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Semantic feature analysis application for people with aphasia

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SEMANTIC FEATURE ANALYSIS APPLICATION FOR PEOPLE WITH APHASIA

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Introduction

The purpose of this study is to determine the effectiveness of the Name That! App as a treatment for aphasia. There are a variety of treatment approaches available. This study will look into the benefits of each approach as well as testing one approach in particular: Semantic Feature Analysis. In addition, there are a limited number of apps available that use this approach and there is very little research into the efficacy of them. Conducting research will help determine the benefits of using a Semantic Feature Analysis approach as well as the benefits of working with the Name That! App. The current study will apply the use of this app in a therapy setting with a person with aphasia.

Overview

Aphasia is an acquired language processing disorder that affects approximately 1 in 250 people in the United States (asha.org). For those affected, this disorder severely limits the ability to communicate. In most cases, aphasia occurs following a stroke or a head injury; however it can also develop more gradually as a result of a degenerative disease or brain tumor (mayoclinic.org). The severity, as well as the difficulties accompanied with aphasia, depends upon the location in the brain that was damaged. As a result, there are various forms of aphasia.

Broca's aphasia is a common form of aphasia caused by a lesion in the posterior inferior portion of the left frontal lobe; this location is known as Broca's area. This form of aphasia is characterized by non-fluent speech, speech that sounds disconnected and is littered with pauses and incorrect or missing grammar. People with Broca's aphasia

may also have difficulty finding words. Auditory comprehension typically remains fairly well intact, although many people with Broca's aphasia tend to have difficulty following multi-step commands. Reading comprehension also suffers in people with Broca's Aphasia (Bhatnagar, 2002).

Another form of aphasia is Wernicke's aphasia. This form is caused by a lesion to the posterior two-thirds of the left superior temporal gyrus, or Wernicke's area. Unlike Broca's, this form of aphasia is characterized by fluent speech. However, the speech that is produced so effortlessly carries little to no meaning. People with Wernicke's aphasia habitually repeat a few phrases and idioms in inappropriate situations. These people may also have trouble with naming and often produce paraphasic words, words that contain unintended syllables, or an unintended word altogether. In addition to speech difficulties, people with Wernicke's aphasia also suffer from poor auditory comprehension, and many are unable to answer yes/no questions (Bhatnagar, 2002).

Other, less common, forms of aphasia include global, conduction, and anomia. Table 1 displays the five forms of aphasia mentioned above and includes the language features affected by each form. As the table shows, naming is one of the most strongly affected language features in people with aphasia. The remainder of this thesis will focus on applying current technologies and treatment strategies to address naming deficits in a person with aphasia.

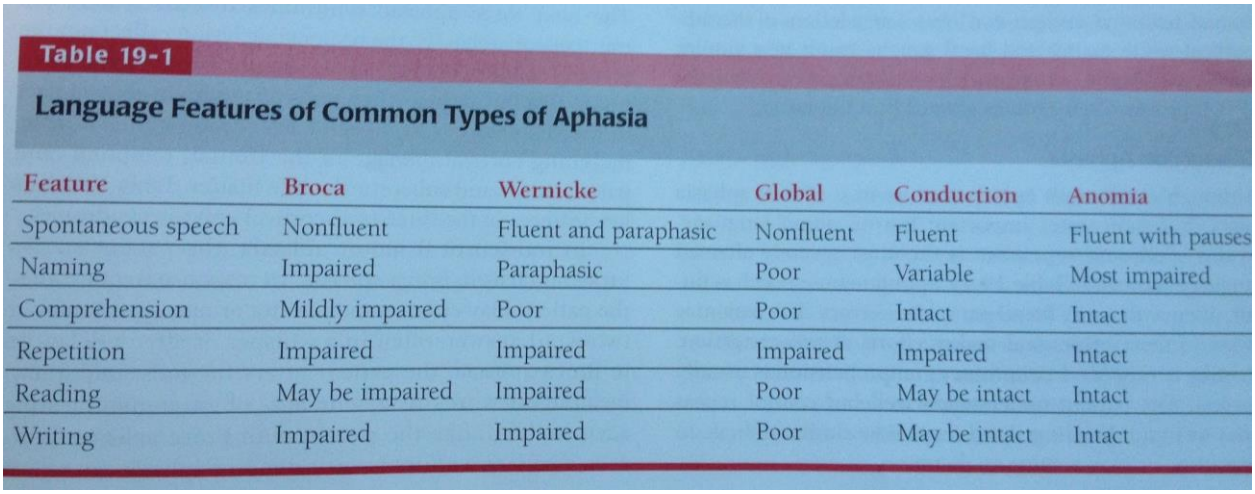


Table 19-1

Language Features of Common Types of Aphasia

Feature	Broca	Wernicke	Global	Conduction	Anomia
Spontaneous speech	Nonfluent	Fluent and paraphasic	Nonfluent	Fluent	Fluent with pauses
Naming	Impaired	Paraphasic	Poor	Variable	Most impaired
Comprehension	Mildly impaired	Poor	Poor	Intact	Intact
Repetition	Impaired	Impaired	Impaired	Impaired	Intact
Reading	May be impaired	Impaired	Poor	May be intact	Intact
Writing	Impaired	Impaired	Poor	May be intact	Intact

T*able 1, Bhatnagar, 2002, p. 409.*

Treatment approaches for naming

Discovering an effective treatment for naming deficits amongst people with aphasia has been a highly sought after goal for many years. Numerous treatments have been tested. Many have been found to be beneficial in particular cases, although some results for the efficacy of these treatments remain inconclusive

Substitutive treatment approaches involve the use of intact subsystems (i.e. the unaffected hemisphere or area of the brain) to make up for the loss experienced in the affected area. Many substitutive treatment approaches involve using gestures in the place of verbal communication. Studies have shown that this approach has aided in basic communication but is inconclusive regarding the influence it has in a more natural or conversational situation (Kiran, 2008, pp. 71-82).

In contrast to substitutive treatments, restitutive treatments involve a focus on the impaired system and are designed to reteach aspects of language. In order to achieve the goal of re-teaching language, the restitutive treatment approaches activate the damaged areas in the brain which increases the plasticity of the brain. The increase in

brain plasticity facilitates neural synapses needed for acquiring new information, or relearning lost information. There are various approaches found under the umbrella of restitutive treatments (Kiran, 2008). The following approaches involve different forms of cueing techniques, a treatment approach that has been studied for many years. According to a study conducted by Love and Webb (1977), cueing techniques are helpful to people with Broca's aphasia. Love and Webb noted that, although cueing techniques do not completely mend the deficits faced by people with aphasia, they do aid in kick starting a person's motor patterns and word recall abilities that are needed for language formulation and conversation. Love and Webb (1977) concluded that, “With further research, a battery of graded cueing techniques might be available to speech pathologists in their work with Broca's aphasia” (p. 177).

Since 1977, Speech-Language Pathologists (SLPs) have worked to develop these cueing approaches. One of these approaches is the lexical-semantic approach. This approach involves word-to-picture matching in which a client is shown a picture and is then asked to match the picture to one of the four semantically related words. These words are written and/or read aloud to the client. After this task is completed, the client moves on to a second task that is very similar to the first, except the provided words are not semantically related. The third, and final, step of this approach is to have the client produce or repeat the target word by looking solely at the picture. Studies done to test this treatment yielded small improvements and little generalization (Kiran, 2008,).

