CURRENT PRACTICES OF SPEECH-LANGUAGE PATHOLOGISTS FOR THOSE WITH RIGHT HEMISPHERE DAMAGE

A Thesis Presented to

the Faculty of the Department of

Communication Sciences and Disorders

University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

By

Ashley Nicole Ramsey

December 2018

CURRENT PRACTICES OF SPEECH-LANGUAGE PATHOLOGISTS FOR THOSE WITH RIGHT HEMISPHERE DAMAGE

An Abstract of a Thesis

Presented to

the Faculty of the Department

of Communication Sciences and Disorders

University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

By

Ashley Nicole Ramsey

December 2018

ABSTRACT

This study was conducted to obtain a snapshot of current clinical practices of practicing Speech-Language Pathologists that work with people who have developed deficits associated with right hemisphere brain damage after a stroke. Currently licensed SLPs were recruited via online resources and were directed to a link containing a survey that targeted their most common tools for assessment, most common treatment approaches, the rationale behind their choices, their opinion on the adequacy of their available tools, and their confidence levels in correctly diagnosing deficits. A total of 143 SLPs responded, a response rate of approximately 11%. Results indicated that observation was the most common tool to diagnose specific deficits areas, the *Cognitive Linguistic Quick Test* (*CLQT*) was the most commonly used test battery for assessment, and the most widely selected rationale behind test selection was administration time. Common treatment approaches for selected deficit areas were also obtained. The majority of SLPs indicated that they did not feel their tools for assessment were adequate but were highly confident that they were correct in their diagnoses. Small, but significant correlations existed between confidence levels and adequacy of tools as well as the type of college courses taken for RHD and the years since graduation.

CONTENTS

INTRODUCTION

The Centers for Disease Control and Prevention (CDC, 2017) report that there are approximately 800,000 people who have strokes in the United States every year. Of these 800,000 people, between 42% and 48% have a right hemisphere stroke (Hedna et al., 2013; Portegies et al., 2015). There are several deficits associated with right hemisphere damage (RHD) including impairments of awareness or anosognosia, memory, executive functioning, attention, production and comprehension of figurative language and discourse, nonverbal and paralinguistic aspects of communication, and pragmatics. To date, there has not been a study to discover what speech-language pathologists do in their clinical practices for the diagnosis and treatment of clients with right hemisphere brain damage. This study aims to get a snapshot of these clinical practices. In this review, current knowledge and the prevalence of each deficit area will be discussed. Additionally, treatment options for each area will be outlined using available research. However, many of the treatments stated here are supported by research based on traumatic brain injury (TBI) literature, not RHD.

Anosognosia is reported in nearly 50% of the RHD population (Blake, Duffy, Myers, & Tompkins, 2002). This can complicate treatment because patients are not aware that they have a deficit leading to no motivation to address it. Assessment of anosognosia can be completed through various patient and family questionnaires, interviews, and rating scales. Treatment options for the deficit are limited and usually take advantage of implicit learning and indirect feedback using the patient's own experiences. Direct feedback is also used to increase awareness of deficits (Barco et al., 1991).

Memory deficits in RHD involve impairments in new learning and recall of information. In a study by Welte (1993), it was found that after a right hemisphere stroke, all the patients tested scored significantly below those without strokes on verbal, nonverbal, and orientation subtests of the Wechsler Memory Scale – Revised (WMS-R). A meta-analysis by Gilllespie, Bowen, and Foster (2006) confirmed these results, with participants with RHD scoring lower on verbal recall tasks than both those without brain damage and those who had a left hemisphere stroke. Several treatment approaches can be used for improving memory including spaced retrieval and the use of internal and/or external memory aids along with errorless learning.

Attention and neglect have been the most commonly reported deficit areas after RHD with 67% of patients diagnosed as having attention deficits and 66% diagnosed with neglect (Blake et al., 2002). Those who have attention deficits can have them in one or more traditional attention categories such as sustained, selective, or divided attention. Neglect, specifically visuospatial neglect, can be divided into egocentric (viewer-centered) and allocentric (object-centered) forms. People with egocentric neglect will attend to details only on the right side of space while those with allocentric neglect will focus attention on the right sides of objects regardless of the position of the objects within the visual field. Neglect can be further divided into three sub-categories: personal, peripersonal, and extrapersonal (Tompkins, Klepousniotou, & Scott, 2016). Personal neglect involves attending only to the right side of the body, peripersonal neglect involves the space within arm's reach, and extrapersonal neglect involves the space outside of arm's reach (Tompkins, et al., 2016). Paper and pencil tasks are one of the most common ways to diagnose visuospatial neglect,

although in at least one study, behavioral tests were shown to be more sensitive (Azouzi et al., 2002). Neglect treatment is the most researched deficit area associated with RHD, likely because it is one of the most common and unique deficit areas. Common treatment approaches include Visual Scanning Treatment (VST), Limb Activation Treatment and Prism Adaptation (Antonucci et al., 1995; Bailey, Riddoch, & Crome, 2002; Bartolomeo, 2014; Blake et al., 2002; Tompkins & Scott, 2016). Virtual reality has become a treatment option in recent years, though research using the treatment has had mixed results (Kim et al., 2011; Ogourtsova, Souza-Silva, Archambault, & Lamontagne, 2017).

Deficits in executive functioning commonly occur in those with RHD (Blake et al., 2002). These can include difficulties with problem solving, sequencing, time management, and goal achievement. There are several assessments that can diagnose deficits in executive functioning including behavioral scales, questionnaires, standardized tests such as the *Behavioral Assessment of the Dysexecutive Syndrome* (*BADS*), and more informal measures such as the Tower of Hanoi or London. Evidence-based treatment methods include Goal Management Training, or GMT (Levine et al., 2000), Problem Solving Training (PST), and the new Self-Management Activity Restriction and Relaxation Training, or SMART (Babcock et al., 2017).

One of the areas of communication that RHD affects is the production and comprehension of discourse and figurative language including metaphors, idioms, sarcasm, and irony. Difficulties with inferencing may also be present. Some people with a deficit in discourse may be verbose or use topics that are egocentric while others may be the opposite and speak very little (Blake, 2006). The stories they produce may also have tangential

branches and be out of sequence (Marini, 2012). Inferencing was theorized to be more difficult for those with RHD than those without brain damage (Beeman, 1993; Beeman et al., 1994; Beeman, Bowden, & Gernsbacher, 2000) but has since been shown that those with RHD can still make accurate inferences but are slower to do so than those without RHD (Blake, 2006; Blake & Tompkins, 2001). One theory behind the slower processing times for inferences is a coarse coding deficit wherein the person may not be able to bring up distantly related features of a word, leading to not generating the correct meaning (Tompkins, Scharp, Meigh, Blake, & Wambaugh, 2012). A second theory is a suppression deficit in which multiple possible meanings are generated but there is prolonged interference from meanings that are not contextually relevant resulting from a delay in the suppression of the inappropriate meaning (Tompkins, Fassbinder, Blake, Baumgaertner, & Jayaram, 2004; Tompkins, Fassbinder, Scharp, & Meigh, 2008a; Tompkins, Scharp, Meigh, & Fassbinder, 2008b). These theories could also apply to deficits in comprehending metaphors and humor. Treatment for a coarse coding deficit shows promise in the current research literature (Tompkins et al., 2012), but as there is no easy way to diagnose it, it will not be covered here. Other treatments for discourse production include imposing time limits, providing feedback, role-playing activities, and video analysis (Tompkins & Scott, 2016).

Nonverbal and paralinguistic features of communication can also be affected by RHD, mostly in the form of aprosodia, or the reduced use and comprehension of prosody. Those with aprosodia generally will speak using a “flat” monotonous tone and may not understand when others use sarcasm or other forms of communication that involve analyzing the tone of voice used. Using and comprehending facial expressions may also be impaired

(Blake, 2016; Tompkins, Klepousniotou, & Scott, 2016). Evidence-based treatments for aprosodia include Cognitive-Linguistic treatment and Motoric-Imitative treatment (Rosenbek et al., 2006). Both these treatments include six stages in which the patient first learns the correct tone of voice (cognitive-linguistic) or follows the clinician's model (motoric-imitative) and supports are gradually faded until the patient can produce the correct prosody spontaneously. However, neither of these treatments have been shown to generalize to non-treated emotions (Rosenbek et al., 2006).

Pragmatics is the last communication area that may be affected by RHD. Common pragmatic difficulties include reduced eye contact, impaired ability to respond to nonverbal cues such as facial expression and taking a greater number of turns and talking more during those turns in conversations (Kennedy, 2000; Mackenzie, Begg, Brady, & Lees, 1997). Many of the assessments for pragmatics are ones developed for traumatic brain injury and not stroke. There are very few evidence-based treatment approaches for pragmatics for people with RHD due to stroke. However, treatments are found in the TBI literature that can be used. One such study provides evidence for interpersonal process recall (IPR) treatment (Youse & Coelho, 2009). This treatment focuses on recorded feedback, coaching, modeling, and rehearsal strategies for initiation of conversation and discourse. Another approach is Cognitive Pragmatic Treatment (CPT) that treats several areas including comprehension and production, theory of mind (ToM), awareness, and executive function (Gabbatore et al., 2015). Other treatment activities may include barrier tasks, direct training of social skills, and role-playing (Tompkins & Scott, 2016).

Whether a person develops communication deficits after a stroke largely depends on the size and location of the damage in the brain, therefore, not everyone who has a right hemisphere stroke will develop communication deficits. However, the right hemisphere is crucial for several areas related to language including pragmatics and the paralinguistic features of speech such as prosody, discourse production and comprehension, inferencing, and production and comprehension of figurative language. Benton and Bryan's 1996 study found that approximately 50% of people who have had a right hemisphere stroke will develop communication deficits in at least one area, of which 20% will have more severe deficits. It is possible that the numbers are higher due to reduced awareness of the involvement of the right hemisphere in communication, therefore, fewer people are referred to speech-language pathologists (SLPs) for testing. In a study conducted by Blake and colleagues (2002) it was found that communication deficits in the areas of receptive and expressive language were diagnosed in only 29% of the reported patients with RHD. Prosodic deficits were diagnosed in 19.5% of patients and pragmatic deficits diagnosed in 16.3%. This study also found that these three deficit areas were diagnosed at a higher rate when the individual was tested by an SLP.

One challenge facing SLPs who work with people that have communication deficits associated with RHD is a dearth of research regarding evidence-based treatments. There are simply not enough studies, and the ones that do exist have problems of their own. First, most of the studies conducted are efficacy studies and not effectiveness or efficiency studies. Second, there is a lack of replication studies. Many of the studies include those that have RHD based on both stroke and traumatic brain injury (TBI). The problem with this is that

TBI tends to have more diffuse damage while strokes are more focal in nature. This causes the two populations to present with different deficits and reactions to treatment. The last issue is most of the studies use small numbers of participants which makes generalization to the entire RHD population more difficult. The systematic review by Blake, Frymark, and Venedictov (2002) included only five studies, with one study addressing prosody treatments, two studies for treating receptive language (specifically metaphors and discourse comprehension), one that addressed discourse production, and the last study looked at improving social skills, or pragmatics. Due to the paucity of well-controlled efficacy and effectiveness studies, many of the recommendations for treatment approaches and techniques come from either expert opinion or tailored to a client by the clinician based on the underlying theories of the roles that the right hemisphere plays in communication.

PURPOSE

The purpose of this study was to obtain information about current practices for the diagnosis and treatment of those with cognitive communication deficits associated with right hemisphere stroke. Since we do not have good evidence-based practice recommendations for the diagnosis and treatment of patients with RHD deficits, we needed to find out how clinicians are handling this population. The study's survey identified which standardized tests and informal measures are used to detect the deficits associated with RHD and the rationale behind choosing the tools. Information about treatment practices for communication deficits associated with right hemisphere stroke and the rationale for choosing them was also obtained. The information collected can be used by future researchers in the field to study treatment approaches that are currently being used to evaluate the efficacy and the effectiveness of the therapy. The information may also lead to recommendations for improving the education of students and development of continuing education that will address gaps in clinical knowledge and practice. Specific questions that this study aimed to answer are:

1. How much education is available in the form of college courses and continuing education credits (CEUs) for SLPs that work with RHD patients?
2. What are the deficit areas commonly screened for?
3. What are the most common deficits areas associated with RHD on SLPs' caseloads?
4. Are standardized tests or a selection of subtests utilized to diagnose deficits?
5. What are the most common test batteries used for RHD deficit diagnosis?
6. What are the most common tools/tasks to assess for specific deficit areas?

