

Right hemisphere brain damage (RHD) in adults frequently causes comprehension difficulties. One potential source of these deficits is a disruption in the ability to use contextual cues. Current evidence is equivocal regarding the extent to which these individuals can use contextual cues. One factor that has not yet received attention in the literature is the type of contextual cues. Existing studies of comprehension in adults with RHD focus on factual cues. However, recent studies of young adults (without brain damage) indicate that readers' preferences can bias their expectations, even when the preferences contradicted facts provided (Rapp & Gerrig, 2002, 2006). In other words, contextual cues about a character can create personal preferences about what a comprehender *wants* to happen in a story. These preferences are what make readers predict that Harry Potter will vanquish Voldemort even in the face of seemingly insurmountable odds against the young man. According to Rapp and Gerrig's hypothesis, readers activate potential outcomes suggested by facts in the context then weight the likelihood of the outcomes based on their personal preferences.

The potential effect of personal preferences has not been considered in studies of discourse comprehension in adults with RHD. There are two hypotheses regarding the performance of adults with RHD. First, these individuals may be more biased by personal preferences than by factual contextual cues. This finding would also be consistent with reports that these individuals tend to be egocentric (Chantrain, Joannette & Ska, 1998; Lojek-Osiejuk, 1996, Mackenzie, Begg, Lees & Brady, 1999, Wapner, Hamby & Gardner, 1981). The egocentrism might lead them to give more weight to their preferences regarding what will happen versus facts in a story that could impact the outcome.

The alternative would be that comprehension by adults with RHD is biased more by contextual cues than personal biases. In this case, readers with RHD may not generate or respond to a "gut-level reaction" about a character and whether or not they want the character to succeed. This finding would be consistent with reports that adults with RHD have difficulty processing emotional or affective information (Brownell & Martino, 1998; Borod, 1992; Gardner, 1994).

## **Procedures**

### *Participants*

Potential participants were recruited through senior centers and the author's existing database of previous research participants. To date 14 individuals without brain damage and three with a lesion in the right cerebral hemisphere have participated in the study. Recruitment and testing are continuing with the RHD group and are expected to be completed by May 2008. Inclusion criteria included: right handed, between the ages of 50 and 85 years, learned only English before school-age, and have no history of drug or alcohol abuse. The three individuals with RHD had no evidence of lesions in the left hemisphere, and no visuospatial neglect as measured by the *Behavioural Inattention Test* (Wilson, Cockburn & Halligan, 1987). The 14 individuals without brain damage had no evidence of cognitive decline (as measured by the *Mini-Mental State Exam*; Folstein, Folstein & McHugh, 1975). Select demographic and clinical variables are provided in Table 1.

### *Methods*

Forty-eight stimulus stories, derived from Rapp and Gerrig (2006) were used (see example in Table 2). Experimental stories contained a factual contextual cue that created a bias toward either a positive or negative outcome. In each experimental story, a character bias was included designed to create a preference toward the opposite outcome. Every story had a control version, in which there was a neutral character bias. The outcome of each story, stated in the last sentence, always matched the factual bias and contradicted the positive/negative character bias.

Participants read each story and rated the likelihood of the outcome on a 5-point Likert-type scale (1 = very unlikely; 5 = very likely). Response times for making the likelihood judgment were recorded. If readers were influenced by character preferences, then outcomes should be rated as more likely for positive character biases as compared to neutral and rated as less likely for negative character biases as compared to neutral, and rating response times should be slower on the biased (positive/negative) as compared to the neutral stories.

The study was conducted as a mixed design, with group (RHD/NBD) as the between-subjects factor and story bias (Positive/Negative/Neutral) as a within-subjects factor. Testing took place across two sessions; biased and neutral versions of each story never appeared in the same session.

## **Results**

Preliminary statistical analyses have been conducted only for the NBD group; visual inspection of the data obtained for the few RHD participants will be discussed. Paired Wilcoxon signed ranks test were conducted to examine differences between ratings. The first analysis examined whether ratings were different for stories with positive versus negative factual biases and no character biases. A one-tailed Wilcoxon signed test indicated that readers rated outcomes as more likely to occur with positive than negative factual biases ( $Z=1.73, p=.04$ ). The next set of analyses examined ratings for matched stories with and without character biases. Results indicated that outcomes for the negative preference biased stories were rated as less likely to occur as compared to the matched neutral stories ( $Z=2.85, p=.004$ ). No significant differences were observed for positive preference biased stories ( $Z=.80, p=.42$ ). Paired, two-tailed  $t$ -tests were conducted to examine differences in rating response times. Ratings took significantly longer for the negative than the neutral stories ( $t(13)=4.01, p=.001$ ), but no significant differences were found for the positive-preference biased stories as compared to the matched neutral stories ( $t(13)=.62, p=.55$ ).