The typicality treatment approach is another restitutive treatment approach. Typicality treatment is conducted by training atypical items within a category. This

treatment is designed around the *typicality effect,* which is the brain's ability to assign basic-level names to items before assigning more specific names (i.e. naming a picture "dog" as opposed to "Siberian Husky"; Kiran, 2008). In this treatment, clients are shown somewhat obscure items and work through a series of semantic features regarding the item (e.g. Siberian Husky: four legs, barks, white and black, blue eyes, etc.). Kiran and Thompson (2003) found that training atypical items leads to generalization to typical items within the same category whereas training typical items did not produce generalizations to atypical items. It is believed that the training of atypical items is beneficial because it exposes the client to a larger number of semantic and descriptive features. The exposure to a variety of features then leads to an overexposure to the more basic features (e.g. dog: four legs, barks). The overexposure aids in strengthening semantic connections and the strengthened connections lead to a stronger ability to access the typical features and name the more typical items (Kiran, 2003,).

Phonological component analysis (PCA) is yet another treatment approach that falls under the umbrella of restitutive approaches. Although originally designed for people with traumatic brain injuries, a test conducted by Leonard, Rochon, and Laird (2008) produced positive results for the effectiveness of PCA on people with aphasia. The phonological approach requires the user to describe the target picture using phonological clues (see Figure 1). The categories for PCA include: rhymes with, first sound, first sound associate, final sounds, and number of syllables (Leonard, Rochon, & Laird 2008).

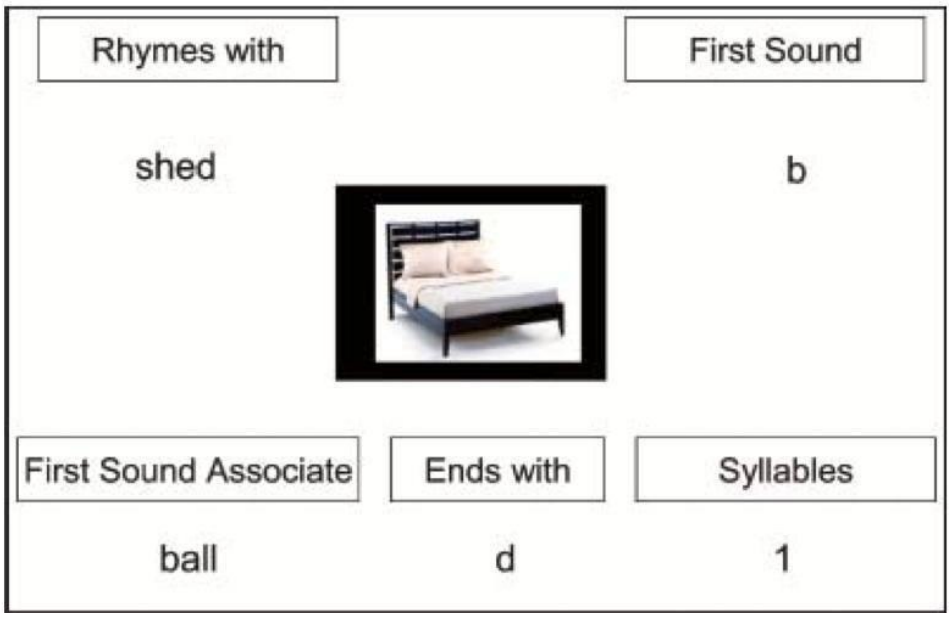


Figure 1 Phonological Compenent Analysis (Leonard, Rochon, and Laird, 2008)

Another restitutive approach is Semantic Feature Analysis (SFA). Unlike PCA, semantic feature analysis involves the use of semantic cues to describe the target word. As a part of this treatment, clients are required to generate semantic information about the target word (e.g,. What do you do with this?). Figure 2 shows the categories used in the semantic feature matrix.

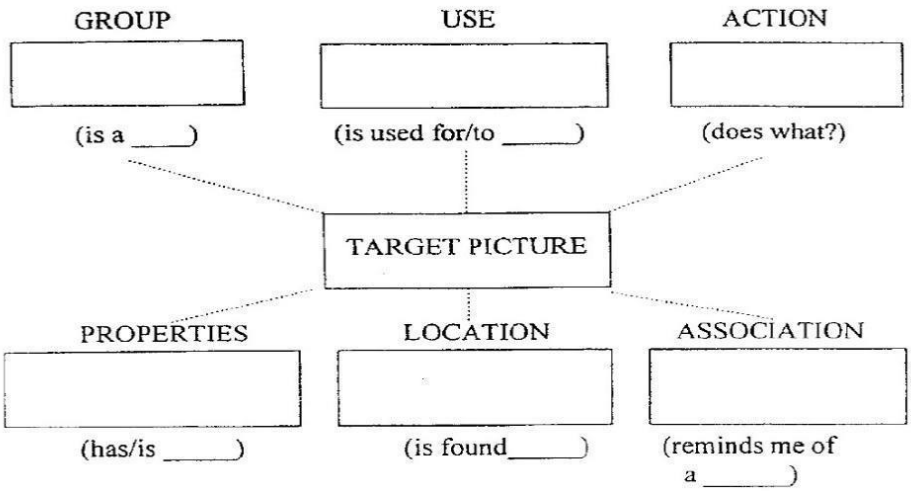


Figure 2. Semantic Feature analysis (Boyle & Coelho, 1995)

SFA has been shown to be a successful treatment. A study by Boyle and Coelho (1995) resulted in remarkable improvement; their participant correctly named less than 20% of the presented pictures during the initial baseline testing and met the criterion of 100% during the seventh session (Boyle & Coelho, 1995). This same study was repeated by Coelho, McHugh, and Boyle (2000); similar results were noted. At the beginning of an eight session trial, the participant correctly named fewer than 50% of pictures during a baseline task. In the final session, the client was able to name 80% of pictures correctly (Coelho, McHugh, & Boyle, 2000). As a result of the mixed evidence surrounding the efficacy of all the approaches, the remainder of this study will focus on a combined approach.

Using a combined approach

The study began by developing an approach using SFA exclusively. However, after further research an approach was developed combining many of the positive approaches explained above.

Naming is, in its simplest form, a two-step process. The first step involves semantic processes and the second step involves the use of phonological processes. SFA attempts to treat naming at its initial stage, the semantic level. This approach acts upon the belief that the semantic network is a web of connections that interact with one another, leading to word representations. In contrast, PCA is beneficial when a breakdown occurs for a person at a more phonological level. Many people with aphasia struggle at one, or both, of these levels. Therefore, it is believed that a somewhat mixed approach, using SFA and PCA may be the most beneficial form of treatment.

