

# The feasibility and benefits of independent use of Voice Recognition Systems in people with aphasia

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## Background

Voice recognition software (VRS) allows the user to write and operate the computer by voice. The user speaks to the computer, the software recognises what is said and writes the words on the screen. VRS recognises around 95% of what is said if the person speaks clearly. Accuracy improves with use and the correction of misrecognised words. If mistakes are not corrected then accuracy may get worse. Thus successful use of VRS depends on the system continuing to be used correctly.

VRS has been found to help people with a variety of disabilities, write by circumventing their physical and/or spelling difficulties [1,2]. It is also useful if oral language skills are stronger than written skills. This is sometimes the case if a person has acquired neurological damage. Recently, studies have shown that people with aphasia can work successfully with VRS [3, 4], but they need greater levels of support and training to overcome difficulties with enrolment, dictation and correction.

Most research has focused on whether people with aphasia can be trained to operate VRS and the effects this has on written language production. Less attention has been directed at whether they can use VRS without therapist guidance and if it has any long term benefits after the clinical phase. On average, about 1/3 of all assistive technologies provided are not used [5].

The current study aimed to answer the following questions.

- Can people with aphasia operate VRS effectively and efficiently without supervision?
- How are they using VRS in the 'real world setting'?
- What are their views on the use of VRS?



## Methodology

Participants: 3 men and 1 woman with aphasia who had completed the enrolment and training for Dragon Naturally Speaking ® Preferred (DNS) and were judged to have adequate skills to use the system independently

Name	Age	Gender	Previous occupation	Years post incident	Type of aphasia	Computer skills
TO	60	M	Headmaster	5	Conduction	Yes
KB	57	M	Journalist	2.4	Anomic	Yes
RM	34	F	Nurse	2.4	Broca's	Limited
GS	52	M	Manager	1	Anomic	Yes

Procedures: Baseline measures were collected on a range of dictation tasks. Then the DNS voice files were duplicated creating one that was only used in the clinic under supervision and a second that was used independently. After at least 3 months the baseline measures were repeated for both files.

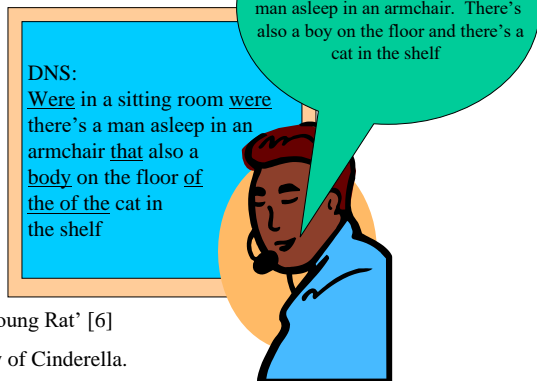
- The total number of words or commands correctly recognised by DNS compared to the total number of words spoken by the participants, and the number of errors where the target was in the correction box was collected for the following tasks:

Reading aloud the first 2 paragraphs of 'Arthur the Young Rat' [6]

Dictating a description of a recent holiday or the story of Cinderella.

Dictating a description of the Dinner Party, an 8 picture sequence and a description of a composite picture, 'The robbery' and/or 'The cat'.

- Interview based on a fixed questionnaire about how they used the system and whether they believed it helped them.



## Results:

Accuracy rates for each participant varied depending on the task. 3 participants (TO, RM and GS) showed a trend toward increased levels of accuracy in the post-work conditions, but not for all tasks. Of the three, only TO showed a significant difference on one of the tasks, the picture stimuli task ( $X^2=3.42, df=2, p=0.00$ ). His accuracy levels for both post-work conditions were higher than the pre-work baseline.

KB's performance was the least consistent. He also showed a significant difference on the picture stimuli task ( $X^2=14.37, df=2, p=0.001$ ). His accuracy levels for the solo file post-work was lower than both the clinic post-work and the pre-work files.

Only TO showed a significant difference in the number of errors where the target was in the correction box ( $X^2=8.95, df=1, p=0.003$ ). More target words were in the correction boxes of the post-work clinic file than the solo file. This would make the clinic file easier to correct.

Interview: Some of the themes deduced from the interviews were shared by all participants. They were all motivated to find a way to circumvent their writing difficulties and VRS was a perfect solution. They all believed that by using VRS they managed to take some control over their lives without having to depend on others all the time. Although they all found the training difficult initially, they felt very capable and pleased when using VRS independently.



## Conclusions

This study showed that some people with aphasia can successfully use VRS without therapist supervision, as there was no difference between the pre and post-work measures. However, there was evidence that even in these cases the integrity of the voice files needed monitoring.

VRS had functional benefits for all the participants in this study. They used VRS in a variety of ways, emails, letters, keeping a diary, writing a book and writing a business plan. They could clearly see how VRS could help them achieve their desired goals. They also reported that VRS enhanced their quality of life.

VRS appears to only partially adapt to the non-standard speech of some people. The accuracy levels may plateau at a lower level. In these cases the users will need to decide whether the number of errors that need correcting are worth the effort. Various ways of protecting voice files against degradation are possible. For example, voice files can be duplicated and one kept as a backup.

## References:

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