7. What is the rationale behind test selection?
8. Does the SLP feel they have adequate tools and confidence in diagnosing RHD deficit areas?
9. What is the SLP's most important tool when diagnosing RHD deficits?
10. What are the most common treatment approaches or techniques for specific deficit areas?
11. What is the rationale behind treatment approaches/techniques selection?

A great deal of variation was expected in survey answers due to the limited relevant research information and evidence-based recommendations regarding diagnosis and treatment of deficits associated with right hemisphere brain damage (with the exception of visuospatial neglect). Since this was an exploratory study, there were no specific guiding hypotheses.

METHODS

Participants were recruited from across the United States via the relevant Special Interest Groups of the American Speech, Language, and Hearing Association (ASHA) and the PI's twitter account. Participants were directed via a link to the website that contained the survey. The survey took an average of 12 minutes to complete. Once completed, the participants could have emailed their name and address to an email created for the survey to be entered into a drawing for one of four $50 Visa gift cards.

The inclusion criteria for this study include: licensed, practicing Speech-Language Pathologists (SLP) who work with adults who have had a right hemisphere stroke. Exclusion criteria include SLPs who do not work with those who have right hemisphere strokes and speech-language pathology assistants. The proposed number of participants was one hundred fifty people. A copy of the survey is provided in the Appendix.

RESULTS

There was a total of 143 responses, with a completion rate of 74% for all questions. There are a total of 1294 people on ASHA's SIG 2 listserv community, for a response rate of 11.05%. It is unknown how many SLPs were exposed to the information about the study for the remaining recruitment tools. Due to technical difficulties with the survey website, the first two questions which verify the responder as a practicing SLP that works with clients who have had a right hemisphere stroke were skipped. However, from the information contained in the consent form, it can reasonably be assumed that the responders were those that met the inclusion criteria. The number of responses varied across questions. The exact number of respondents is reported for questions for which the total was less than 100.

The responders came from a total of 33 states including Texas (15), Pennsylvania (8), Washington (8), California (7), Colorado (7), and New York (7). The remaining states had 6 or fewer responders (*Table 1*). Responders' graduation dates varied with one reporting 1961 and the most recent in 2016, the majority of which were from 2005 to 2015 (see summaries in *Table 2 and full table in Appendix*). During their schooling, 31% of responders reported that they had a cognition course that included multiple etiologies such as traumatic brain injury, stroke, and dementia. Closely following this at 30% was one course that covered a range of neurogenic disorders that included aphasia, motor speech, TBI, RHD, and dementia (*Table 3*). Only one reported a course that addressed only aphasia and RHD. After graduating, 66% reported having taken continuing education credits (CEUs), in the past five years with 1-3 hours most common followed by 4-6 hours and more than 6 hours. A chi-square test was used to test for significance between graduation year and the type of college

coursework. For this analysis, the coursework groups were divided as follows: no course or a single neurogenics course were little to none group, a cognition course that also covered aphasia was the shared group, and those that had one or two cognition or TBI courses were the standalone group. The results indicated that there was a significant difference, X^2 (12, N = 143) = 156.96, $p < 0.001$ (see Table 23 in appendix) such that those who graduated more recently were more likely to be in either the standalone group or the shared group.

Table 2 - What year did you graduate?

Year	Percentage
1960s	1.54
1970s	8.46
1980s	15.38
1990s	18.46
2000-2004	7.69
2005-2009	16.92
2010-2014	18.46
2015-2018	13.08

Table 3 - What best describes your coursework?

Course	Percentage
Cognition course with multiple etiologies	31.06
1 Neurogenic course covering a range of etiologies	30.3
1 Neurogenics course with aphasia and 1 cognitive etiology	14.39
2 or more courses in Cognition	8.33
None	7.58
Traumatic Brain Injury course	6.82

Reported practice settings include a majority of the respondents worked at outpatient rehabilitation (59), inpatient rehabilitation (56), and acute care (50) facilities. Respondents could indicate more than one setting, thus the numbers do not equal 100%. Other responses

included university clinics and home health practice (*Table 4*). The clear majority of responders indicated working at their current position for more than six years (62) followed by 3-5 years (33), 1-2 years (28), with only 8 reporting less than a year.

Table 4 - What setting do you practice in?

Setting	Percentage
Out-patient Rehab	49.57
In-patient Rehab	47.05
Acute	42.01
SNF	12.56
Private Practice	11.76
Home Health	5
University	4

Responders confirmed screening for all deficit areas associated with RHD. Only 55% of respondents indicated they screened for nonverbal and paralinguistic deficits Write-in responses included orientation, reading, writing, and sequencing (*Table 5*). Responders were asked how often they had clients with associated deficit areas in the past six months. Thirty-seven responders confirmed that executive functioning deficits were seen in over 90% of their clients with RHD, followed closely by attention deficits with thirty-five responses. The responding SLPs indicated that the following deficits were seen in less than 25% of their clients: non-literal language comprehension), non-verbal communication, appropriateness of language and/or behavior, and unilateral neglect. The full breakdown of all deficit areas is in Table 6.

Table 5 - Deficit areas screened

Area	Percentage
Memory	98.35
Executive functioning	98.35
Attention	97.52
Neglect	94.21
Language	88.43
Awareness	85.12
Pragmatics	83.47
Nonverbal and paralinguistics	55.37

Deficit Area	Total Respondents	Table 6 - % of clients exhibiting deficits in previous 6 months				
		<10	*25%*	*50%*	*75%*	*>90*
Appropriateness of language or behavior	115	12% (n=14)	345 (n=39)	33% (n=38)	17% (n=20)	3% (n=4)
Attention Deficit	115	3% (n=3)	4% (n=5)	14% (n=16)	49% (n=56)	30% (n=35)
Awareness/Anosognosia	114	6% (n=7)	21% (n=24)	23% (n=26)	34% (n=39)	16% (n=18)
Discourse Production	115	7% (n=8)	17% (n=20)	35% (n=40)	30% (n=35)	10% (n=12)
Executive Functioning	115	2% (n=2)	5% (n=6)	14% (n=16)	47% (n=54)	32% (n=37)
Memory	115	3% (n=3)	11% (n=13)	25% (n=29)	38% (n=33)	23% (n=26)
Neglect	114	18% (n=20)	28% (n=32)	29% (n=33)	18% (n=21)	7% (n=8)
Non-Literal Language Comprehension	108	26% (n=28)	29% (n=31)	26% (n=28)	15% (n=16)	4% (n=5)
Nonverbal Communication	111	17% (n=19)	34% (n=38)	32% (n=36)	13% (n=14)	3% (n=4)

When asked if they used standardized tests or batteries in their current position, 88% indicated yes, with 12% answering no. Of the 12% (14 respondents), four indicated they used a facility-mandated packet of tests or subtests and eight used subtests from standardized tests

(see *Table 7* for specific screening areas). Those who did use standardized tests used a wide variety for both batteries and deficit specific tests.

Table 7 - What areas are assessed by the mandated packet?

Area	Percentage
Attention	83.33
Executive Functioning	83.33
Memory	83.33
Appropriateness	66.67
Discourse production	50
Unilateral Neglect	50
Awareness	41.67
Non-literal language comprehension	41.67

The most widely used test battery was the *Cognitive Linguistic Quick Test (CLQT*) at 76%. One other test that had a high usage rate was the *Ross Information Processing Assessment*, or *RIPA* (44%). Other responses included the *Repeatable Battery for the Assessment of Neuropsychological Status*, or *RBANS* (6%), the *Functional Assessment of Verbal Reasoning and Executive Strategies*, or *FAVRES* (5%) and the *Test of Everyday Attention*, or *TEA* (5%). Observation was also widely used by nearly 54% of respondents (*Table 8*). Please note, the results for the *Montreal Evaluation of Communication* (*MEC*) and the *Montreal Cognitive Assessment* (*MoCA*) were not used as one is a screening tool and the other is an evaluation but were incorrectly placed as the same item.

Table 8 - Standardized test batteries

Test Name	Percentage
CLQT	76.42
MOCA/MEC*	61.32
Observation	53.77
RIPA	44.34
SCCAN	26.42
Mini Inventory of Right Brain Injury	23.58
MMSE	22.64
RIC Evaluation of Communication Problems in RH Dysfunction	18.87
Burns Brief Inventory	17.92
Neuropsychological Assessment Battery	7.55
Right Hemisphere Language Battery	6.6
RBANS	6.6
FAVRES	5.5
TEA	4.58
SCATBI	2.75
I don't use standardized tests	1.89
SLUMS	1.83

Standardized tests that are used to assess specific deficit areas had varied responses. For pragmatics, most responders indicated they did not use standardized tests and relied on observation. A small number used questionnaire format tests, such as *the LaTrobe Communication Questionnaire* (5%) and the *Profile of Functional Impairment in Communication*, or *PFIC*, which had 6% of the responses (*Table 9*). The most widely used test for attention was the *TEA* with 30% of the responses. Like with pragmatics, most reported using observation (57%) and not using standardized tests. Others indicated using the *CLQT* (8%), *Attention Processing Test*, or *APT* (8%) or informal tasks such as switching attention between tasks (*Table 10*). When assessing neglect, SLP's again indicated using observation over standardized testing. The most widely used was a Line Bisection Test with thirty-five percent responses. Others used *CLQT* subtests to observe neglect such as clock

drawing (28%), drawing, writing, and reading tasks (11%), and two reported using electronic applications such as the Visual Attention app by Tactus Therapy and unspecified Lingraphica apps (*Table 11*).

Table 9 - Tests for Pragmatics

Test Name	Percentage
I don't use standardized tests	65.09
Observation	53.77
PFIC	5.66
Communication Performance Scale	4.72
LaTrobe Communication Scale	4.72
Pragmatic Protocol	4.72
TASIT	3.77
RIC	1.9

Table 10 - Attention Tests

Test Name	Percentage
Observation	57.14
TEA	30.48
I don't use standardized tests	25.71
Brief Test of Attention	13.33
PASAT	8.57
Symbol Digit Modalities Test	8.57
Sustained Attention to Response Task	7.62
CLQT	7.62
APT	7.62
Rating Scale of Attentional Behavior	3.81
Moss Attention Rating Scale	2.86

Table 11 - Neglect Tests

Test Name	Percentage
Observation	62.5
Line Bisection Test	34.72
CLQT Clock Drawing	27.78
I don't use standardized tests	26.39
Drawing/writing/reading	11.1
Behavioral Inattention Test (BIT)	6.94
Electronic applications	2.8
Cathrine Bergego Scale (CBS)	1.39
Gap Detection Task	1.39
Apples Test (Part of BcoS)	0
Balloons Test	0
Wheelchair Collision Test	0

The two most widely used tests to assess executive functioning were the *Functional Assessment of Verbal Reasoning and Executive Strategies*, or *FAVRES* (44%), and the Trail Making Test (46%). Most also indicated using observation (58%) to supplement the tests. Other responses included the *CLQT* (5%) and informal measures such as family interviews and sequencing or organizing tasks from the client's activities of daily living, or ADL (*Table 12*). Very few SLPs indicated using standardized assessments for anosognosia. The overwhelming majority use observation (66%) and other responses also indicated using interviews, self-rating scales, and informal measures. Only 23% indicated using specific tests, with 10% of those using the *Awareness Questionnaire* (*AQ*) and 4% using the *Self Awareness of Deficit Interview* (*SADI*). The *Bisiach Scale* and the *Levine Denial of Illness Scale* were not used by any of the responding SLPs (*Table 13*).

Table 12 - Executive Function

Test Name	Percentage
Observation	57.55
Trail Making Test	46.23
FAVRES	44.34
BADS	17.92
I don't use standardized tests	15.09
BRIEF - Adult	9.43
DEX	4.72
CLQT	4.72
Delis-Kaplin Executive Function System	3.77
Multiple Errands Test	2.83
Ruff Figural Fluency Test	0.94

Table 13 - Anosognosia Tests

Test	Percentage
I don't use standardized tests	66.04
Observation	59.43
AQ	10.38
SADI	3.77
ISA	1.89
SAI	1.89
Visual Analogue Test for Anosognosia Language	1.89
HIBS	0.94
PCRS	0.94
PCRS-NR	0.94

A wide variety of tests were indicated for testing memory. Only twenty responders indicated not using standardized tests, but high numbers of SLPs use observation (41%). The most widely used test was the *Rivermead Behavioral Memory Test* (35%). Other tests with 10 or more responses were the *California Verbal Learning Test* (13%), the *Wechsler Memory Scales* (12%), and the *Everyday Memory Questionnaire* (9%). Several responders indicated using subtests from *RBANS* (12%), *CLQT* (11%), *SLUMS* (3%), *SCATBI* (3%), and *RIPA* (2%). The *Arizona Battery for Communication Disorders of Dementia* (*ABCD*) was suggested by five responders in their written responses (*Table 14*).