A study conducted by Hashimoto (2012) compared both forms of treatment in order to determine if one treatment proved more effective. In this study, the participants were trained using both SFA and PCA on an alternating basis. Hashimoto's study yielded positive results for both SFA and PCA, although it appeared that SFA had a slightly better long term affect. However, it was believed that even though the treatments were conducted during separate therapy sessions, semantic cues were used regardless of the approach, which strengthened semantic processes. This may be due to the fact that, as previously stated, naming is a two- step process that begins at the semantic level. Therefore, simply by looking at a photo, the semantic process begins to activate. Nevertheless, it was noted that PCA was also an effective form of treatment which supports the idea that a combination of both PCA and SFA may prove to be the most advantageous approach.

A similar study was conducted by Wambaugh, et al. (2001); however, this study looked at both treatments in people with different levels of deficits. In addition, each participant only received one form of treatment, either SFA or PCA. The results of this study, much like the study by Hashimoto, yielded fairly even results for both approaches. As a result, the approach used in the current study most closely resembles SFA, although only one semantic feature is probed for each photo. If the semantic feature is not adequate to aid in naming, the first sound is given to the participant.

Another process that was looked at when developing the treatment approach used in this study was the typicality effect. Due to the strong evidence gathered by Kiran and Thompson (2003), the incorporation of the typicality effect in the treatment approach cannot be overlooked. As a result, the computer application developed for this

study trains a combination of typical items (e.g. apple, grapes) and atypical items (e.g. dragon fruit, pomegranate).

The importance of naming therapy

The main goal when working with people with aphasia is to improve their overall communication. Therefore, the question arises as to whether or not training an individual to name a set of pictures is truly beneficial in day to day conversation. A study conducted by Best et al. (2011) looked into this question. This study set out to determine the carryover from word finding skills to conversation.

The study showed that the increased ability in picture naming did not have a strong correlation with conversation. Picture naming scores yielded significant benefits whereas the evaluation of conversation variables (e.g. turns taken, word errors, nouns per turn, content words, nouns per five minutes of conversation) did not yield any significant benefits. However, even though an overall increase in communication skills was not noted, a significant increase was noted in the number of nouns used per turn and nouns used during five minutes of conversation. Therefore, some carryover was noted following therapy. Furthermore, it is noted that training just a few words that a client deems important can drastically improve their quality of life. An example of this is training a woman to consistently access the words 'Bacardi and Coke' so she can order herself a drink. Even though training the recall of two words will appear insignificant in a study, these two words may have an incredibly significant effect on that woman's life (Best, et al., 2011).

Technology and its role in therapy

Technology is constantly improving and expanding; it has become a basic part of everyday life for most people. As a result, SLPs are following suit and including the use of technology in therapy approaches. According to a survey conducted by the Pennsylvania Speech-Language-Hearing Association, over 50% of SLPs use iPads as an aid in therapy (Bruno-Dawling, 2012). Not only is the use of iPads and other similar devices growing in popularity, the apps available are constantly improving and more are being created. Simply typing the phrase “speech therapy” into the Apple App Store search bar yields 373 results (Apple).

When using apps with people with aphasia, it is important to choose an app that can be easily navigated by the user. Due to the fact that many people with aphasia struggle with increased complexity, the more simple the app, the more beneficial it may be. Although the use of apps for treatment is growing, there are still a limited number of treatment apps that specifically work on treating anomia and naming deficits for people with aphasia.

Naming TherAppy, from Tactus Therapy, is a fairly complex app designed to treat word finding deficits, however, it can also be used for children with special needs. This app is arranged into 10 categories including animals, foods, objects, and so on. Each item contains four to six prompts that are self-selected from a list of ten semantic features and four phonemic features. This app is highly customizable and contains over 700 words (Apple). Figure 3 is an example of a picture and set of prompts in the Naming TherAppy app.

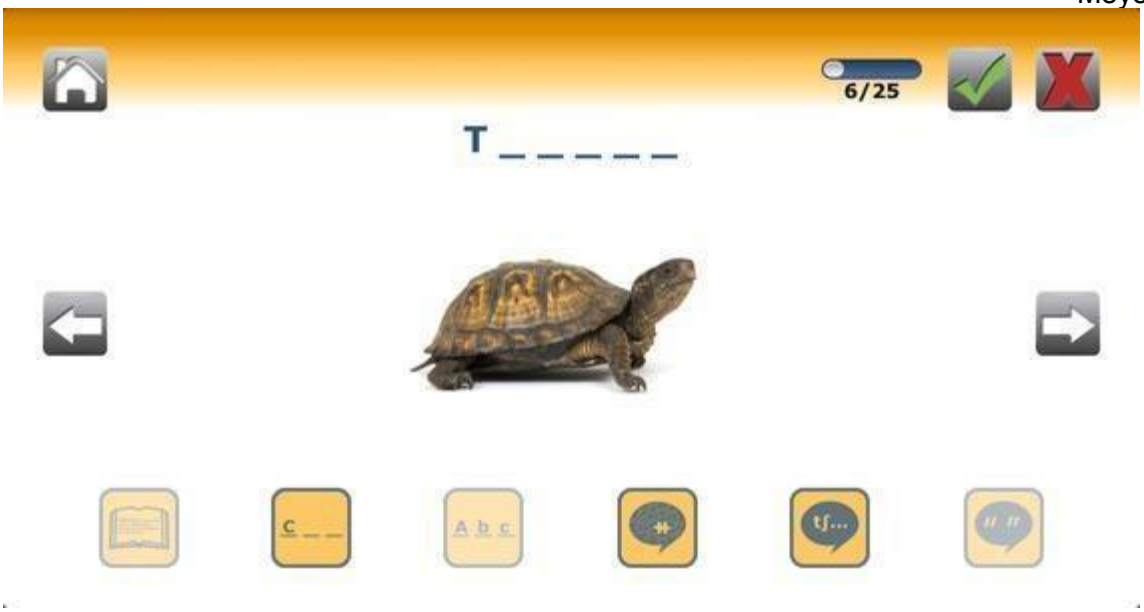


Figure 3. Naming TherAppy. iTunes App Store (2014)

iName it is an app from Smarty Ears Apps that can be found in the iTunes App store. Unlike Naming TherAppy, this app is designed to be used by a speech language pathologist or a caregiver. This app only contains 50 of the most common words that are necessary for day to day life. Each target item is presented in the context of where it would be found, for example, the client will see a photo of a bedroom and will be prompted to name a specific item within the bedroom. Much like Naming TherAppy, iName it provides a large variety of cues including phonemic, phrase completion, semantic, and a whole word cue (Apple). Figure 4 shows a typical scene found within this app and the phrase completion cue that accompanies this item.

Figure 4. iName It. iTunes App Store (2014).

A third app that is available for people with aphasia to improve naming is the Talk Around IT app by Neuro Hero. This app also uses a combination of SFA and PCA, as it offers the client a semantic question as well as the ability to choose from a number of phonological cues. Talk Around IT comes in four different versions: home, personal, men, and nature. Each version contains 50 words that are found under that specific category (Apple). A screenshot from the nature version of this app is provided (Figure 5).

Figure 5. Talk Around IT. iTunes App Store (2014).

