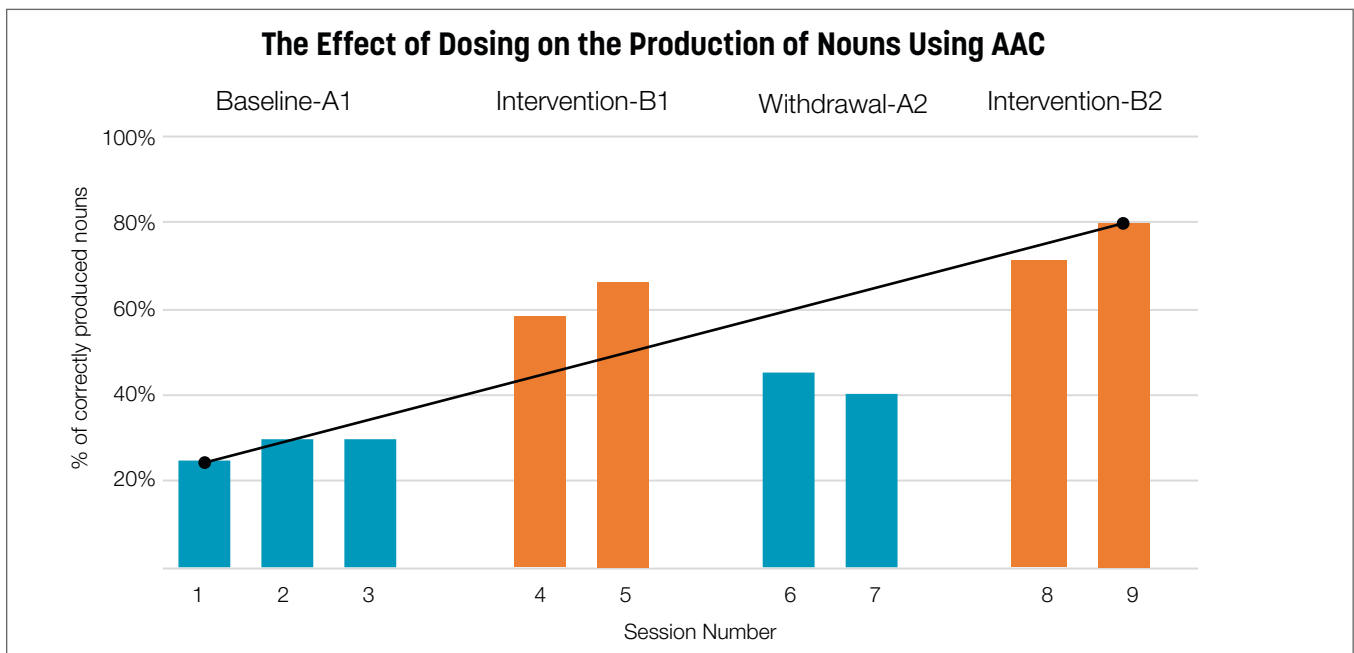
The data point for the eighth session was 71/100 for 71%. The data point for the ninth session was 80/100 for 80%. From 8/20 correctly named photos for 40% accuracy in the previous withdrawal phase to the first data point of 71/100 for 71% in this phase, there was an immediate level change of 31% across adjacent conditions in a therapeutic direction. **The mean was 75.5%.**