Table 14 - Memory Tests

Test	Percentage
Observation	40.57
Rivermead Behavioral Memory Test	34.91
I don't use standardized tests	18.87
California Verbal Learning Test	13.21
Wechsler Memory Scales	12.26
RBANS	12.26
CLQT	11.32
Everyday Memory Questionnaire	9.43
Rey Complex Figure Test and Recognition Trial	7.55
Hopkins Verbal Learning Test	4.72
ABCD	4.72
BAPM	2.83
Memory Test for Older Adults	2.83
SLUMS	2.83
SCATBI	2.83
Cambridge Prospective Memory Test	1.89
RIPA	1.89
SCCAN	1.89
Oxford Cog Screen - Memory Subtest	0.94

When assessing language, the overwhelming majority indicated using a picture description task. Additionally, eighty-five respondents added write-in options. Again, SLPs reported using observation as another tool (63%) and using informal measures such as mean length of utterance and semantic information (44%). Written responses included several different assessments not listed in the survey options. The *Boston Diagnostic Aphasia Examination* (*BDAE*), was listed thirteen times and the *Western Aphasia Battery*, (*WAB*), eight times. Other written answers included the *Woodcock Johnson Test of Cognitive Abilities*, *Minnesota Test of Differential Diagnosis of Aphasia* (*MTDDA*), *Assessment of Language-Related Functional Activities* (*ALFA*), *RBANS*, and *CLQT* (*Table 15*). Few SLPs indicated using standardized testing for the assessment of prosody. The majority used

observation and informal measures. Seven percent reported using the Florida Affect Battery and only two percent used the Aprosodia Battery. One written response indicated using Visipitch for visual feedback in addition to other informal measures (*Table 16*).

Table 15 - Language Tests

Test	Percentage
Cookie Theft Picture Description	80.19
Observation	63.21
Informal measures	44.34
Discourse Comprehension Test	14.15
Western Aphasia Battery	6.6
Test of Language Competence - Expanded Edition	4.72
I don't use standardized tests	3.77
Social Comprehension and Judgement Screening Test	2.83
The Word Test 2: Adolescent	1.89
RBANS	1.89
ALFA	1.89
Familiar and Novel Language Comprehension Protocol	0.94
Listening Behaviors Checklist	0.94

Table 16 - Prosody tests

Test	Percentage
Observation	69.81
I don't use standardized tests	58.49
Florida Affect Battery	6.6
Aprosodia Battery	1.89

When asked how they chose tests, SLPs indicated that administration time (81%), availability (75%), ease of use (60%), and habit or preference (59%) were all important factors. Less important were reliability (30%), validity (30%), sensitivity and specificity (30%), cost (35%), and publication date (6%) (*Table 17*). Those that provided written responses said they chose the tests based on the appropriateness for the client, or client needs, and the tests that would give them information on functional outcomes. The majority of

responders (66%) indicated that they felt they did not have adequate materials for diagnosing the deficits associated with RHD while forty-four percent did. Despite this, the majority of responders felt that they were confident in their diagnoses with 64% rating themselves as 7 or above on a 10-point scale with 1 being not confident and 10 very confident (*Figure 1*). When diagnosing clients with deficits associated with RHD, responders indicated that all suggested areas were important with personal factors such as experience and intuition with the least number of responses at forty-two percent and observation with the most at seventy-six percent (*Figure 2*). Several of the written responses indicated that it is a combination of all the factors listed.

Table 17 - How do you choose?

Attribute	Percentage
Administration Time	80.95
Availability	75.24
Ease of Use	60
Habit/preference	59.05
Reliability	38.1
Cost	35.24
Validity	30.48
Sensitivity and Specificity	29.52
Publication Date	5.71

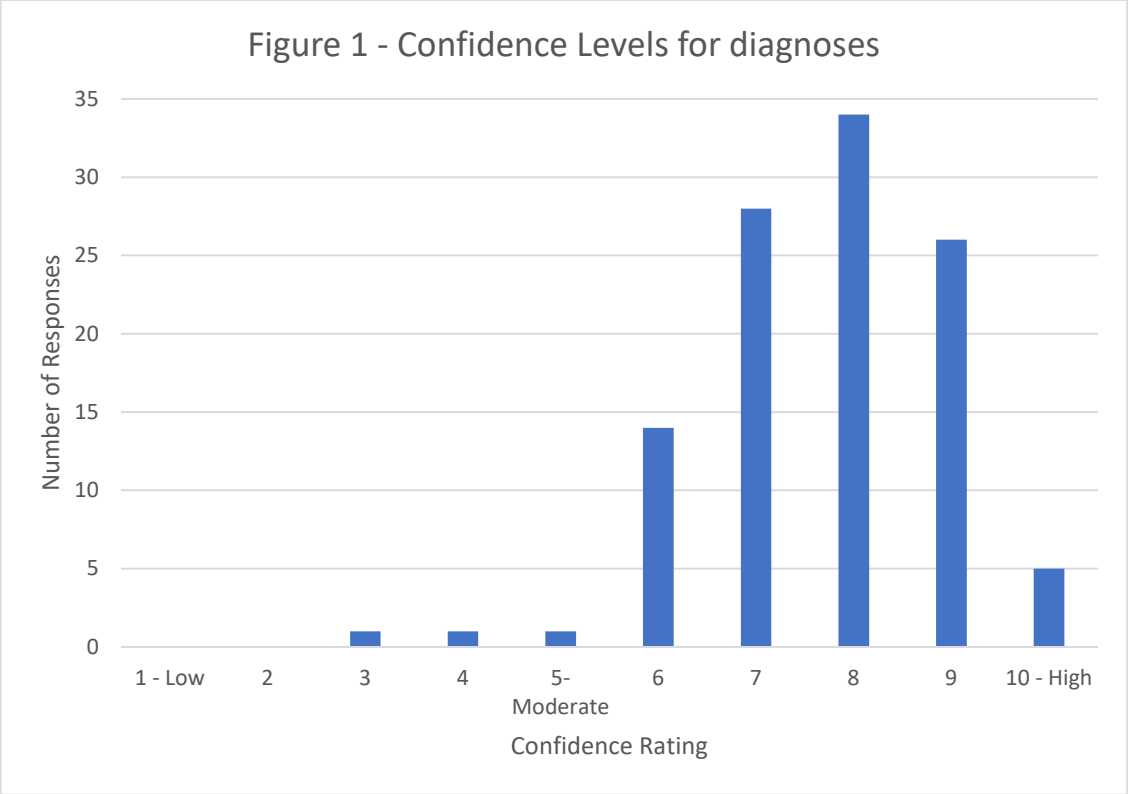


Figure 1 - Confidence Levels for diagnoses
35
30
25
20
15
10
5
0
Number of Responses
1 - Low
2
3
4
5-
Moderate
6
7
8
9
10 - High
Confidence Rating

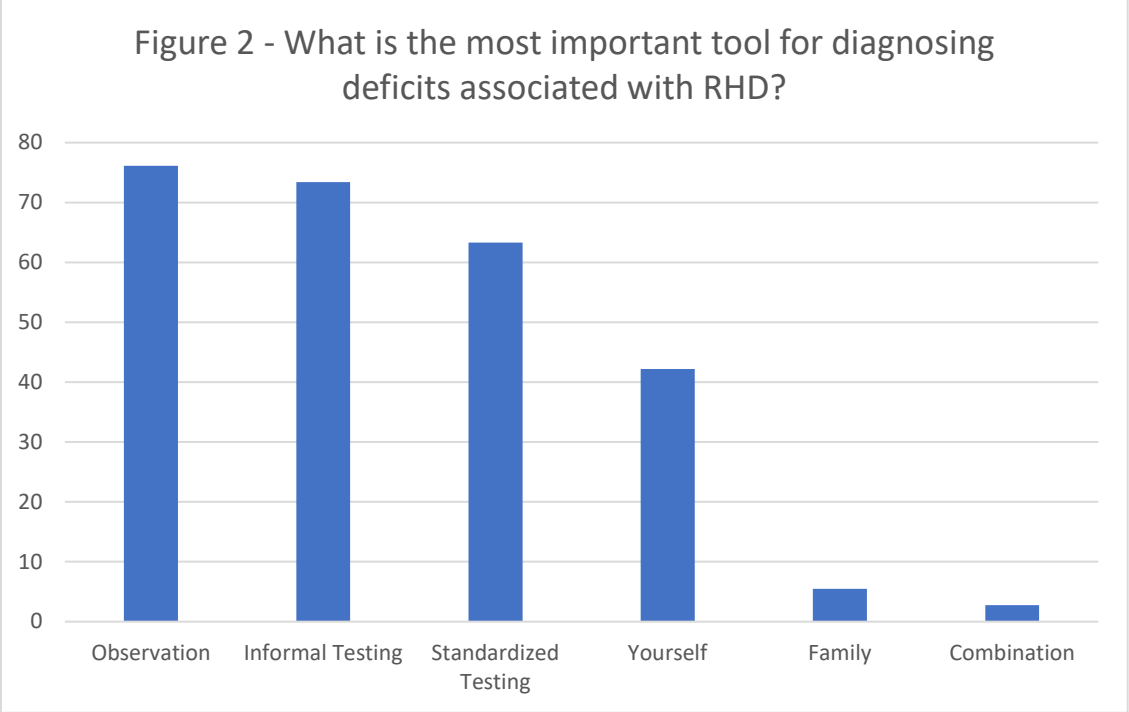


Figure 2 - What is the most important tool for diagnosing deficits associated with RHD?
80
70
60
50
40
30
20
10
0
Observation
Informal Testing
Standardized Testing
Yourself
Family
Combination

Several tests were used to explore relationships between confidence and several other questions. Those that were tested included practice setting, types of college courses, time at current position, taking CEUs, years since graduating and whether there were adequate tools. Chi-square tests were conducted for the categorical variables of practice setting, types of courses, time at position, and CEUs. For these tests, confidence was divided into several groups: 0-5 was not confident, 6-7 was moderately confident, 8 was strong confidence, and 9-10 was very confident. The moderately confident and very confident groups were divided this way in order to provide relatively equal groups. The not confident group was excluded, as there were only three total responses. None of the results were significant.

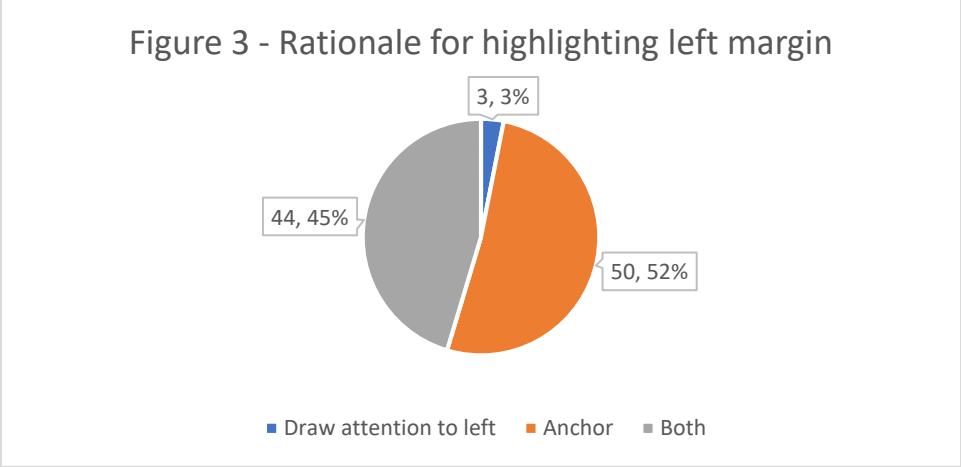
Correlations were run using confidence as a continuous variable for the last two items. A point biserial correlation between confidence level and whether SLPs had adequate tools indicated a small but significant correlation, $r = .243$, $n = 108$, $p = 0.011$ (see Table 25 in appendix) which indicates that the more confident SLPs were more likely to be satisfied with their current tools. A Pearson correlation between confidence levels and years since graduation also was relatively small but significant, $r = .331$, $n = 108$, $p = 0.001$, indicating that those with more experience were more confident (see Table 26 in Appendix).