The app being tested in the current study is the Name That! App developed by a collaborative team at the University of Northern Iowa. The team consists of a faculty member and students in the Department of Communication Sciences and Disorders and the manager of the John Pappajohn Entrepreneurial Center's Apps Lab. Much like the other three apps, Name That! was designed to aid in naming for people with aphasia and other special needs. This app, as mentioned previously, adopts a combination of a few different treatment approaches. However, the current app available uses the SFA approach. Unlike the other apps, this app is very simple and only offers one semantic cue, in the form of a randomly generated question, for each picture. If, after answering the semantic question, the client is still unable to name the photo, they are given the first sound and shown the first letter. If the cue does not facilitate naming, the entire word is modeled and shown. Name That! also enacts the training of atypical items as a way to increase the ability to name typical items. The app

is designed to be navigated by the person with aphasia. Below (Figure 6) is a screenshot of this app.

Figure 6. Name That!. iTunes App Store (2014).

Methods

Testing was conducted to determine the effectiveness of the Name That! App in a person with aphasia. The participant in this study was C.D., a 52 year old female with Broca's Aphasia as a result of a stroke. In 1999, C.D. had a left middle cerebral artery aneurysm; she also has insulin dependent diabetes mellitus. C.D. has been diagnosed with aphasia, dysphagia, and mild right side hemiplegia. She began receiving speech services at the Roy Eblen Speech and Hearing Clinic (RESHC) in January 2000. The therapy she receives at RESHC consists of individual therapy as well as Aphasia Group. Pre-testing consisted of: the Western Aphasia Battery - Revised (WAB-R;

Kertesz, 2006), the Boston Naming Test-2nd edition (BNT; Goodglass, Kaplan, and Barresi, 2000), 20 images from the Name That! App, and a personal information questionnaire that C.D. was to complete in written format. The written task served as the control that assessed both reading and writing skills. The baseline photos were scored on a scale of 1-3: a score of 1 for completely incorrect, 2 for partially correct, and 3 was given for fully correct responses.

C.D. received treatment two-three times a week for 50 minute sessions. Three sessions were missed during this time period, due to previously scheduled appointments. Pre-testing was conducted on January 9th, 2014 and post testing was done on March 3rd, 2014. Baseline measures were gathered once a week at the beginning of the session. C.D. was seen a total of 10 sessions, including pre- and post-testing dates.

Each session consisted of working through sessions on the Name That! App. Each session contained five words and finished with a randomly selected repeated word. All of the words in the session were chosen at random; as a result, the participant occasionally saw the same photo multiple times within one session. The Name That! App was modeled after a combination of Semantic Feature Analysis (SFA). The app presented an image as well as a randomly generated semantic feature question such as “What do you do with this?” If C.D. was unable to name the item, she selected the “Name That” key and was then prompted to ask for the first sound or the whole word. When the first sound was selected, the app modeled the sound and showed the first letter(s) followed by the number of letters in the remainder of the word. (e.g. dog - d _ _). If C.D. was still unable to name the photo, she was able to select the whole word key

and the app would model the word for her. C.D. would then repeat the modeled word and move on to the next item. The time needed to complete each session was recorded.

Results

The time needed for C.D. to complete each session on the Name That! App decreased over the course of the study period. Figure 7 shows the progression C.D. achieved over the course of treatment.

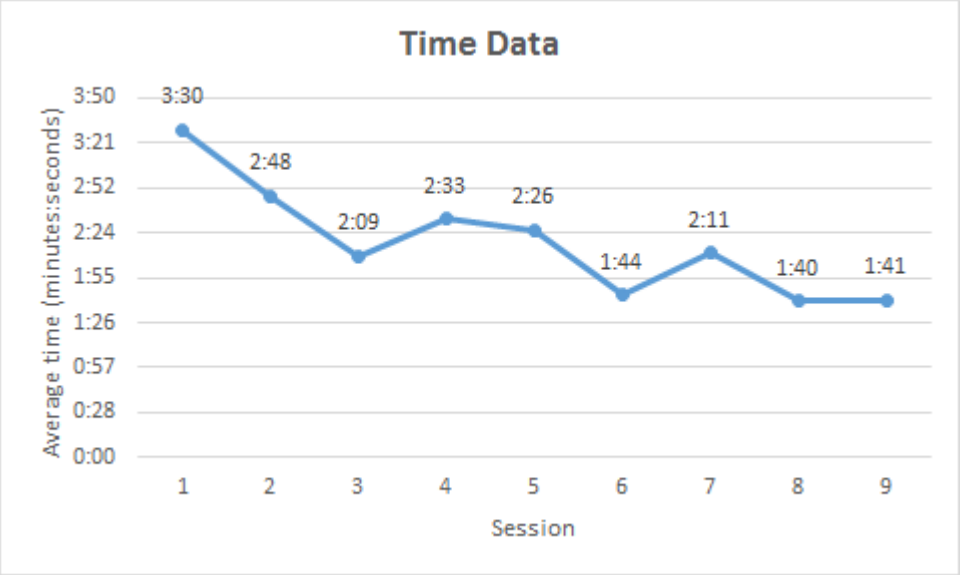


Figure 7, Time Data for C.D.

This chart tracks the average time it took C.D. to complete each session during all nine sessions. In the table above, it is evident that the average time drastically decreased from 3 minutes and 30 seconds on her first session to 1 minute and 41 seconds during her final session. This decrease suggests an improvement in the participant's time spent naming items as less time was spent on each word.

The baseline measures for naming showed an increase in ability that peaked early in the sessions and tapered off near the end. Figure 8 illustrates this pattern.

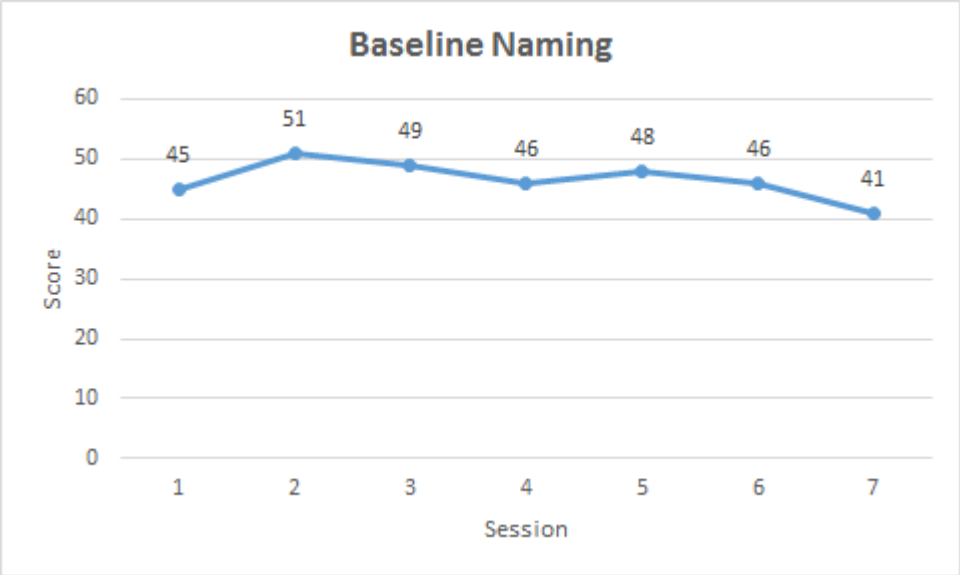


Figure 8, Baseline Naming for C.D.