Visual examination of data obtained for the three participants in the RHD group suggest that these individuals were sensitive to factual contextual cues in the absence of character biases. They rated outcomes as more likely to occur with positive ( $M=4.42$ ) than negative ( $M=3.88$ ) factual biases. Examining results for matched stories with and without character biases, ratings were similar for preference biased and neutral stories, but rating response times appeared to be longer for the negative preference biased stories ( $M=3.18$  seconds) than their matched neutral stories ( $M=2.55$  seconds). Repeated measures statistical analyses will be conducted once data is collected from 15 participants with RHD to fully examine performance of the RHD group and explore group differences.

## **Discussion**

Results from the NBD group indicate that, as demonstrated with younger adults (Rapp & Gerrig, 2002, 2006), older adults' expectations of outcomes are biased by personal preferences about characters. The results indicated that this is true, though, only for negative character biases: Readers did not want positive outcomes to occur for characters they did not like. Due to the small number of adults with RHD tested thus far, conclusions cannot yet be made for this group. Once data is collected for the entire group of 15 participants, results will be evaluated in light of the two hypotheses described in the introduction.

## **Conclusions**

Healthy older adults judge outcomes based on personal preferences as well as contextual cues. Negative outcomes are preferred for negative characters even in the presence of facts supporting positive outcomes. Data from a very small number of adults with RHD suggest that

these individuals are able to use factual contextual cues when there are no additional character-biasing cues. Testing will continue with adults with RHD to gather more data and determine whether or not their expectations are biased by personal preferences.

Table 1. Select demographic and clinical data for two participant groups.

	<b>NBD (N=14)</b>	<b>RHD (N=3)</b>
Sex	5 female 9 male	1 female 2 male
Age	63.8 (8.1) 50-74	75.0 (9.8) 64-83
Education	14.9 (2.3) 12-19	14.7 (2.3) 12-16
Mini Mental State Exam Score	29.1 (.95) 27-30	--

Table 2. Sample experimental stimuli

<b>Experimental (negative character bias, positive factual bias)</b>	<b>Control (neutral character bias, positive factual bias)</b>
<p>Charles was running for the Virginia senate seat. Election day had finally arrived and many people were expected to vote.</p> <p><i>Unbeknownst to the voters, Charles had taken bribes from companies that polluted the environment.</i></p> <p><b>The New York Times had put Charles' campaign several points ahead in its final poll.</b></p> <p>At the end of the day the ballots were tabulated and the outcome declared.</p> <p>Charles was elected to the Senate seat in Virginia.</p>	<p>Charles was running for the Virginia senate seat. Election day had finally arrived and many people were expected to vote.</p> <p>Charles had worked hard on his campaign and was ready for election day.</p> <p><b>The New York Times had put Charles' campaign several points ahead in its final poll.</b></p> <p>At the end of the day the ballots were tabulated and the outcome declared.</p> <p>Charles was elected to the Senate seat in Virginia.</p>

\*character bias in italics; factual bias in bold

## References

- Borod, J.C. (1992). Interhemispheric and intrahemispheric control of emotion: A focus on unilateral brain damage. *Journal of Consulting and Clinical Psychology, 60*, 339-348.
- Brownell, H. & Martino, G. (1998). Deficits in inference and social cognition: The effects of right hemisphere brain damage on discourse. In: M. Beeman and C. Chiarello (Eds) *Right Hemisphere Language Comprehension: Perspectives from Cognitive Neuroscience*. (pp. 309-328). Mahwah, NJ: Lawrence Erlbaum.
- Chantraine, Y., Joannette, Y. & Ska, B. (1998). Conversational abilities in patients with right hemisphere damage. *Journal of Neurolinguistics, 11*, 21-32.
- Folstein, M.F., Folstein, S.E., & McHugh, P.R. (1975). Mini Mental State. *Journal of Psychiatric Research, 12*, 189-198.
- Gardner, H. (1994). The stories of the right hemisphere. In: *Integrative Views of Motivation, Cognition, and Emotion: Volume 41, The Nebraska Symposium on Motivation*. (pp. 57-69). Lincoln NE: U.Nebraska Press.
- Lojek-Osiejuk, E. (1996). Knowledge of scripts reflected in discourse of aphasics and right-brain-damaged patients. *Brain and Language, 53*, 58-80.
- Mackenzie, C., Begg, T., Lees, K.R. & Brady, M. (1999). The communication effects of right brain damage on the very old and the not so old. *Journal of Neurolinguistics, 12*, 79-93.
- Rapp, D.N. & Gerrig, R.J. (2002). Readers' reality-driven and plot-driven analyses in narrative comprehension. *Memory & Cognition, 30*, 779-788.
- Rapp, D.N. & Gerrig, R.J. (2006). Predilections for narrative outcomes: The impact of story contexts and reader preferences. *Journal of Memory and Language, 54*, 54-67.
- Wapner, W., Hamby, S., & Gardner, H. (1981). The role of the right hemisphere in the apprehension of complex linguistic materials. *Brain and Language, 14*, 15-33.
- Wilson, B., Cockburn, J., & Halligan, P. (1987). *Behavioural Inattention Test*. Thames Valley Test Co.: Bury St. Edmonds.