The results obtained for the questions involving treatment yielded interesting information, as seen in the proceeding text. When treating neglect, the responding SLPs indicated using external cues such as highlighting left margins (89%), verbal cues (85%), and line guides (75%). Environmental manipulation was also widely used with 79% of responses. Visual Scanning Treatment (58%) and stimulus discrimination and matching (37%) were also used. Using irrelevant information on the left was not as widely used with

only 9% of responses and only one SLP indicated using virtual reality. Written responses indicated that SLPs used family training, lighthouse technique, and referrals to occupational therapy (*Table 18*). For those that answered highlighting left margins, 52% responded that their rationale for doing so was that it served as an "anchor" for the client to find and 45% answered that it was a combination of being an "anchor" and helping draw the client's attention due to the brightness of the stimulus (*Figure 3*).

Table 18 - Neglect approaches

Approach	Percentage
Highlighting left margin	89.09
Verbal Cues	85.41
Environmental manipulation	79.09
Line guides	74.55
Visual Scanning Treatment	58.17
Stimulus discrimination and matching	37.27
Attaching irrelevant information on left side of stimulus	9.09
Referral to OT	2.72
Family training	1.81
Virtual Reality	0.91



Seventy-two percent of respondents indicated they addressed prosody deficits by using cognitive-linguistic treatment and contrastive stress drills (70%). The least indicated was motoric-imitative treatment with 48% (*Table 19*). Family training was suggested by two SLPs in their written responses. When targeting attention, the majority of responders indicated using compensatory strategies (84%) and metacognitive strategy training (77%). Attention Process Training (APT) was indicated by 36% of SLPs (*Table 20*). Two responders also mentioned using APT-like tasks that were not computer based. Other written responses included family training and environmental manipulation. One SLP reported using card games, mindfulness meditation, and video games such as those provided by Lumosity. All proposed treatment approaches for targeting anosognosia had similar response rates. Experiential learning and visual or video feedback were indicated the least while the highest was verbal feedback (84%) followed by metacognitive strategy training (72%) (*Table 21*).

Table 19 - Aprosodia approaches

Approach	Percentage
Cognitive-Linguistic treatment	71.95
Contrastive stress drills	69.51
Motoric-Imitative treatment	47.56

Table 20 - Attention approaches

Approach	Percentage
Compensatory strategies	90.65
Metacognitive strategy training	76.64
Attention Process Training	35.51
Family training	2.8
Environmental manipulation	1.87

Table 21 - Anosognosia approaches

Approach	Percentage
Verbal Feedback	84.26
Metacognitive Strategy	72.22
Visual or video feedback	60.19
Experiential Learning	55.56

Asking how they chose which approaches to use for each client yielded a wide variety of answers. The approaches with the two highest responses were client considerations with 92% followed by success with past clients with 82%. Expert opinion was indicated the least with 52% and comfort with the technique had sixty-five responses. Research findings had 75%, indicating its use is fairly important to SLPs (*Table 22*). Other written responses were time constraints, clinical judgement, and experience. As one SLP answered "there is not a lot to draw from. It's kind of like the Wild West".

Table 22 - How do you choose treatment approaches?

Answer	Percentage
Client considerations	91.82
Success with past clients	81.82
Research Findings	74.55
Comfort with technique	59.09
Expert opinion	51.82

DISCUSSION

The first question this study was designed to answer was how much education SLPs are getting in the diagnosis and treatment of those with RHD. Most of the responding SLPs have taken college courses that covered neurogenics, or a course that covers several disorders, such as aphasia, motor speech disorders (such as dysarthria and apraxia of speech), TBI, stroke, dementia, and cognition. Since this type of course covers multiple etiologies, it allows for limited time covering deficits associated with RHD. The most common course, a cognition course that includes multiple etiologies, which would be limited to TBI, dementia, and RHD, would allow for more time than the neurogenics courses which were the second and third most common. As the chi-square test results indicate, there is a difference in the proportion of types of course taken when compared across graduation periods. The test results show a higher rate of little to no course work for those who graduated more than 25 years ago and higher rates of standalone cognitive courses for those who graduated recently. This is expected as there is more research and knowledge available in the field, which would facilitate an expansion of available courses. The majority of responders have completed CEUs in the past five years, which indicates that there are opportunities for SLPs to educate themselves further if they wish.

The second question to be answered was which deficit areas are screened for in acute care. As indicated by the results, at least 80% of SLPs report screening for nearly all deficit areas associated with RHD with the exception of nonverbal and paralinguistics. However, this question did not target only those that work in acute care. When filtered for only SLPs that work in acute care, the numbers rise to 100% for neglect, attention, memory, and

executive functioning. The only area that did not see an increase is nonverbal communication, which decreased to nearly 50% (*Table 23*). This pattern is similar to the results seen in Blake et. al (2002), where nonverbal communication deficits were least-likely to be diagnosed. If only 50% of SLPs in acute care are screening for this area, it leads to fewer people being diagnosed.

Table 23 - Deficits Screened in Acute Care Only

Area	Percentage	Responses
Neglect	100	49
Attention deficits	100	49
Pragmatics	87.76	43
Language	93.88	46
Nonverbal	51.02	25
Memory	100	49
Executive Functioning	100	49
Awareness	91.84	45

The next question was: what are the most common deficit areas on SLPs' caseloads? Based on survey results, the two most common areas are attention and executive functioning deficits. Seventy-nine percent of SLPs reported that 75% or more of their clients had exhibited attention or executive functioning deficits within the previous six months. The least common area is non-literal language comprehension, which comprises 25% or less for 59 SLPs, followed by unilateral neglect and appropriateness.

Questions four, five, and six all focus on the assessment of deficits associated with RHD. Most SLPs use standardized tests rather than a facility mandated packet of tests. The fourteen SLPs that indicated using subtests or a packet of tests work either in acute care, in-patient rehabilitation, or skilled nursing facility, with one SLP working in two different

settings. It is interesting to note that while 14 SLPs indicated they did not use standardized tests or batteries, only four use a facility mandated selection of subtests. Several respondents indicated that they do use subtests from standardized tests, but they are chosen by the SLP and not the facility and one SLP writes that they use a "knowledge base" of informal tools and trained observation. From these results, it can be interpreted that while most SLPs use standardized tests or subtests from them, a few rely on informal tasks and observation only.

The next question was: what are the most common test batteries used for diagnosing RHD deficits? As expected, there were a wide variety of tests used. The most commonly used test, the *CLQT*, is not actually a comprehensive RHD test; however, it was given this classification in this study because it assesses more than one relevant area. The *CLQT* assesses five different areas: attention, memory, executive function, language, and visuo-spatial skills (Helm-Estabrooks, 2001). While this test does assess deficits associated with RHD, it does not test all of them, such as anosognosia, the production and comprehension of figurative language and discourse, nonverbal and paralinguistic aspects of communication, and pragmatics, and it is made for people with different etiologies, including RHD, aphasia, TBI, and others. The selection with the second highest number of responses cannot be used due to an error in the construction of the item. The *Montreal Evaluation of Communication* (*MEC*) and the *Montreal Cognitive Assessment* (*MoCA*) were entered as the same selection; thus the results cannot be interpreted. Another widely used test was the *RIPA*, which was used by 47 responding SLPs. Like the *CLQT*, it was developed for patients with a variety of neurogenic etiologies that include right hemisphere stroke. Written responses from the SLPs include tests like *FAVRES* and *TEA*, which focus more on one particular area and are not

considered comprehensive test batteries. Tests that were made for evaluating those with RHD were actually used the least, with the *Mini Inventory of Right Brain Injury* being the most common at less than 25%. The results gathered here indicate that the most widely used tests are not made specifically for those with RHD which could possibly lead to under-diagnosis of deficits related to RHD.

The next question to be answered involved the assessment of specific deficit areas. As with the previous question, there were a wide variety of tests that were used to assess each specific deficit area. It is interesting to note that the two tests that received no responses for assessing anosognosia, the *Bisiach Scale* and the *Levine Denial of Illness Scale* (*LDIS*) were the two tests that were least appropriate for SLP's to use for those with RHD. The *Bisiach Scale* (Bisiach et al., 1986) was developed to assess anosognosia of hemiparesis and the *LDIS* (Levine et al., 1987) was developed to assess the denial of illness in patients with heart disease.

One common theme throughout, including responses obtained for test batteries, is observation. Most of the responding SLPs supplemented their standardized tests or informal tasks results with observation. For pragmatics, anosognosia, and prosody, the majority of the responders indicated they use observation only with the most extreme example being prosody, of which only 9 of 106 used standardized tests while one written response indicated using a self-developed screening tool. These results correspond with another study question: what do SLPs believe is their most important tool when diagnosing deficits associated with RHD. The responders indicated that observation and informal testing were the two most important tools, followed by standardized testing. These answers directly correspond to the

answers received for each individual deficit area, where observation and informal tools and subtests were used instead of a complete standardized assessment.

Another specific question to answer related to how SLPs decide which test to use. The results gathered here indicate that administration time is most important, followed by availability, cost, and ease of use. This order of importance is consistent with the time constraints that many SLPs have to work with in adult settings, especially in acute settings where the SLP may not have the time available to give tests that are time-consuming or have complex administration procedures. Validity, reliability, sensitivity, and specificity statistics were in the middle, with an average of 33% of SLPs indicating their importance. The least important was publication date, which is exactly opposite of conclusions from a study by Betz et al. (2013) which looked at the frequency of use of specific standardized tests for children. In Betz et al.'s study, the only significant correlation between frequency of test use was the publication date. This may be explained by the differences between available tools for the two the populations. There are a wide variety of assessments available for children that are updated periodically to modernize or change with current views of appropriateness, such as picture and vocabulary selections. However, adult RHD assessments are fewer in number with less frequent revisions which could explain why publication date is not important to SLPs working with this population.

The ninth study question is whether SLPs believed they had adequate tools to diagnose deficits associated with RHD and how confident they were in their diagnoses? As noted in the previous section, most SLPs do not feel as if the tools available to them are adequate. However, it is interesting to note that despite this answer, the majority rate

themselves at a 7 or above for confidence in their diagnoses with only 16 of the 73 rating themselves between 3-6. Those who indicated yes, they did have the necessary tools rated themselves between 6 and 10, with a weighted average of 8.16 while those that answered no rated themselves between 3 and 10, with a weighted average of 7.48, a difference of only 0.68. Despite the small difference, the there is a small, but statistically significant correlation between confidence levels and the adequacy of available tools as reported in the results. This test shows that those with more confidence are more likely to believe the tools available to them are adequate. It is possible that this result is also related to the second correlation that indicates having more confidence with more experience. Logically, those with more experience will be more likely to trust in their diagnoses relative to those with less.

The last two questions for this study were: what are the most common treatments for specific deficits and what is the rationale when choosing them? An effort was made to include treatment techniques and approaches that were backed by research as discussed in the introduction. However, there are exceptions to this for attention and neglect. The research supporting attention process training (APT) is mixed (Barker-Collo et al., 2009, Murray, Keaton, & Karcher, 2006, Park, 2010, & Sohlberg et al. 2010). In each of these studies, it is shown that APT does result in improvement in attention for trained items, however, there is little generalization to non-treated skills. It was therefore a little surprising that 35% of responding SLPs use it. However, further analysis shows that APT is not used alone. Nearly all responders indicated that it is used in conjunction with compensatory strategies and metacognitive training. One written response emphasized that while APT is used on the

computer, they also supplement the training with functional tasks, which would likely increase the generalization.

Neglect is the most widely researched deficit area associated with RHD. Results regarding external cues, such as highlighting the left margins or verbal cues is mixed. While there have been studies that indicate that they do help, others have shown that there is little to no generalization to other tasks outside the therapy environment as discussed in Manly's review article (Manly, 2002). Lawson (1962) documented that providing an "anchor" did not generalize to reading a different edition of the same book without the marker. Another study used visual and verbal cues to reduce neglect but was only successful when the verbal cue was given (Riddoch & Humphreys, 1983). A different study proposes the opposite. In the study by Halligan and Marshall (1994) the results indicated that a "large vertical configuration" can reduce the effects of neglect. However, the results gathered here show that approximately 90% of SLPs use a combination of the external cues listed in therapy. Most of these SLPs use more than one external cue as well as environmental manipulation (89%). Fifty-eight percent use visual scanning treatment which usually involves the gradual fading of external cues. A few of the responding SLPs do not treat neglect, instead referring the patient to their occupational therapist, although they did not provide a rationale for their decision. An additional question was included to find out SLPs' rationale for highlighting left margins since research for using external visual cues has shown that there is little benefit over time (Manly, 2002; Riddoch & Humphreys, 1994). Three choices were given: A) the brightness draws attention to the left, B) the stimulus serves as an anchor, and C) a combination of both. The majority supported the second option, followed closely by C or

both. Given the responses received, the majority of the responding SLPs seem to have the same rationale as previous researchers such as Weinberg (Weinberg et al., 1977) who also believed that the stimulus provides an anchor.