Although the data indicates that the participant received the lowest baseline score on the final day of therapy, it should be noted that in every session, with the exception of the final session, C.D. scored higher than the initial baseline testing. This suggests that working with the Name That! App did facilitate naming.

During initial testing, C.D. received an Aphasia Quotient of 60.5 with an object naming score of 31 and a repetition score of 42 on the WAB-R. Other areas tested as part of the WAB-R included spontaneous speech, and auditory verbal comprehension. Upon completion of the study, C.D. was given the WAB-R once more. This time she received an Aphasia Quotient of 60.9. More notably, C.D.'s word repetition score rose from 42 to 56 and her object-naming score rose from 31 to 37. The following tables (Figure 9, 10, and 11) compare all of the scores from the pre- and post- WAB-R testing.

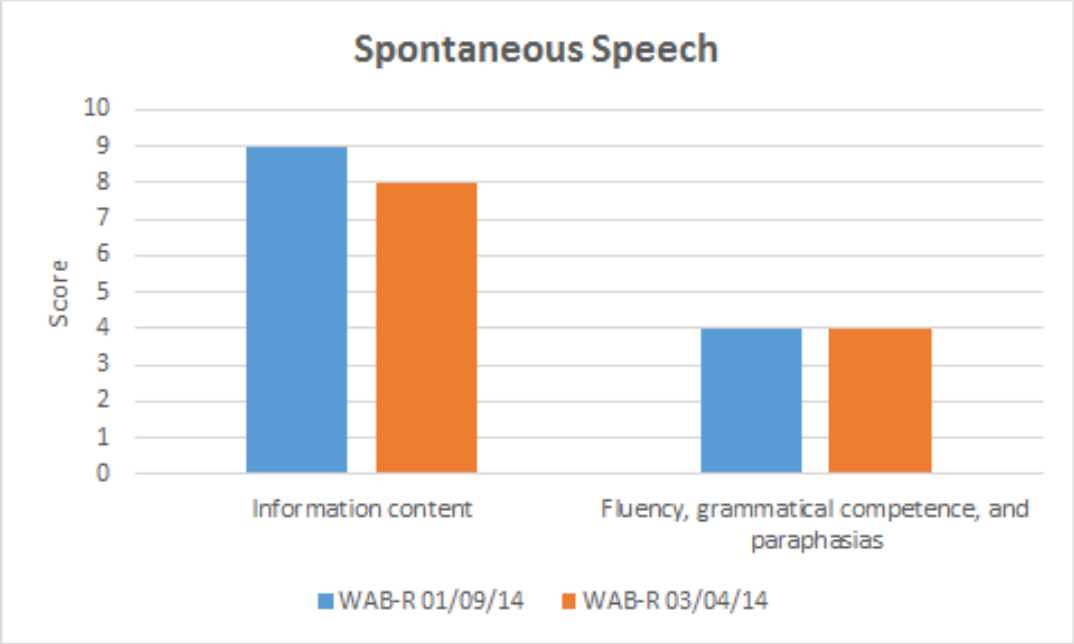


Figure 9 Spontaneous Speech on WAB-R for C.D.

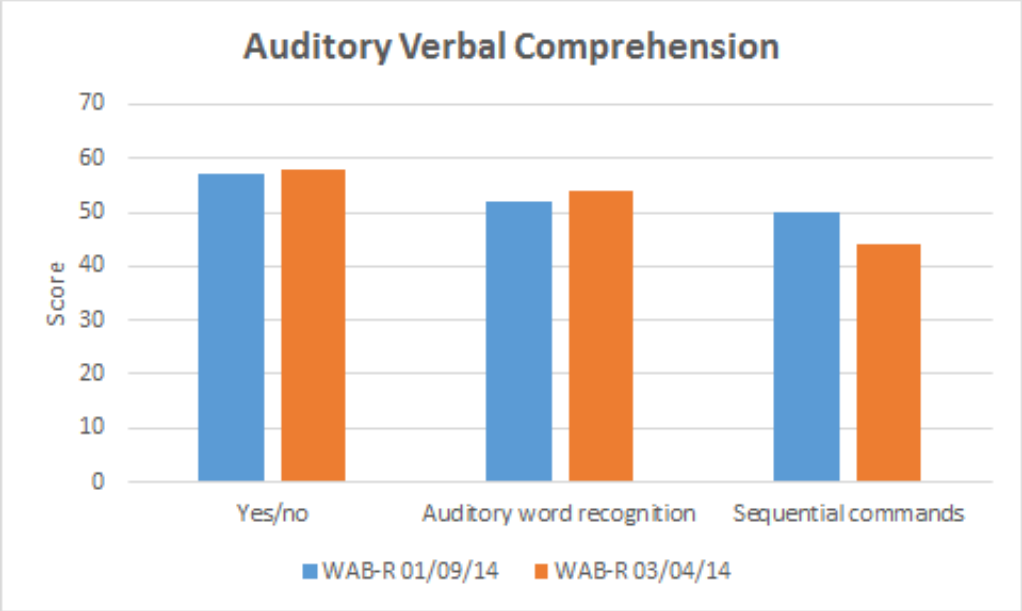


Figure 10, Auditory Verbal Comprehension on WAB-R for C.D.

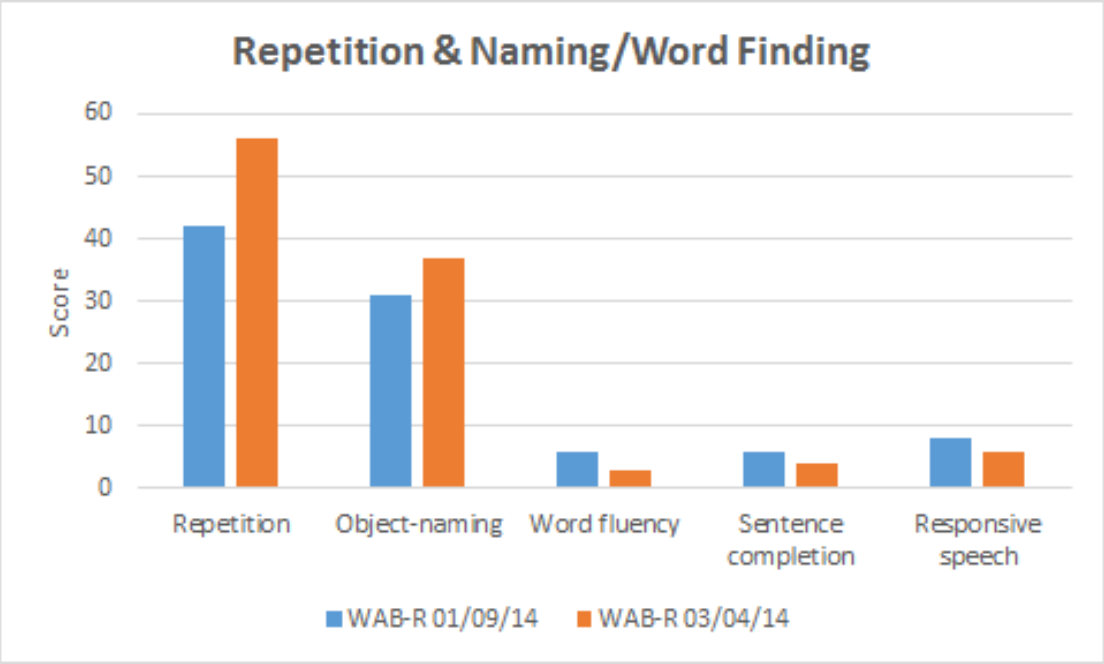


Figure 11, Repetition & Naming/Word Finding on WAB-R for C.D.