FIGURE 3

Participant 3: Slope per Phase

Patient: Participant 3

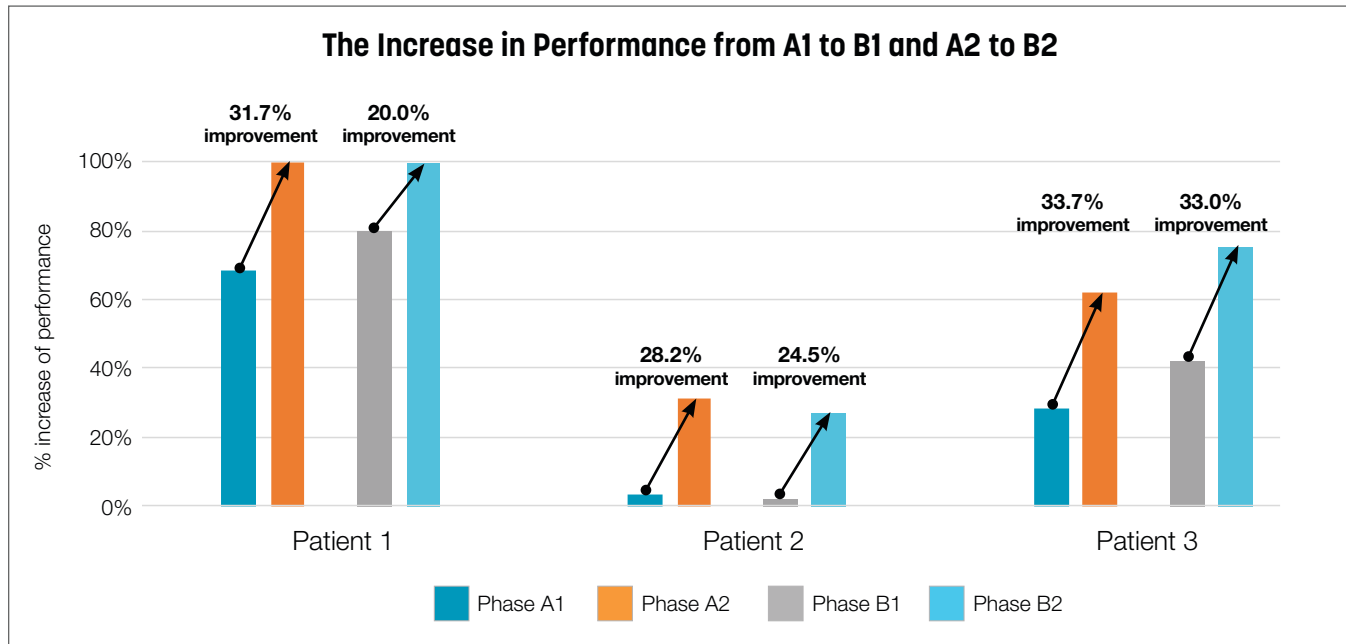
Intervention: ABAB



Results

P1 exhibited an average increase in performance of 31.7% from Phase A1 to Phase B1 and a 20% increase from Phase A2 to Intervention Phase B2. P2 exhibited an average increase in performance of 28.2% in Phase A1 to Phase B1 and a 24.5% increase from Phase A2 to Phase B2. P3 had a 33.7% increase from Phase A1 to Phase B1 and a 33% increase from Phase A2 to Phase B2.

FIGURE 4



Conclusions

The research supports the hypothesis that five repeated trials during a confrontational naming task using a TT device does positively affect the production of nouns in persons with chronic expressive aphasia. The results of this study support other findings that visual images help to stimulate language and word meanings (Collier & Dietz, 2014; DeLong et al., 2015; Griffith et al., 2014; Harnish et al., 2014; McKelvey et al., 2010; Off et al., 2015) and that even years after a stroke, PWAs can improve with the practice of a Lingraphica communication device (Lefkos et al., 2001; Steele, 2004; Steele, 2006). Further, intensive dosing with repetition may improve skills in regaining language and increasing vocabulary for PWAs.

What does this mean for clinicians?

Practical Implications

Practicing clinicians who work with this population can benefit from the knowledge of this study which indicates that PWAs status post 2 to 8 years CVA or injury can still be stimulated using a speech-generating device (SGD) to produce nouns. Although these individuals are verbal, practice on the Lingraphica TT device helped reduce the number of errors during confrontational naming. A communication device is often identified as a tool to achieve functional communication but is rarely considered an instrument to elicit language through its multimodal capabilities. Clinicians who work with and treat this population should consider the therapeutic nature of an SGD with easy programming functionality.