There are few standard treatments for any other deficit related to RHD, thus it was not possible to query SLPs' approach to other deficits. Thus, SLPs were asked what was important when choosing treatment approaches. The overwhelming majority chose client considerations and past successes. Surprisingly, available research was near the top, with 82 responders, despite how little there actually is for RHD. Expert opinion had the fewest responses, with only 57 of 110, suggesting that even without efficiency studies and studies with mixed results, research is still more valuable to the working clinician than expert opinion. The responses to this question suggest that SLPs select treatments that they have used successfully in the past, which they feel would be appropriate for each individual client. Research evidence also is considered more strongly than expert opinion.

There are several strengths in this study. The first is the relatively large number of responders. While the target of 150 was not reached, 143 is only 7 short of the target. The state origins of the responder coincide with the total number of licensed SLPs in each state, with the exception of Texas, which had the most responders, but has the 3rd largest population of SLPs in the U.S. (ASHA, 2017). This discrepancy is possibly due to the posting for the survey on the University of Houston ComD Facebook page, which is followed by alumni, many of whom are still in Texas. A further strength is the wide variety of items available for selection for each question. There were relatively few write-in choices

for all of the questions that provided that option, indicating the survey used appropriate choices.

One of the weaknesses of this study was covered in the previous section. Due to an error creating the survey, questions that were intended to verify the inclusion criteria were omitted, leaving the possibility that some of the respondents did not meet the criteria of being licensed or working with RHD. It is possible (but not verifiable) that some of those who did not complete the survey did not work with people with RHD, and thus quit responding. Another weakness was question formulation and item selection for a small number of questions. For example, when asked what the most important factor for diagnosing deficits, the options allowed more than one answer to be selected, negating the implicit statement of "most important". Other errors included two instances of providing an "Other" answer option without giving a space for the responder to write in their answer; however, these were corrected soon after the survey was opened, which limited the error to only 6 responses of 130 for the first instance and 10 of 106 for the second. A further weakness is that we can only know the information obtained from questions that were asked. For example, while most of the respondents indicated using observations, there is much more information that could be asked about their observation such as when and how often they observe their clients, or whether they may miss aspects of a deficit in informal observations but then "catch" it on a test. Future research may include these types of questions, with an additional focus on how SLP's make their diagnoses, how often do they treat those they diagnose, and if they feel their treatments are effective and how often they are effective. A different aspect of this weakness was that respondents did not have a way of ranking the importance of their

answers, such as which test they used the most if they selected multiple options, which could have allowed a deeper understanding of the results obtained here.

This study has provided a look at the practices of SLPs in regard to their clients with RHD. We now know which tests and tools are commonly used for each of the deficit areas, which as expected, was a wide variety. We learned that observation seems to be one of the most important tools for SLPs when making their diagnoses and that they are generally confident in their diagnoses despite the majority believing the tools that are available are not adequate. This study has also given a possible cause for this discrepancy: more years of experience in the field. Other information this study has provided is what are common treatment approaches for certain deficits, as well as their rationale behind the choices.

APPENDIX

I have read the above information and I consent to participate in the research.

   a. Yes
   b. No

2. Are you a certified SLP?
   a. Yes
   b. No
3. In your current position, do you currently diagnose and/or treat clients with right hemisphere damage?
   a. Yes
   b. No
4. What state do you practice in?
5. What year did you graduate?
6. Which best describes the coursework you had related to cognition and right hemisphere damage (RHD) in graduate school?
   a. Course focused on Traumatic Brain Injury
   b. Cognition course with multiple etiologies (e.g., TBI, RHD, dementia)
   c. Single neurogenics course that covered aphasia plus one etiology related to cognition (e.g., TBI, RHD or dementia)
   d. Single course that covered a range of neurogenic disorders (e.g., 3 or more of the following: aphasia, motor speech, TBI, RHD, dementia)
   e. Two or more courses devoted to cognition

f. No coursework in cognition

g. Other (please specify)

7. Have you earned CEUs (continuing education units) in the assessment or treatment of clients with RHD in the past 5 years?

    a. No

    b. Yes

8. If yes, how many hours?

    a. 1-3 hours

    b. 4-6 hours

    c. 6+ hours

    d. I have not had any CE''s related to RHD in the last five years

9. What setting do you practice in? (Check all that apply)

    a. Acute

    b. In-patient Rehabilitation

    c. Out-patient Rehabilitation

    d. Skilled Nursing Facility or Assisted Living

    e. Private Practice

    f. Other – Please specify

10. How long have you been at your current position?

    a. Less than 1 year

    b. 1-2 years

    c. 3-5 years

    d. 6+ years

11. Which deficit areas do you screen for? (Check all that apply)
    a. Neglect
    b. Attention deficits (e.g. sustained, selected, divided attention)
    c. Pragmatics
    d. Language (potentially including discourse production and comprehension, inferencing, and figurative language)
    e. Nonverbal communication and paralinguistics (e.g., body language, eye contact, turn taking)
    f. Memory
    g. Executive Functioning (e.g., reasoning, problem solving, inhibition)
    h. Awareness
    i. Other (please specify)
12. Considering a typical 6-month period, how commonly do you see the following deficits in adults with RHD?
    a. Less than 10% of patients, about 25% of patients, about 50% of patients, about 75% of patients, over 90% of patients
        i. Unilateral Neglect
        ii. Attention deficits (e.g., sustained, selected, divided attention)
        iii. Discourse production (e.g., organization, staying on topic, relevance)
        iv. Non-literal language comprehension (e.g., idioms, metaphors, sarcasm)
        v. Nonverbal communication (e.g., body language, eye contact, turn taking)

vi. Pragmatics

vii. Memory

viii. Appropriateness of language/behavior

ix. Executive Functioning (e.g., reasoning, problem solving, inhibition)

x. Awareness/anosognosia

13. Do you use standardized tests or batteries at your current position?

a. Yes

b. No

14. Do you use a facility mandated packet of tests or subtests?

a. Yes

b. No

15. What areas does this packet assess? (Check all that apply)

a. Unilateral Neglect

b. Attention Deficits (e.g. sustained, selective, divided)

c. Discourse production (e.g., organization, staying on topic, relevance)

d. Non-literal language comprehension (e.g., body language, eye contact, turn taking)

e. Memory

f. Appropriateness of language/behavior

g. Executive Functioning (e.g., reasoning, problem solving, inhibition)

Awareness/anosognosia

16. Does this packet contain subtests from standardized tests?

a. Yes

b. No

c. I’m not sure

17. Which standardized RHD test batteries do you use to assess right hemisphere brain damage? (Check all that apply)

a. I don’t use standardized test batteries

b. Burns Brief Inventory

c. Mini Inventory of Right Brain Injury

d. Montreal Evaluation of Communication (MEC)

e. Rehab Institute of Chicago Evaluation of Communication Problems in RH Dysfunction (RIC)

f. Right Hemisphere Language Battery (RHLB)

g. Ross Information Processing Assessment (RIPA)

h. Other (please specify)

18. Which general cognitive tool/s do you use to assess cognition? (Check all that apply)

a. I don’t use standardized tests for cognition

b. Cognitive Linguistic Quick Test

c. Mini Mental State Exam (MMSE)

d. Montreal Cognitive Assessment (MOCA)

e. Neuropsychological Assessment Battery

f. The Oxford Cognitive Screen

g. Scales of Cognitive and Communicative Ability for Neurorehabilitation

h. Observation

i. Other (please specify)

19. Which tool/s do you use to assess pragmatics? (Check all that apply)

    a. I don't use standardized tests for pragmatics
    b. Behaviorally References Rating System of Intermediate Social Skills (BRISS)
    c. Communication Performance Scale
    d. LaTrobe Communication Questionnaire
    e. Pragmatic Protocol
    f. Profile of Pragmatic Impairment in Communication (previously the Profile of Functional Impairment in Communication – PFIC)
    g. The Awareness of Social Inference Test (TASIT)
    h. Observation
    i. Other (please specify)

20. Which tool/s do you use to assess attention? (Check all that apply)

    a. I don't use standardized tests for attention
    b. Brief Test of Attention
    c. Moss Attention Rating Scale
    d. Paced Auditory Serial Addition Task (PASAT)
    e. Rating Scale of Attentional Behavior
    f. Ruff Selective Attention Test
    g. Sustained Attention to Response Task
    h. Symbol Digit Modalities Test
    i. Test of Everyday Attention
    j. Observation
    k. Other (please specify)

21. Which tool/s do you use to assess neglect? (Check all that apply)

a. I don't use standardized tests for neglect
b. Apples Test (part of the Birmingham Cognitive Screen – BCoS)
c. Balloons Test
d. Behavioral Inattention Test (BIT)
e. Catherine Bergego Scale (CBS)
f. Gap Detection Task
g. Line Bisection Test
h. Wheelchair Collision Test
i. Observation
j. Other (please specify)

22. Which tool/s do you use to assess executive function? (Check all that apply)

a. I don't use standardized tests for executive function
b. Behavioral Assessment of the Dysexecutive Syndrome (BADS)
c. Behavior Rating Inventory of Executive Function (BRIEF) – Adult version
d. Delis-Kaplin Executive Function System
e. Dysexecutive Questionnaire (DEX)
f. Functional Assessment of Verbal Reasoning and Executive Strategies (FAVRES)
g. Hayling Sentence Completion Test
h. Multiple Errands Test
i. Naturalistic Action Test
j. Revised Strategy Application Test

k. Ruff Figural Fluency Test

l. Trail Making Test

m. Observation

n. Other (please specify)

23. Which tool/s do you use to assess awareness/anosognosia? (Check all that apply)

a. I don't use standardized tests for awareness/anosognosia

b. Awareness Questionnaire (AQ)

c. Bisiach Scale

d. Head Injury Behavior Scale (HIBS)

e. Impaired Self-Awareness (ISA) Scale

f. Levine Denial of Illness Scale

g. Patient Competency Rating Scale (PCRS)

h. Patient Competency Rating Scale for Inpatient Neurorehabilitation (PCRS-NR)

i. Self-Awareness of Deficit Interview (SADI)

j. Structured Awareness Interview (SAI)

k. Visual-Analogue Test for Anosognosia Language

l. Observation

m. Other (please specify)

24. Which tool/s do you use to assess memory? (Check all that apply)

a. I don't use standardized tests of memory

b. Brief Assessment of Prospective Memory (BAPM)

c. California Verbal Learning Test

d. Cambridge Prospective Memory Test

e. Everyday Memory Questionnaire

f. Hopkins Verbal Learning Test

g. Memory Test of Older Adults

h. Oxford Cog Screen – Memory Subtest

i. Rey Complex Figure Test and Recognition Trial

j. Rivermead Behavioral Memory Test

k. Wechsler Memory Scales

l. Observation

m. Other (please specify)

25. Which tool/s do you use to assess language? (Check all that apply)

a. I don't use standardized tests for language

b. Cookie Theft picture description

c. Discourse Comprehension Test

d. Familiar and Novel Language Comprehension Protocol

e. Listening Behaviors Checklist

f. Social Comprehension and Judgment Screening Test

g. Test of Language Competence – Expanded Edition

h. The Word Test 2: Adolescent

i. Informal measures such as mean utterance length and semantic information

j. Observation

k. Other (please specify)

26. What tool/s do you use to assess prosody and affect? (Check all that apply)

a. I don’t use standardized tests for prosody/affect

b. Aprosodia Battery

c. Florida Affect Battery

d. New York Emotion Battery

e. Observation

f. Other (please specify)

27. For any standardized tests that you use, how do you choose which test/s to use? (Check all that apply)

a. Reliability statistics

b. Validity statistics

c. Sensitivity and specificity statistics

d. Availability

e. Cost

f. Ease of use

g. Administration time

h. Publication date

i. Habit/preferences

j. Other (please specify)

28. Do you feel that the tools available to you are adequate for diagnosing cognitive & communication deficits in your RHD patients?

a. Yes

b. No

29. In your opinion, what is the most important tool available for diagnosing a patient with RHD?
    a. Standardized testing
    b. Informal testing
    c. Observation
    d. Yourself (e.g. experience, intuition, etc.)
30. On a scale of 1-10, generally, how confident are you that your diagnoses are correct?
31. When targeting neglect, what approach/es do you use? (Check all that apply)
    a. Attaching irrelevant information on the left of a stimulus such as “xxxtrain”
    b. Prism Adaptation (PA)
    c. Highlighting left margin
    d. Line guides
    e. Stimulus discrimination and matching
    f. Verbal cues
    g. Virtual Reality
    h. Visual Scanning Treatment (VST) – systematically guide a client to scan the contralesional side of stimuli using various external cues and clinician feedback
    i. Environmental manipulation
    j. Other (please specify)
32. If you use external visual cues, such as a red line along the left margin, what is the rationale for doing so?

a. The bright stimulus will aid in unconsciously drawing the patient's attention to the left
b. The bright stimulus serves as a concrete "anchor" for the patient to find
c. Both
d. Other (please specify)

33. When targeting expressive aprosodia, what approach/es do you use? (Check all that apply)
    a. Cognitive-Linguistic treatment (teaching clients what emotional prosody sounds like, matching facial expressions to prosody)
    b. Motoric-Imitative treatment (repetitive practice of emotional prosody through imitation and elicitation)
    c. Contrastive stress drills
    d. Other (please specify)
34. When targeting attention, what treatment approach/es do you use? (Check all that apply)
    a. Attention Process Training – computer program that involves various tasks such as discriminating and focusing on relevant material like sounds while disregarding irrelevant material
    b. Metacognitive strategy training (repeated practice of specific strategies including reviewing the task, selecting a plan, doing the plan, and checking work afterwards)
    c. Compensatory strategies
    d. Other (please specify)

35. When targeting awareness/anosognosia, what treatment approach/es do you use? (Check all that apply)

    a. Experiential learning
    b. Metacognitive strategy training
    c. Verbal feedback
    d. Visual/video feedback
    e. Other (please specify)

36. How do you determine which treatment technique/s to use? (Cark all that apply)

    a. Research findings
    b. Expert opinion
    c. Client considerations
    d. Comfort with the technique
    e. Successes with past clients
    f. Other (please specify

Table 1 - What state do you practice in?