The majority of these scores reflect little variation; however, a significant increase occurred in the participant's repetition and object-naming scores.

During the pre-testing, C.D. received a score of 13 on the BNT. During final testing C.D. received a total score of 17, a four point increase. During the post testing, C.D. improved upon the number of spontaneous responses from 13 to 16. She also received fewer stimulus cues. Figure 12, below, illustrates the comparison of scores for C.D. on the BNT.

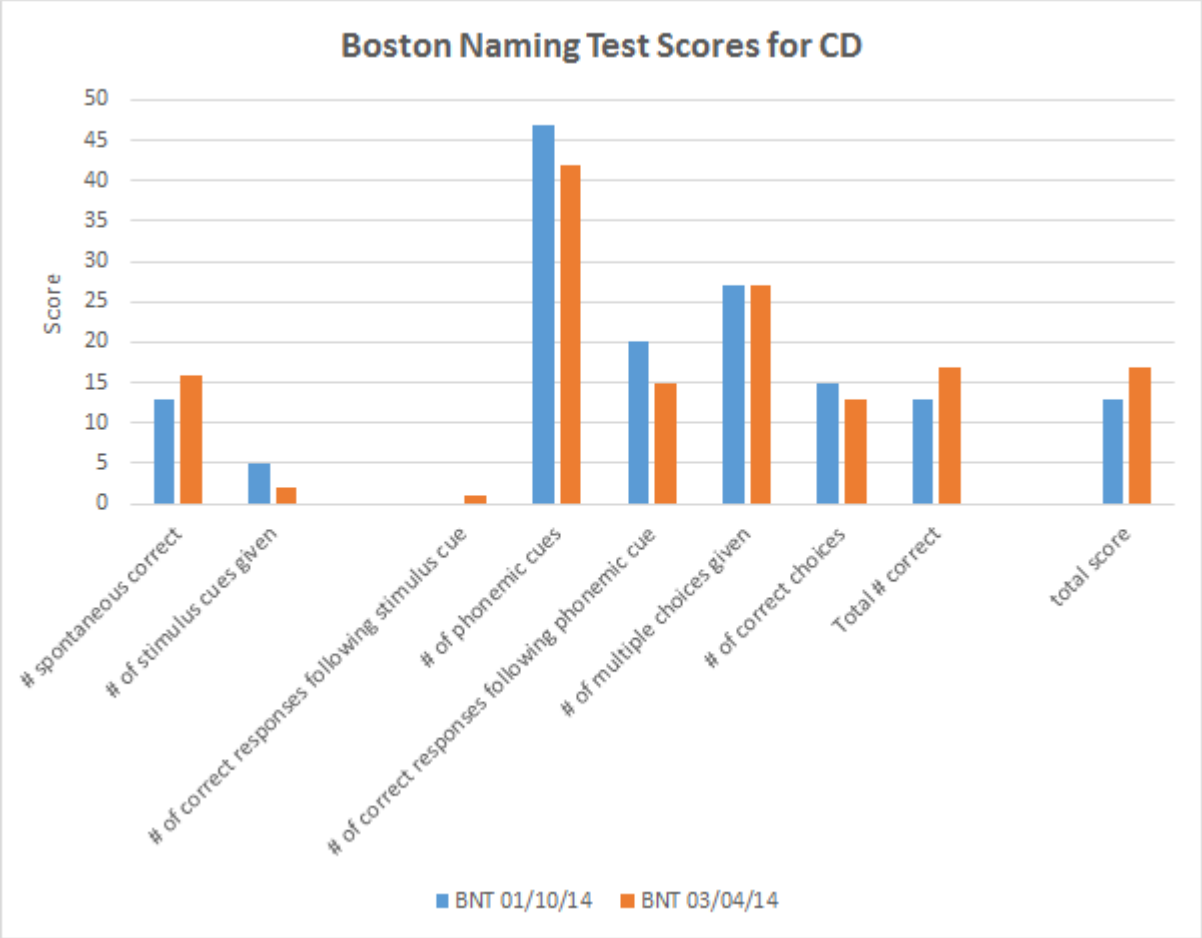
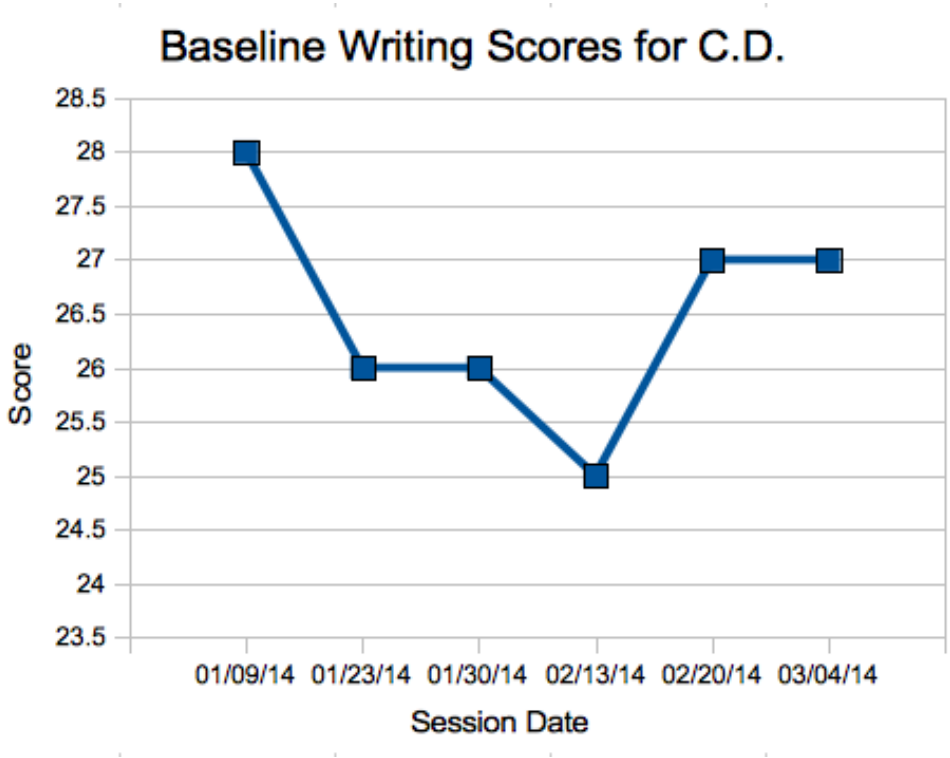
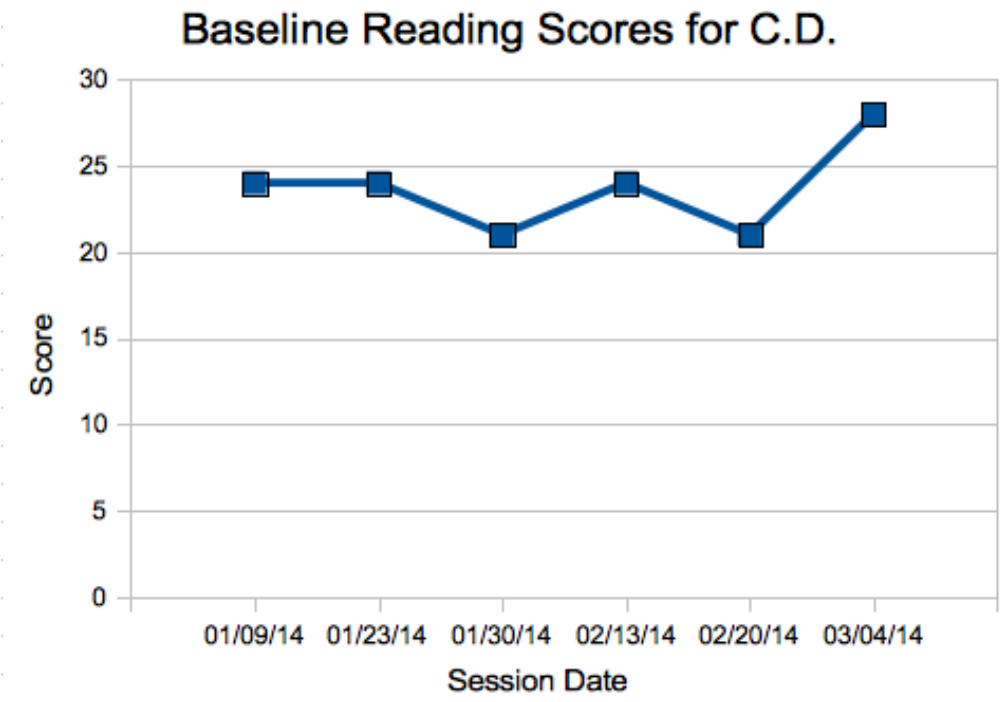


