How difficult is it? How well Adults with Aphasia Perceive Task Demands

Introduction

Researchers investigating self-ratings of task difficulty and effort allocated to lexical decision tasks in adults with aphasia indicated a mismatch between their perceptions and behavioral performance (e.g. Clark & Robin, 1995; Murray et al., 1997a; Murray et al., 1997b). That is, although participants with aphasia performed more poorly on the language tasks, they did not rate the tasks as more difficult (Murray et al., 1997a, 1997b) or as requiring more effort (Clark & Robin, 1995) compared to control participants. Murray et al., (1997a) reported that this impaired relationship between performance and perceptions was only found for difficulty ratings and not for ratings of perceived accuracy, leading them to conclude that individuals with aphasia are impaired in their ability to perceive the demands of the tasks.

The purpose of the current study was to extend these findings by including both pre- and post-task ratings of difficulty for verbal and spatial tasks. We hypothesized that if participants with aphasia are misperceiving the demands of the tasks, the relationship between performance and ratings of difficulty would be less for the pre-task ratings compared to the post-task ratings. Comparing the relationship between difficulty ratings and performance on non-verbal (spatial) and verbal tasks would further reveal whether any deficits in perceiving the task demands are specific to verbal stimuli or a domain-general deficit in evaluating task demands.

Method

Participants

Participants included 13 IWA and 21 age- and education-matched control participants. All participants demonstrated normal hearing and vision and no depression at the time of testing. Additional inclusion criteria for IWA included a history of unilateral left hemisphere stroke and presence of aphasia as indicated by performance on the Western Aphasia Battery-Revised (WAB-R; Kertesz, 2006).

Tasks

The experimental tasks included verbal and spatial n-back tasks that varied in processing load. The n-back task requires participants to decide whether each stimulus in a sequence matches the one that appeared *n* items ago; it requires temporary storage and manipulation of information, while, continuously updating the contents in WM (Jonides, et al., 1997).

All participants completed three n-back tasks – a 1-back, 2-back, and 3-back for verbal and spatial stimuli. The verbal stimuli consisted of eight letters presented one at a time in the center of the screen. Participants responded as quickly as possible by pressing the spacebar when the letter was the same as the letter *n* back.

The spatial stimuli included black circles presented on a white background in eight different locations spaced in an octagon fashion around a central fixation point. One dot appeared on the screen at a time. Participants respond to the spatial tasks by pressing the spacebar when the dot was in the same location as the one *n* back.

Stimulus onset asynchronies (SOA) of 3500 ms, shown to be effective for use with IWA (Wright, et al., 2007), were used in all n-back tasks. The experimental conditions included 33 targets presented in a single block containing 100 stimuli.

Performance accuracy on n-backs was assessed using d prime which is a measure of sensitivity that takes into account both hit rate and false positives. Participants made difficulty ratings by marking the point that matched their perceptions on a vertically presented 100-millimeter line anchored with the words "easy" and "difficult". Simple and complex math problems were also included as anchors to further illustration of the concepts on the rating scale (See Figure 1).

Procedures

Prior to completing the experimental tasks, all participants viewed task instructions and sample stimuli in Microsoft PowerPoint while listening to oral instructions provided by the experimenter. Instructions and sample stimuli were repeated until the participant verbalized and demonstrated understanding of the practice items. In the experimental task, presented via E-Prime v 2.0, an additional practice block was presented prior to each n-back. This practice block consisted of 10 items with two targets. Participants completed pre-task difficulty ratings immediately following all task instructions and prior to beginning each n-back task. Post-task difficulty ratings were completed after completion of each of the n-back tasks.

Results

Correlations among n-back performance, pre-task difficulty ratings, and post task difficulty ratings were conducted. Results indicated statistically significant, negative correlations for both groups. Difficulty ratings increased as n-back performance decreased.

Pre-task difficulty ratings

The correlations between pre-task difficulty ratings and performance were stronger for the control group than for the participants with aphasia. For the control group, pre-task expected difficulty ratings correlated strongly with verbal, $r = -.73$, $p < .01$, and spatial n-back performance, $r = -.60$, $p < .01$. For the aphasia group, pre-task difficulty ratings were moderate, but significantly correlated with verbal, $r = -.44$, $p < .01$, and spatial, $r = -.39$, $p < .05$ n-back performance.

Post-task difficulty ratings

For the control group, post-task ratings also significantly correlated with performance on verbal, $r = -.74$, $p < .01$ and spatial, -.68, $p < .01$ n-backs. Similarly, the aphasia group's post-task ratings were significantly correlated with performance on the verbal, $r = -.73$, $p < .01$, and spatial n-back tasks, $r = -.66$, $p < .01$. For both groups, post-task difficulty ratings were stronger for verbal than spatial tasks.

Discussion

Researchers investigating self-ratings of task difficulty and effort allocated to lexical decision tasks in adults with aphasia indicated a mismatch between their perceptions and behavioral performance (e.g. Clark & Robin, 1995; Murray et al., 1997a; Murray et al., 1997b). Murray et al. (1997a) suggested that individuals with aphasia are impaired in their ability to perceive the demands of the tasks.

In the current study, we sought to extend this research by including both pre- and post-task ratings of difficulty for verbal and spatial tasks. As hypothesized, participants with aphasia misperceived the demands of the tasks as demonstrated by a weaker relationship between performance and ratings of difficulty for the pre-task ratings compared to the post-task ratings.

We did not find a stronger relationship between performance and ratings of difficulty for spatial tasks compared to the verbal tasks in the aphasia group. For both groups, the relationship among performance and perceived task difficulty was stronger for verbal tasks than the spatial tasks. Clinical implications of these results will be discussed along with suggestions for future research.

References

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FIGURES

Figure 1. Difficulty Rating Scale.

Rate the **difficulty** of the task.

$$\frac{1.47x + 17.648 - 2.997y \times .5621}{376928.1741} =$$

DIFFICULT

EASY

1 + 1 =