State	# of Responses	Percentage
Alabama	1	0.77
Arizona	6	4.62
California	7	5.38
Colorado	7	5.38
Florida	4	3.08
Georgia	2	1.54
Illinois	4	3.08
Indiana	1	0.77
Iowa	2	1.54
Kansas	3	2.31
Kentucky	2	1.54
Louisiana	1	0.77
Maine	2	1.54
Maryland	1	0.77
Massachusetts	6	4.62
Michigan	5	3.85
Minnesota	1	0.77
Missouri	3	2.31
Montana	2	1.54
New Jersey	1	0.77
New Mexico	1	0.77
New York	7	5.38
North Carolina	6	4.62
Ohio	4	3.08
Oklahoma	3	2.31
Oregon	2	1.54
Pennsylvania	8	6.15
Rhode Island	1	0.77
South Carolina	3	2.31
Tennessee	1	0.77
Texas	15	11.54
Utah	1	0.77
Vermont	1	0.77
Virginia	1	0.77
Washington	8	6.15
Wisconsin	8	4.62
Wyoming	1	0.77

State	Percentage
Alabama	0.77
Arizona	4.62
California	5.38
Colorado	5.38
Florida	3.08
Georgia	1.54
Illinois	3.08
Indiana	0.77
Iowa	1.54
Kansas	2.31
Kentucky	1.54
Louisiana	0.77
Maine	1.54
Maryland	0.77
Massachusetts	4.62
Michigan	3.85
Minnesota	0.77
Missouri	2.31
Montana	1.54
New Jersey	0.77
New Mexico	0.77
New York	5.38
North Carolina	4.62
Ohio	3.08
Oklahoma	2.31
Oregon	1.54
Pennsylvania	6.15
Rhode Island	0.77
South Carolina	2.31
Tennessee	0.77
Texas	11.54
Utah	0.77
Vermont	0.77
Virginia	0.77
Washington	6.15
Wisconsin	4.62
Wyoming	0.77

Table 24 – Years since graduation and type of coursework

			littleto	shared	standalo	Total
YrsOutgrp		Count	1	0	1	2
		Expected Count	.8	.3	.9	2.0
		% within YrsOutgrp	50.0%	0.0%	50.0%	100.0%
		% within COURSEgrp	2.0%	0.0%	1.6%	1.5%
		% of Total	0.8%	0.0%	0.8%	1.5%
		Standardized Residual	.3	-.5	.1	
	a1-5	Count	7	3	21	31
		Expected Count	12.0	4.5	14.6	31.0
		% within YrsOutgrp	22.6%	9.7%	67.7%	100.0%
		% within COURSEgrp	13.7%	15.8%	33.9%	23.5%
		% of Total	5.3%	2.3%	15.9%	23.5%
		Standardized Residual	-1.4	-.7	1.7	
	b6-10	Count	2	3	11	16
		Expected Count	6.2	2.3	7.5	16.0
		% within YrsOutgrp	12.5%	18.8%	68.8%	100.0%
		% within COURSEgrp	3.9%	15.8%	17.7%	12.1%
		% of Total	1.5%	2.3%	8.3%	12.1%
		Standardized Residual	-1.7	.5	1.3	
	c11-25	Count	11	8	23	42
		Expected Count	16.2	6.0	19.7	42.0
		% within YrsOutgrp	26.2%	19.0%	54.8%	100.0%
		% within COURSEgrp	21.6%	42.1%	37.1%	31.8%
		% of Total	8.3%	6.1%	17.4%	31.8%
		Standardized Residual	-1.3	.8	.7	
	d26+	Count	30	5	6	41
		Expected Count	15.8	5.9	19.3	41.0
		% within YrsOutgrp	73.2%	12.2%	14.6%	100.0%
		% within COURSEgrp	58.8%	26.3%	9.7%	31.1%
		% of Total	22.7%	3.8%	4.5%	31.1%
		Standardized Residual	3.6	-.4	-3.0	
Total		Count	51	19	62	132
		Expected Count	51.0	19.0	62.0	132.0
		% within YrsOutgrp	38.6%	14.4%	47.0%	100.0%

	% within COURSEgrp	100.0%	100.0%	100.0%	100.0%
	% of Total	38.6%	14.4%	47.0%	100.0%

Chi-Square Tests

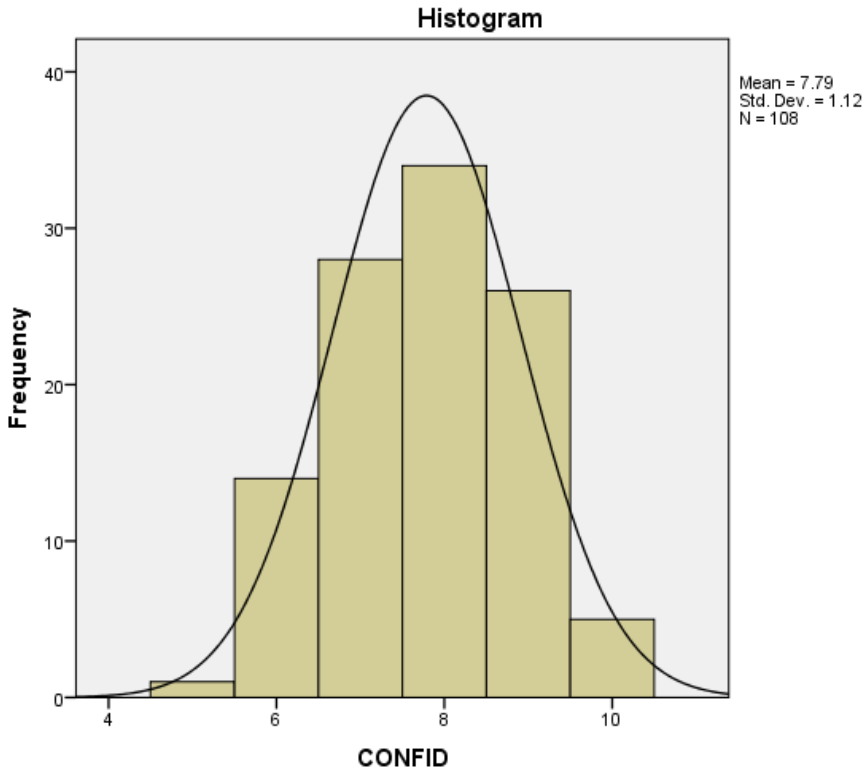
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.189[a]	8	.000
Likelihood Ratio	37.228	8	.000
N of Valid Cases	132		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is .29.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.516	.000
	Cramer's V	.365	.000
N of Valid Cases		132	

Table 25 – Confidence Ratings and Adequate tools



		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5	1	.9	.9	.9
	6	14	13.0	13.0	13.9
	7	28	25.9	25.9	39.8
	8	34	31.5	31.5	71.3
	9	26	24.1	24.1	95.4
	10	5	4.6	4.6	100.0
	Total	108	100.0	100.0	

		CONFID	ADEQTOOL
CONFID	Pearson Correlation	1	.243*
	Sig. (2-tailed)		.011
	N	108	108
ADEQTOOL	Pearson Correlation	.243*	1
	Sig. (2-tailed)	.011	
	N	108	108

Table 26 – Confidence Levels and Years of Experience

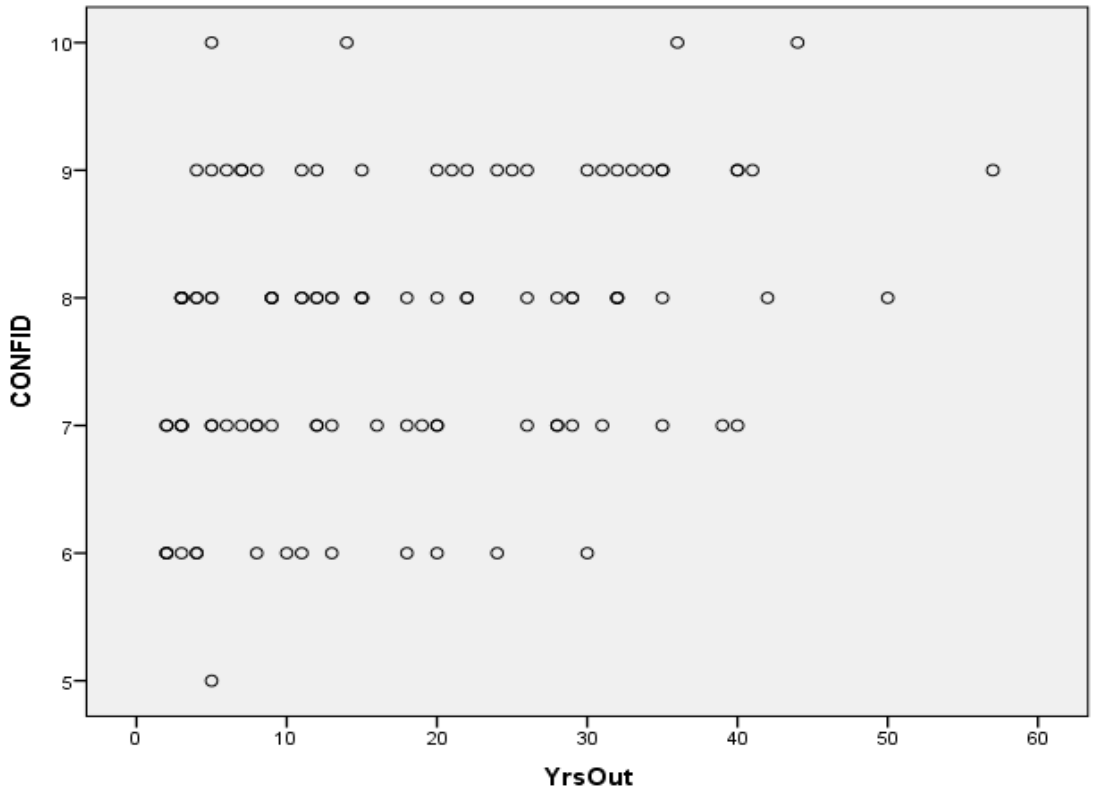
Descriptive Statistics

	Mean	Std. Deviation	N
CONFID	7.79	1.120	108
YrsOut	17.89	12.979	107

Correlations

		CONFID	YrsOut
CONFID	Pearson Correlation	1	.331**
	Sig. (2-tailed)		.001
	N	108	107
YrsOut	Pearson Correlation	.331**	1
	Sig. (2-tailed)	.001	
	N	107	107

**. Correlation is significant at the 0.01 level (2-tailed).



REFERENCES

Alderman, N., Evans, J.J., Emslie, H., Wilson, B.W., & Burgess, P.W. (1996). Zoo Map Test. In B.A. Wilson, N. Alderman, P.W., Burgess, H. Emslie, & J.J. Evans (Eds.), *Behavioural Assessment of the Dysexecutive Syndrome*. Bury St. Edmunds: Thames Valley Test company.