Figure 12, Boston Naming Test Scores for C.D

Control measures were taken six times over the testing period. These items consisted of a reading and writing task and were scored in the following manner: 3 = immediately, fully correct; 2 = mostly correct immediately, fully correct with prolonged delay, or self-corrected; 1 = some correct; 0 = fully incorrect; N = no response. Both the reading and the writing tasks were scored out of 30 points. The following graphs show the scores for both the writing task (Figure 13) and reading task (Figure 14) that were gathered during the testing period.



(Figure 13, Baseline Writing Scores for C.D.)



(Figure 14, Baseline Reading Scores for C.D.)

The Name That! App does not target reading or writing skills, so little change was expected. The graphs do not display a pattern of improvement or declination in the ability to perform either task. This supports the belief that the Name That! App does not aid in reading and writing skills.

Overall, the data received from C.D. indicates improvement of naming scores on the WAB-R, BNT, and slight improvement with baseline measures. Furthermore, the time it took to complete each session drastically decreased over the course of treatment. After initial testing with this app, the scores suggest that the Name That! App effectively improves naming in people with aphasia.

Discussion

The purpose of this study was to determine whether or not the Name That! App improves naming for a person with aphasia. In this study, ten therapy sessions were conducted with a single participant, C.D., a 52 year-old female with Broca's Aphasia. C.D. worked her way through sessions on the Name That! App and the time required to finish each session was recorded. Pre- and post-testing was administered during these sessions and baseline measures were gathered six times during the testing period.

Semantic feature analysis observations

The Name That! App adopts the Semantic Feature Analysis (SFA) strategy as the treatment strategy for naming. During therapy, C.D. was shown a picture as well as a question regarding a semantic property of the target word. The SFA strategy often triggered the production of the target word. Of the variety of semantic feature questions, it was noted that C.D. favored the "Where do you find this?" question over all of the others. In many situations, C.D. chose to answer this question in place of, or in addition to, the presented question. This particular feature was the most beneficial for C.D. It

was also noted that C.D. perseverated (i.e., repeated or fixated on one word or phrase) on certain answers to SFA prompts. For example, in nearly every session, C.D. perseverated on the word “kitchen” as her answer to the SFA prompt: “Where do you find this?” even for items not found in the kitchen.

Although enacting SFA did prove to be helpful in triggering target word production during therapy, it occasionally served as a distraction, especially when perseverations occurred. During these situations, C.D. shifted her focus from producing the target word to finding the answer to the semantic feature prompt. Possible remedies for this would be to have the app produce the answer to the feature when necessary, or have the SLP working with the client provide the answer when needed.

Time data

Over the course of the testing period, the time required for C.D. to work her way through the sessions drastically decreased. During the first day of therapy, the longest session was 5 minutes and 7 seconds. As therapy progressed, sessions were completed at a quicker rate. By the last session, C.D. completed a few sessions in less than one minute.

This data strongly supports the benefit of working with the Name That! App. After just 10 sessions working with the Name That! App, C.D. required just over half the time she needed per session at the beginning of treatment. It is believed that the decrease in the time needed to complete each session reflects an improvement in C.D.’s ability to name the randomly generated items. Further testing was conducted to support this data.

Pre- and post-testing

The WAB-R and the BNT were both administered to C.D. at the beginning of the study. C.D. received a pre-test Aphasia Quotient score of 60.5 on the WAB-R. Upon completion of the study, C.D. was tested again and received an Aphasia Quotient of 60.8. The overall score did not yield a significant increase. However, the object naming score for C.D. rose from 31 on her pre-test to 37 on her post-test. An explanation as to why the overall Aphasia Quotient yielded an insignificant increase whereas the object naming score increased by six points, is that the WAB-R tests a variety of language skills. This assessment looks at aspects of Spontaneous Speech, Auditory Verbal Comprehension, Repetition, Naming and Word Finding. The Name That! App specifically targets naming and word finding, and, as expected, this is where a significant increase occurred. It was also noted that a significant improvement occurred on the Repetition portion of the assessment; C.D. scored 42 on her pre-test and a 56 on the post-test. A possible explanation for the improvement on the Repetition portion of the assessment may be that when a target word was supplied by the app, C.D. repeated the word before moving on to the next item. Further testing is required to determine whether or not the Name That! App has a positive influence on word repetition.

The BNT is an exam designed specifically to test naming abilities. As expected, a significant increase was noted in the post-test score. During pre-testing C.D. received an overall score of 13. This score rose to 17 on the post-test, yielding a four point increase. It was also noted that C.D. received a higher score on spontaneously correct answers during the post-test and required fewer cues.

The BNT data yielded a few surprising scores. When looking at the number of phonological and verbal paraphasias, significant differences were noted. Verbal paraphasias occur when another word is used in place of the target word, this word can either be related (e.g. fork instead of spoon) or unrelated (e.g. fork instead of dog). Phonological paraphasias occur when the sounds in the word are produced in the wrong order, or sounds are left out (e.g. ephelant instead of elephant). The number of phonological paraphasias drastically increased from three in the pre-test to 12 in the post-test. In contrast, the number of verbal paraphasias decreased from 16 during the pre-test, to 10 in the post-test. The increase in phonological paraphasias may reflect an increase in naming ability as phonological paraphasias can be close approximations of the target word. On the other hand, verbal paraphasias involve a completely different word, suggesting more difficulty in naming. More participants are needed to further prove the claim that an increase in phonological paraphasias and a decrease in verbal paraphasias reflect an improvement in naming ability.

