**Comprehension and Egocentrism with Right Hemisphere Damage**

Egocentrism has been linked to damage to the right cerebral hemisphere (RHD). Egocentrism in this population has been reported in discourse production, as those irrelevant or tangential comments that are inappropriately personal; for example, they contain personal opinion, or include comments in which the speaker places himself as a character in the story (Blake, 2008). While egocentrism has been shown to affect discourse production of individuals with RHD (Chantraine, Joanette & Ska, 1998; Lojek-Osiejuk, 1996; Mackenzie, Begg, Lees & Brady, 1999), less is known regarding the effect egocentrism has on text comprehension. To date, few empirical studies have been conducted to examine how egocentrism may contribute to the comprehension deficits of individuals with RHD. However, intuitively, if egocentrism affects discourse production, then it is possible that egocentrism also will affect comprehension of text. If egocentrism affects comprehension, then individuals with RHD may interpret stories or outcomes in light of their own personal biases or preferences about story characters, regardless of contextual cues that may suggest an alternative interpretation (Blake, 2008).

A competing hypothesis is that adults with RHD will be less affected by personal preferences than adults without brain damage due to reduced affect and emotional processing ability (Blake, 2002; Myers, 1999). If so, then adults with RHD may be less likely to process or develop likes/dislikes of characters, and will appear to be less "egocentric" in text comprehension tasks.

The purpose of this study is to examine whether discourse comprehension in adults with RHD is affected by character biases. The hypothesis is that comprehenders desire certain outcomes based on whether or not they like or dislike a character, and adults with RHD, who may have increased egocentrism, will focus on their desired outcomes at the expense of contextual cues regarding an alternative outcome.

## Procedures

*Participants*

Potential participants were recruited through senior centers and the second author's existing database of previous research participants. To date seven individuals without brain damage and nine with a lesion in the right cerebral hemisphere have participated in the study. 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 eight 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) or a computer based visual screening test. The seven individuals without brain damage had no evidence of cognitive decline (as measured by the *Barrow Neurological Institute Screen for Higher Cerebral Functions*; Prigatano, Amin & Rosenstein, 1995). 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 for the main character. 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. Following each story

participants read a question regarding the likelihood of an outcome. The outcome always matched the factual bias. Thus, in experimental stories, the queried outcome contradicted the character bias. There was no contradiction in the control stories. 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 paired control stories and rated as less likely for negative character biases as compared to paired control stories. Additionally, it was predicted that rating response times should be slower on the experimental (positive/negative) as compared to the control stories, because participants would have to consider contradictory information.

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

**Results**

A set of planned comparisons was used to evaluate the comparisons of interest. Within groups, paired sample *t* tests were conducted to examine differences between ratings on experimental and paired control stories. Results indicated that for both NBD and RHD groups, outcomes for the negative preference biased stories were rated as less likely to occur as compared to the matched neutral stories [NBD: $t(6)$ 3.8, $p$=0.009; RHD: $t(8)$ 2.6, $p$=.031]. No significant differences within groups were observed for positive preference biased stories and their control versions [NBD: $t(6)$ 1.1, $p$=.31; RHD: $t(8)$ .60, $p$=.56].

Paired, two-tailed *t*-tests were conducted to examine differences in rating response times. For both the NBD and RHD participants, ratings took significantly longer for the negative than the neutral stories [NBD: $t(6)$ 3.0, $p$=0.23; RHD: $t(8)$ 2.7, $p$=.028,] but no significant differences were found for the positive-preference biased stories as compared to the matched neutral stories NBD: $t(6)$ .39, $p$=.709; RHD: $t(8)$ .63, $p$=.548.

Independent t-tests were conducted to examine differences between groups. No significant differences were obtained for either ratings or response times (all $t(14) < .8$, all $p > .4$).

**Discussion/Conclusions**

Healthy older adults judge outcomes based on personal preferences as well as contextual cues, as demonstrated with younger adults (Rapp & Gerrig, 2002, 2006). The results indicated that this was true, though, only for negative character biases: Readers did not want positive outcomes to occur for characters they did not like. The RHD group exhibited the same pattern, indicating that their expectations of outcomes are biased by personal preferences.

The hypothesis was not supported: the RHD group did not exhibit effects of egocentrism on their perceptions of story outcomes, as observed in the absence of between-group differences. One explanation for this finding is that the participants with RHD did not differ from the NBD group on a cognitive screening test ($t(12)$ 1.27, $p$=.23). Thus, the participants with RHD may not have had typical RHD characteristics or may not have had egocentrism. Egocentrism was not directly tested due to the absence of a standardized measure of egocentrism.

Despite not supporting the hypothesized link between egocentrism and discourse comprehension, valuable information was obtained. The RHD group was sensitive to negative character biases, and to the same extent as the NBD group. This indicates that these individuals

(at least those with mild cognitive-communication deficits) do rely on personal preferences during discourse comprehension. Thus, they are not, as the alternative hypothesis suggested, unable to process affective/emotional information. Future work should include a more impaired RHD group and a formal measure of egocentrism and affective/emotional processing to further explore the effects of these characteristics on comprehension.

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

| | **NBD (N=7)** | **RHD (N=9)** |
|---|---|---|
| Sex | 5 female<br>2 male | 7 female<br>2 male |
| Age | 68.1 (9.5)<br>54-80 | *73.3 (7.5)*<br>*62-85* |
| Education | 15.9 (2.6)<br>12-19 | *15.4 (2.5)*<br>*12-20.5* |
| BNI Exam Score | 37 (2.2)<br>33-40 | 34.4 (5.2)*<br>27-40* |

*missing BNI scores for one RHD participant.

Table 2. Sample experimental stimuli

| **Experimental (negative character bias, positive factual bias)** | **Control (neutral character bias, positive factual bias)** |
|---|---|
| Shelly needed to get up at 7AM in order to make it to class on time.<br>She laid out her clothes and bag before going to bed.<br>*She hadn't bothered studying for her test because she had stolen a copy of the final exam.*<br>**She was an early riser, and never slept in after her alarm clock rang.**<br>Shelly went to bed before 10:00 and had a good night's sleep.<br><br><u>Likelihood question:</u><br>How likely is it that Shelly will awake just before her alarm clock rings and arrive at class in plenty of time? | Shelly needed to get up at 7AM in order to make it to class on time.<br>She laid out her clothes and bag before going to bed.<br>Shelley was finished studying for her test and was glad she had only one final exam left.<br><br>**She was an early riser, and never slept in after her alarm clock rang.**<br>Shelly went to bed before 10:00 and had a good night's sleep.<br><br><u>Likelihood question:</u><br>How likely is it that Shelly will awake just before her alarm clock rings and arrive at class in plenty of time? |

*character bias in italics; factual bias in bold

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