Antonucci, G., Guarigglia, C., Judica, A., Magnotti, L., Paolucci, S., Pizzamiglio, L., & Zoccolotti, P. (1995). Effectiveness of neglect rehabilitation in a randomized group study. *Journal of Clinician and Experimental Neuropsychology, 17*(3), 383-389.

Azouvi, P., Marchal, F., Samuel, C., Renard, C., Louis-Dreyfus, A., Jokie, C., … & Bergego, C. (1996). Functional consequences and awareness of unilateral neglect: Study of an evaluation scale. *Neuropsychological Rehabilitation, 6*(2), 133-150.

Azouvi P., Samuel C., Louis-Dreyfus A., Bernati, T., Bartolomeo, P., Beis, J.M.,…Rousseaux, M. (2002). Sensitivity of clinical and behavioral tests of spatial neglect after right hemisphere stroke. *Journal of Neurology, Neurosurgery, & Psychiatry, 73*, 160-166.

Babcock, L., Kurowski, B.G., Zhang, N., Dexheimer, J.W., Dyas, J., & Wade, S.L. (2017). Adolescents with mild traumatic brain injury get SMART: An analysis of a novel web-based intervention. *Telemedicine Journal and E-Health, 23*(7), 600-607.

Bailey, M.J., Riddoch, M.J., & Crome, P. (2002). Treatment of visual neglect in elderly patients with stroke: A single-subject series using either a scanning and cueing strategy or a left-limb activation strategy. *Physical Therapy, 82*(8), 782-97.

Baldassarre, A., Ramsey, L., Hacker, C.L., Callejas, A., Astafiev, S.V., Metcalf, N.V.,…Corbetta, M. (2014). Large-scale changes in network interactions as a physiological signature of spatial neglect. *Brain, 137*, 3267-3283.

Barco, P. P., Crosson, B., Bolesta, M. M., Werts, D., & Stout, R. (1991). Training awareness and compensation in postacute head injury rehabilitation. In J. S. Kreutzer & P. H. Wehman (Eds.), *Cognitive rehabilitation for persons with traumatic brain injury: A functional approach* (pp. 129-146). Baltimore, MD, England: Paul H. Brookes Publishing.

Barker-Collo, S.L., Feigin, V.L., Lawes, C.M.M., Parag, V., Senior, H., & Rodgers, A., (2009). Reducing attention deficits after stroke using attention process training. *Stroke, 40*, 3292-2398.

Barker-Collo, S., Feigin, V., Lawes, C., Senior, H., & Parag, V. (2010). Natural history of attention deficits and their influence on functional recovery from acute stages to 6 months after stroke. *Neuroepidemiology, 35*, 255-262.

Bartolomeo, P. (2014) *Attention disorders after right brain damage: Living in halved worlds*. London: Springer.

Beeman, M. (1993). Semantic processing in the right hemisphere may contribute to drawing inferences from discourse. *Brain and Language, 44*(1), 80-120.

Beeman, M., Friedman, R.B., Grafman, J., Perez, E., Diamond, S., & Lindsay, M.B. (1994). Summation priming and coarse semantic coding in the right hemisphere. *Journal of Cognitive Neuroscience, 6*(1), 26-45.

Beeman, M.J, Bowden, E.M., Gernsbacher, M.A (2000). Right and left hemisphere cooperation for drawing predictive and coherence inferences during normal story comprehension. *Brain and Language, 71*(2), 310-336.

Benton, E. & Bryan, K., (1996). Right cerebral hemisphere damage: incidence of language problems. *International Journal of Rehabilitation Research, 19*(1), 47-54.

Betz, S.K., Eickhoff, J.R., Sullivan, S.F., Nippold, M., & Schneider, P. (2013). Factors influencing the selection of standardized tests for the diagnosis of specific language impairment. *Language, Speech, & Hearing Services in Schools, 44*(2), 133-146.

Birnboim, S. (2004). Strategy application test: Discriminate validity studies. *Canada Journal of Occupational Therapy, 71*, 47-55.

Bisiach, E., Vallar, G., Perani, D., Papagno, C., & Berti, A. (1986). Unawareness of disease following lesions of the right hemisphere: Anosognosia for hemiplegia and anosognosia for hemianopia. *Neuropsychologia, 24*, 471-482.

Blake, M.L. & Tompkins, C.A. (2001). Predictive inferencing in adults with right hemisphere brain damage. *Journal of Speech, Language, and Hearing Research, 44*, 639-654.

Blake, M.L., Duffy, J.R., Myers, P.S., & Tompkins, C.A. (2002). Prevalence and patterns of right hemisphere cognitive/communicative deficits: Retrospective data form an inpatient rehabilitation unit. *Aphasiology, 16*(4/5/6), 537-547.

Blake, M.L. (2006). Clinical relevance of discourse characteristics after right hemisphere brain damage. *American Journal of Speech-Language Pathology, 15*(3), 255-267.

Blake, M.L. (2009). Inferencing processes after right hemisphere brain damage: Maintenance of inferences. *Journal of Speech, Language, and Hearing Research, 52*(2), 359-372.

Blake, M.L., Frymark, T., & Venedictov, R. (2013). An evidence-based systematic review on communication treatments for individuals with right hemisphere brain damage. *American Journal of Speech-Language Pathology, 22*, 146-160.

Blake, M.L. (2016). Cognitive-communication deficits associated with right hemisphere brain damage. In Kimbarow, M.L. (Ed.), *Cognitive communication disorders* (129-185). San Diego, California: Plural Publishing.

Borgaro, S. R., & Prigatano, G. P. (2003). Modification of the Patient Competency Rating Scale for use on an acute neurorehabilitation unit: the PCRS-NR. *Brain Injury, 17*(10), 847–853. http://doi.org/10.1080/0269905031000089350

Borod, J. C., Welkowitz, J., & Obler, L. K. (1992). New York Emotion Battery. *Unpublished*.

Bowers, D., Blonder, L., & Heilman, K. (1991). The Florida Affect Battery. *Center for Neuropsychological Studies Cognitive Neuroscience Laboratory*. University of Florida. Retrieved from http://neurology.ufl.edu/files/2011/12/Florida-Affect-Battery-Manual.pdf

Bowers, L., Huisingh, R., LoGuidice, C., & Orman, J. (2005). The Word Test 2 – Adolescent. Austin, Texas: Pro-Ed Publishing.

Brandt, J., & Benedict, R. H. B. (2001). *Hopkins Verbal Learning Test - Revised*. Lutz, FL: Psychological Assessment Resources, Inc.

Brookshire, R. H., & Nicholas, L. E. (1997). *Discourse Comprehension Test.* Minneapolis: BRK Publishers.

Bryan, K. (1999). *The right hemisphere language battery*. London: Whurr.

Burgess, P. W., Alderman, N., Wilson, B. A., Evans, J. J., & Emslie, H. (1996). *The Dysexecutive Questionnaire*. Bury St. Edmunds: Thames Valley Test Company.

Burgess, P. & Shallice, T. (1997). *The Hayling and Brixton Tests. Test manual.* Bury St. Edmunds, UK: Thames Valley Test Company.

Burns, M. S. (1997). *Burns brief inventory of communication and cognition*. San Antonio, Texas: Psychological Corp.

Centers for Disease Control and Prevention, 2017. Stroke Facts. Retrieved from https://www.cdc.gov/stroke/facts.htm

Cocchini, G., Gregg, N., Beschin, N., Dean, M., & Della Sala, S. (2010). Vata-L: Visual-Analogue Test Assessing Anosognosia for language impairment. *The Clinical Neuropsychologist*, *24*(8), 1379–1399. http://doi.org/10.1080/13854046.2010.524167

Delis, D. C., Kaplan, E., & Kramer, J. H. (2001). *Delis-Kaplan Executive Function System (D-KEFS)*. San Antonio: Pearson Assessment.

Delis, D. C., Kramer, J. H., Kaplan, E., & Ober, B. A. (1983). *California Verbal Learning Test*. San Antonio: Pearson.

Demeyere, N., Riddoch, M. J., Slavkova, E. D., Bickerton, W.-L., & Humphreys, G. W. (2015). The Oxford Cognitive Screen (OCS): Validation of a Stroke-Specific Short Cognitive Screening Tool. *Psychological Assessment*, *27*(3), 883–894. http://doi.org/10.1037/pas0000082

Douglas, J.M, O'Flaherty, C.A., Snow, P.C. (2000). Measuring perception of communicative ability: the development and evaluation of the La Trobe communication questionnaire. *Aphasiology, 14*(3), 251-268.

Edgeworth, J., Robertson, I. H., & McMillan, T. M. (1998). *The balloons test*. Oxford: Pearson Assessment.

Farrell, A. D., Rabinowitz, J. A., Wallander, J. L., & Curran, J. P. (1985). An evaluation of two formats for the intermediate-level assessment of social skills. *Behavioral Assessment, 7*, 155-171.

Fleming, J., & Ownsworth, T. (2006). A review of awareness interventions in brain injury rehabilitation. *Neuropsychological Rehabilitation*, *16*(4), 474-500. doi:10.1080/09602010500505518

Folstein, M.F., Folstein, S.E., & McHugh, P.R., (1975) Mini-mental state: a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res, 12*, 189-198.

Gabbatore, I., Sacco, K., Angeleri, R., Zettin, M., Bara, B.G., & Bosco, F.M. (2015). Cognitive pragmatic treatment: A rehabilitative program for traumatic brain injury individuals. *Journal of Head Trauma Rehabilitation, 30*(5), 14-28.

Gillespie, D.C., Bowen. A., & Foster, J.K. (2006). Memory impairment following right hemisphere stroke: A comparative meta-analytic and narrative review. *The Clinical Neuropsychologist, 20*(1), 59-75.

Godfrey, H. P. D., Harnett, M. A, Knight, R. G., Marsh, N. V, Kesel, D. A, Partridge, F. M., & Robertson, R. H. (2003). Assessing distress in caregivers of people with a traumatic brain injury (TBI): A psychometric study of the Head Injury Behaviour Scale. *Brain Injury*, *17*(5), 427–35. http://doi.org/10.1080/0269905031000066201

Gronwall, D. M. (1977). Paced auditory serial-addition task: A measure of recovery from concussion. *Perceptual and Motor Skills*, *44*(2), 367–373. http://doi.org/http://dx.doi.org.ezproxy.lib.uh.edu/10.2466/pms.1977.44.2.367

Halligan, P.W. & Marshall, J.C. (1994). Right-sided cueing can ameliorate left neglect [Abstract]. *Neuropsychological Rehabilitation, 4*(1).

Harper, A. S., Cherney, L. R., Burns, M. A., & Rehabilitation Institute of Chicago. (2010). *RIC evaluation of communication problems in right hemisphere dysfunction-3 (RICE-3)*. Chicago, Illinois: Rehabilitation Institute of Chicago.

Hedna, V. S., Bodhit, A. N., Ansari, S., Falchook, A. D., Stead, L., Heilman, K. M., & Waters, M. F. (2013). Hemispheric Differences in Ischemic Stroke: Is Left-Hemisphere Stroke More Common? *Journal of Clinical Neurology*, *9*(2), 97–102.

Helm-Estabrooks, N. (2001). *CLQT: Cognitive linguistic quick test*. Hove: Psychological Corporation.

Hubley, A. M., & Tombaugh, T. N. (2002). *Memory Test for Older Adults*. North Tonawanda, NY: MultiHealth Systems.

Humphreys, Bickerton, Samson, & Riddoch (2012). The Birmingham Cognitive Screen (BCoS). London, United Kingdom: Psychology Press.

Joanette, Y., Ska, B., Côté, H., Ferré, P., LaPointe, L., Coppens, P., & Small, S. (2015). *Montreal Protocol for the Evaluation of Communication (MEC)*. Sydney, Australia: ASSBI Resources.

Johns, C.L., Tooley, K.M., & Traxler, M.J. (2008). Discourse impairments following right hemisphere brain damage: A critical review. *Language and Linguistics Compass, 2*(6), 1038-1062.

Kempler, D. & Van Lancker, D. (1996). Familiar and Novel Language Comprehension Test. Retrieved from https://danielkemplerblog.files.wordpress.com/2010/11/fanl-c-instructions-and-answer-sheet.pdf. June 24, 2018,

Kennedy, M.R.T. (2000) Topic scenes in conversations with adults with right-hemisphere brain damage. *American Journal of Speech-Language Pathology*, *9*, 72-86.

Kim, Y.M., Chun, M.H., Yun, G.J., Song, Y.J., Young, H.E. (2011). The effect of virtual reality training on unilateral spatial neglect in stroke patients. *Annals of Rehabilitation Medicine, 35*(3), 309-315.