The scores from both the WAB-R and the BNT exhibit improved naming abilities. This data strongly supports the use of the Name That! App as a tool for improving naming ability.

Baseline measures and other observations

C.D. was asked to perform a baseline assessment of her reading and writing skills six times over the course of this study. As the Name That! App does not target either of these skills, little change was expected. Although C.D.'s scores did range from as low as 25 and as high as 28 in the writing assessments and 21 to 28 in reading assessments, no pattern was noted. People with aphasia commonly exhibit an

inconsistency in skill level, so the lack of a pattern in both the reading and writing skills was expected.

C.D. was also tested on a set of 20 baseline images taken from the Name That! App six times over the course of the study. C.D. received a score of 45 during the first session. Her scores peaked on the second session, with a score of 51, with a slight decrease in the remainder of the sessions. C.D. unexpectedly received her lowest score, 41, on her final day of testing. A possible explanation may be that C.D. appeared very nervous during final testing and her anxiety may have affected her performance on this task. Nevertheless, it should be noted that, with the exception of the final session, C.D. consistently received scores higher than her initial score. The baseline photo naming scores yielded minor improvements in naming and therefore modestly suggest that the Name That! App aids in naming ability for people with aphasia.

Throughout this study, various behavioral observations were noted. Frequently, when C.D. arrived at a word she could not name initially, she was able to spell out the word with her finger. When this was the case, C.D. often needed to proceed to the first letter/sound prompt on the screen and was then able to name the target word. This may suggest an importance in a phonological component analysis approach or a more mixed approach as opposed to strictly enacting SFA . However, this behavior may be unique to C.D. Thus, more participants are needed to determine whether or not phonological cues are more helpful than semantic cues in certain situations. It was also observed that C.D. occasionally perseverated on stress patterns of previous target words. This too may suggest an increased awareness of phonological components.

Possible limitations with study

Although this study yielded many positive results that support the use of the Name That! App, a few limitations were noted. Only one participant was tested in this study, making it difficult to generalize the results. In addition, scheduling was difficult and fewer sessions were held than originally planned, which may have had an effect on the data observed. Despite the fact that fewer than anticipated sessions were held, improvements still occurred. Therefore, there is a possibility that there may be a minimum number of sessions needed to see improvement in performance.

Suggestions for future research

Further testing used the app with persons who have different types of aphasia (e.g. Wernicke's) as well as testing participants exhibiting a wide range of severities of aphasia would be helpful in determining the overall efficacy of the Name That! App. This would also be helpful in determining any limitations the app may have in regards to severity levels and types of aphasia. Measures should also be included that evaluate whether or not improvements on test items transfer to changes in the participants' daily communication with others.

Conclusion

In conclusion, this study was conducted to test the effectiveness of the Name That! App as a treatment for a person with aphasia. The app enacts Semantic Feature Analysis (SFA) as the main treatment approach. There are a variety of approaches currently available and a limited number of apps available for treatment.

The data collected from the study showed that naming abilities did improve in the participant after working with the app for eight sessions. The time needed to name each item drastically decreased and significant increases in scores on both the BNT and the WAB-R were noted.

The positive results observed in this study provide support for the efficacy of the Name That! App as well as SFA as treatments for people with aphasia. With this knowledge, the app can be put to use in therapy settings as well as at home. In addition, the data collected from this study, as well as data that will be collected in future studies, can be used to further develop and improve the Name That! App.

References

Aphasia. (n.d.). *Definition*. Retrieved February 26, 2014, from http://www.mayoclinic.org/

Aphasia. (n.d.). *: Overview*. Retrieved February 26, 2014, from http://www.asha.org/

Apple. (n.d.). *Apple*. Retrieved February 25, 2014, from http://www.apple.com/

Best, W., Grassly, J., Greenwood, A., Herbert, R., Hickin, J., & Howard, D. (2011). A controlled study of changes in conversation following aphasia therapy for anomia. *Disability and Rehabilitation*, *33*(3), 229-242.

Bhatnagar, S. C. (2002). *Neuroscience for the study of communicative disorders* (2nd ed.). Philadelphia: Lippincott Williams & Wilkins.

Boyle, M., & Coelho, C. A. (1995). Application of semantic feature analysis as a treatment for aphasic dysnomia. *American Journal of Speech-Language Pathology*, *4*(4), 94.

Bruno-Dawling, S. (2012, March 13). [Early Intervention Speech Therapy: How Many SLPs are REALLY Using iPads?.] *Health Care POV*. Retrieved October 5, 2013,from http://community.advanceweb.com/blogs/sp_1/archive/2012/03/13/how-may-slps-are-really-using-ipads.aspx

Coelho, C. A., McHugh, R. E., & Boyle, M. (2000). [Semantic Feature Analysis As A Treatment For Aphasic Dysnomia: A Replication.] *Aphasiology*, *14*(2), 133-142.

Hashimoto, N. (2012). The use of semantic- and phonological-based feature approaches to treat naming deficits in aphasia. *Clinical Linguistics & Phonetics*, *26*(6), 518-553.

iName it. (n.d.). *Smarty Ears Apps for Learning- Search "Smarty Ears" on the app store*. Retrieved February 26, 2014, from http://smartyearsapps.com/service/iname

Kaplan, E., Goodglass, H., & Weintraub, S. (2001) Boston Naming Test. Baltimore, MD. Lippincott Williams & Wilkins.

Kiran, S., & Bassetto, G. (2008). [Evaluating the Effectiveness of Semantic-Based Treatment for Naming Deficits in Aphasia: What Works?.] *Seminars in Speech and Language*, *29*(1), 71-82.

Kiran, S., & Thompson, C. K. (2003). [The Role of Semantic Complexity in Treatment of Naming Deficits: Training Semantic Categories in Fluent Aphasia by Controlling Exemplar Typicality.] *Journal of Speech, Language, and Hearing*, *46*(June), 773-787.

Kertesz, A. (2007). Western Aphasia Battery Revised. San Antonio, TX. NCS Pearson Inc.

Leonard, C., Rochon, E., & Laird, L. (2008). [Treating Naming Impairments In Aphasia: Findings From A Phonological Components Analysis Treatment.] *Aphasiology*, *22*(9),
923-947.

Love, R. J., & Webb, W. G. (1977). [The Efficacy of Cueing Techniques in Broca's Aphasia.] *Journal of Speech and Hearing Disorders*, *XLII*, 170-178.

Naming TherAppy. (n.d.). *Tactus Therapy Solutions*. Retrieved February 26, 2014, from http://tactustherapy.com/apps/naming

Wambaugh, J. L., Linebaugh, C. W., Doyle, P. J., Martinez, A. L., Kalinyak-Fliszar, M., Spencer, K. A. (2001). [Effects Of Two Cueing Treatments On Lexical Retrieval In

Aphasic Speakers With Different Levels Of Deficit.] *Aphasiology*, *15*(10-11), 933-950.

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