Lawson, R. (1962). Visual-spatial neglect in lesions of the right cerebral hemisphere. *Neurology, 12*(1).

Levine, J., Warrenburg, S., Kerns, R., Schwartz, G., Delaney, R., Fontana, A., . . ., & Cascione, R. (1987). The role of denial in recovery from coronary heart disease. *Journal of Psychosomatic Medicine, 49,* 109-117.

Levine, B., Robertson, I.H., Clare, L., Carter, G., Hong, J., Wilson, B.A.,…Stuss, D.T. (2000) Rehabilitation of executive functioning: an experimental-clinical validation of goal management training. *Journal of the International Neuropsychological Society, 6*(3), 299-312.

Linscott, R.J., Knight, R.G., & Godfrey, H.P. (1996). The profile of functional impairment in communication (PFIC): a measure of communication impairment for clinical use. *Brain Injury, 10*(6), 397-412).

Ogourtsova, T., Souza-Silva, W., Archambault, P.S., & Lamontagne, A. (2017). Virtual reality treatment and assessments for post-stroke unilateral spatial neglect: A systematic literature review. *Neuropsychological Rehabilitation, 27*(3), 409-454.

Pimental, P. A., Kingsbury, N. A., & Pro-Ed (Firm). (2000). *Mini inventory of right brain injury*. Austin, Texas: PRO-ED.

Portegies, L.P., Selwaness, M., Hofman, A., Koudstaal, P.J., Vernooij, M.W., & Ikram, M.A. (2015) Left-sided strokes are more often recognized than right-sided strokes: The Rotterdam study. *Stroke, 46,* 252-254.

MacDonald, S. (2005). *Functional Assessment of Verbal Reasoning and Executive Strategies*. Guelph, Ontario: CCD Publishers.

Mackenzie, C., Begg, T., Brady, M., & Lees, K.R. (1997). The effects of verbal communication skills of right hemisphere stroke in middle age. *Aphasiology, 11*(10), 929-945.

Man, D. W. K., Fleming, J., Hohaus, L., & Shum, D. (2011). Development of the Brief Assessment of Prospective Memory (BAPM) for use with traumatic brain injury populations. *Neuropsychological Rehabilitation*, *21*(6), 884–98. http://doi.org/10.1080/09602011.2011.627270

Mancuso, M., Damora, A., Abbruzzese, L., & Zoccolotti, P. (2017). Prism adaptation improves ego-centric but not allocentric unilateral neglect: A case study. *European Journal of Physical and Rehabilitation Medicine.*

Manly, T. (2002). Cognitive rehabilitation for unilateral neglect: Review. *Neuropsychological Rehabilitation, 12*(4), 289-310.

Marini, A. (2012). Characteristics of narrative discourse processing after damage to the right hemisphere. *Seminars in Speech and Language, 33*(1), 68-78.

McDonald, S., Flanagan, S., & Rollins, J. (2002). The Awareness of Social Inference Test (TASIT). San Antonio: Pearson Clinical.

Milman, L.H. & Holland, A.L. (2012). *Holland Scales of Cognitive and Communicative Ability for Neurorehabilitation*. Austin, Texas: Pro-Ed.

Murray, L.L., Keeton, J., & Karcher, L. (2006). Treating attention in mild aphasia: Evaluation of attention process training – II. *Journal of Communication Disorders, 39*, 37-61.

Myers, J. E., & Myers, K. R. (1995). *Rey Complex Figure Test and Recognition Trial*. Lutz, FL: Psychological Assessment Resources, Inc.

Nasreddine, Z.S., Phillips, N.A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., …Chertkow, H. (2005). The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society*. *53* (4), 695–699.

Park, N.W. (2010). Evaluation of the attention process training programme. *Neuropsychological Rehabilitation, 9*(2), 135-154.

Ponsford, J. & Kinsella, G. (1991). The use of a rating scale of attentional behavior, *Neuropsychological Rehabilitation, 1*, 231-257.

Prutting, C.A. & Kirchner, D.M. (1987). A clinical appraisal of the pragmatic aspects of language. *Journal of Speech and Hearing Disorders, 52*, 105-119.

Pulsipher, D.T., Stricker, N.H., Sadek, J.R., & Haaland, K.Y. (2013). Clinical utility of the Neuropsychological Assessment Battery (NAB) after unilateral stroke. *The Clinical Neuropsychologist*, *27*, 924-945.

Qiang, W., Sonoda, S., Suzuki, M., Okamoto, S., & Saitoh, E. (2005). Reliability and validity of a wheelchair collision test for screening behavioral assessment of unilateral neglect after stroke. *American Journal of Physical Medicine and Rehabilitation*, *84*(3), 161–166.

Randolph, C. (1998). *Repeatable Battery for the Assessment of Neuropsychological Status*. San Antonio, TX: The Psychological Corporation.

Reitan, R.M. (1958). Validity of the Trail Making test as an indicator of organic brain damage. *Perceptual and Motor Skills, 8*, 271–276.

Riddoch, M.J. & Humphreys, G.W. (1983). The effect of cueing on unilateral neglect [Abstract]. *Neuropsychologia, 21*(6), 589-599.

Robertson I. H., Manly, T., Andrade, J., Baddeley, B. T., & Yiend, J. (1997). Oops!: Performance correlates of everyday attentional failures in traumatic brain injured and normal subjects. *Neuropsychologia, 35*, 747– 758.

Robertson, I. H., Ward, T., Ridgeway, V., & Nimmo-Smith, I. (1994). *Test of Everyday Attention*. Oxford: Pearson Assessment.

Rosenbek, J., Rodrigues, A., Hieber, B., Leon, S.., Curcian, G., Ketterson, T.,…Gonzalez-Rothi, I. (2006). Effects of two treatments for aprosodia secondary to acquired brain injury. *Journal of Rehabilitation Research and Development*, *43*, 379-390.

Ross, D. G., & Pro-Ed (Firm). (1986). *RIPA: Ross Information Processing Assessment*. Austin, Texas: Pro-Ed.

Ross-Swain, D., & Pro-Ed (Firm). (1996). *RIPA-2: Ross Information Processing Assessment*. Austin, Texas: Pro-Ed.

Ross, E.D., Thompson, R.D., & Yenkosky, J.P. (1997) Lateralization of affective prosody in brain and the callosal integration of hemispheric language functions. *Brain and Language, 56*(1), 27-54.

Roth, R.M., Isquith, P.K., & Gioia, G.A. (2005). Behavior Rating Inventory of Executive Function – Adult Version (BRIEF-A). Lutz, Florida: Psychological Assessment Resources.

Royle, J., & Lincoln, N. B. (2008). The Everyday Memory Questionnaire-revised: Development of a 13-item scale. *Disability and Rehabilitation*, *30*(2), 114–121. http://doi.org/10.1080/09638280701223876

Ruff, R. M. (1995). *Ruff 2 & 7 Selective Attention Test*. Lutz, FL: Psychological Assessment Resources, Inc.

Ruff, R. M., Light, R. H., & Evans, R. W. (1987). The ruff figural fluency test: A normative study with adults. *Developmental Neuropsychology*, *3*, 37–51. http://doi.org/10.1080/87565648709540362

Schenkenberg, T., Bradford, D. C., & Ajax, E. T. (1980). Line bisection and unilateral visual neglect in patients with neurologic impairment. *Neurology*, *30*(5), 509–517.

Schretlen, D. (1997). *Brief Test of Attention*. Lutz, FL: Psychological Assessment Resources, Inc.

Schwartz, M. F., Buxbaum, L. J., Ferraro, M., Veramonti, T., & Segal, M. (2002). *Naturalistic Action Test*. Oxford: Pearson Assessment.

Simmond, M. & Prigatano, G.P. (2003). Reliability of the self-awareness of deficits interview for adults with traumatic brain injury. *Brain Injury, 17*(4), 325-337.

Shallice, T. & Burgess, P. (1991). Deficits in strategy application following frontal lobe damage in man. *Brain, 114*, 727-741.

Sherer, M., Bergloff, P., Boake, C., High Jr, W., & Levin, E. (1998). The Awareness Questionnaire: factor structure and internal consistency. *Brain Injury*, *12*(1), 63–68. http://doi.org/10.1080/026990598122863

Sherer, M., Hart, T., & Nick, T. G. (2003). Measurement of impaired self-awareness after traumatic brain injury: A comparison of the Patient Competency rating Scale and the Awareness Questionnaire. *Brain Injury*, *17*(1), 25–37.

Sohlberg, M.M., McLaughlin, K.A., Pavese, A., Heidrich, A., & Posner, M.I. (2010). Evaluation of attention process training and brain injury education in persons with acquired brain injury. *Journal of Clinical and Experimental Neuropsychology, 22*(5), 656-676.

Smith, A. (1973). *Symbol Digit Modalities Test*. Torrance: Western Psychological Services.

Takamura, Y., Imanishi, M., Osaka, M., Ohmatsu, S., Tominaga, T., Yamanaka, K.,…Kawashima, N. (2016). Intentional gaze shift to neglected space: a compensatory strategy during recovery after unilateral spatial neglect. *Brain, 139,* 2970-2982.

Tompkins, C.A., Fassbinder, W., Blake, M.L., Baumbaertner, A., & Jayaram, N. (2004). Inference generation during text comprehension by adults with right hemisphere brain damage. *Journal of Speech, Language, and Hearing Research, 47,* 1380-1395.

Tompkins, C.A., Fassbinder, W., Scharp, V.L., & Meigh, K.M. (2008). Activation and maintenance of peripheral semantic features of unambiguous words after right hemisphere brain damage in adults. *Aphasiology, 22*(2), 119-138.

Tompkins, C.A., Scharp, V.L., Meigh, K.M., & Fassbinder, W. (2008). Coarse coding and discourse comprehension in adults with right hemisphere brain damage. *Aphasiology, 22*(2), 204-223.

Tompkins, C.A., Scharp, V.L., Meigh, K., Blake, M.L., & Wambaugh, J. (2012). Generalization of a novel, implicit, treatment for coarse coding deficit in right hemisphere brain damage: A single subject experiment. *Aphasiology, 25*(5), 689-708.

Tompkins, C.A., Klepousniotou, E., & Scott, A.G. (2016) Nature and assessment of right hemisphere disorders. In Papathanasiou, I. & Coppens, P. (Eds.), *Aphasia and Related Neurogenic Communication* Disorders (354-398). Burlington, Massachusetts: Jones & Bartlett Learning.

Tompkins, C.A. & Scott, A.G. (2016) Treatment of right hemisphere disorders. In Papathanasiou, I. & Coppens, P. (Eds.), *Aphasia and Related Neurogenic Communication* Disorders (399-420). Burlington, Massachusetts: Jones & Bartlett Learning.

Weinberg, J., Diller, L., Gordan, W.A., Gerstman, L.J., Lieberman, A., Lakin, P., . . . & Ezrachi, O. (1977). Visual scanning training effect on reading-related tasks in acquired right brain damage. *Archives of Physical Medicine Rehabilitation, 58*(11), 479-486.

Welte, P.O. (1993). Indices of verbal learning and memory deficits after right hemisphere stroke. *Archives of Physical Medicine and Rehabilitation, 74*(6), 631-636.

Wechsler, D. (2009). *Wechsler Memory Scale - Fourth Edition*. San Antonio: Pearson Assessment.

Whyte, J., Hart, T., Bode, R.K., Malec, J.F. (2003). The Moss Attention Rating Scale for traumatic brain injury: initial psychometric assessment. *Archive of Physical Medical Rehabilitation, 84*, 268-76.

Wilg, E. & Secord, W. (1989). Test of Language Competence – Expanded Edition. San Antonio, Texas: Pearson Clinical.

Wilson, B. A., Cockburn, J., Baddeley, A. D., Ivani-Chalian, R., & Aldrich, F. (2003). *Rivermead Behavioural Memory Test* (2nd ed.). Oxford: Pearson Assessment.

Wilson, B. A., Cockburn, J., & Halligan, P. W. (1987). *Behavioural Inattention Test*. Oxford: Pearson Assessment.

Wilson, B. A., Evans, J. J., Emslie, H., Foley, J., Shiel, A., Watson, P., … Groot, Y. (2005). *Cambridge Prospective Memory Test (CAMPROMPT)*. Oxford: Pearson Assessment.

Youse, K. & Coelho, C. (2009). Treating underlying attention deficits as a means for improving conversational discourse in individuals with closed head injury: A preliminary study. *Neurorehabilitation, 24,* 355-364.