Clinical Focus

Clinical Guidelines for Eliciting Discourse Using the RHDBank Protocol

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ABSTRACT

Purpose: Examining discourse after right hemisphere brain damage (RHD) can provide invaluable clinical data and insight into functional communication capabilities. Yet, clinicians preparing to enter the field may have limited experience eliciting and analyzing discourse for therapeutic purposes. The purpose of this work is to present a practical guide for the clinical use of the RHDBank protocol.
Method: Following a brief overview of the RHDBank protocol, elicitation guidelines and protocol administration considerations are offered. Measures that should be considered when analyzing RHDBank-elicited discourse are summarized. The RHDBank protocol is positioned as an accessible resource for discourse elicitation in the clinical setting, and examples for the clinical use of the protocol are provided.
Conclusions: Discourse production can be a key source of information regarding communication ability following RHD. The RHDBank provides a structured and scripted approach to the clinical elicitation of language and consideration of discourse production. Its immediate clinical utility will assist developing clinicians with the acquisition of a clinically relevant elicitation approach and more comprehensive view of the RHD communication impairments. Application of the protocol can aid in collective knowledge advancement that will promote a better understanding of RHD language production as a clinical entity with an array of possible characteristics.

Differences in discourse production after right hemisphere brain damage (RHD) are well established and clinically recognized as common communication impairments (Ferré et al., 2012; Mackenzie & Brady, 2008; Parola et al., 2016). Engaging in a conversation, telling a story, and providing directions to complete a task are all forms of discourse—connected linguistic units that are larger than a sentence (Tannen et al., 2015)—that may be impaired after RHD. Changes in the interpretation and use of language by adults with RHD can result in discourse described as either tangential, verbose, and egocentric, or sparse and inefficient (Barnes et al., 2019; Blake,

2006; Bloom et al., 1992; Brownell & Stringfellow, 1999; Marini, 2012; Sherratt & Bryan, 2012; Trupe & Hillis, 1985). Performance characteristics subsumed under these descriptors are less established, and the discourse produced by adults with RHD may vary based on the communicative context and discourse type, aligning the communication impairment within the pragmatic domain (Myers, 2001).

Successful communication necessitates linguistic and nonlinguistic skills for the comprehension and production of language with respect to the speaker, the addressee, and the social context (Leech, 1983). Whereas research focused on language comprehension impairments has dominated the RHD literature, there has been limited inquiry concerning the production of language. Language production impairments after RHD are most evident during complex communicative interactions above the level of

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a single utterance (i.e., discourse). Consider the following interaction: A young man enters a café and notices an empty seat at a bar next to a person wearing attire from a college sports team that he attended and of whom he is an avid fan. He sits next to the person, briefly gazes at the menu, and then turns to the person and says, "I am a fan too. The team really did well this past season. Did you attend college there?" He then continues to attempt to engage in a conversation with the person, but the person gazes to the right, provides few statements related to the topic of "college sports team," shows little variation in facial expression, offers unrelated comments, and asks very few questions. There is, however, no explicit statement produced to indicate reduced desire to interact nor overt indication that the individual has a communication difficulty. Like the person originally sitting at the bar, people with RHD produce language that is comprehensible (i.e., syntax, morphology, and grammar are adequate), but the communicative interaction is impaired.

The communicative challenges demonstrated in this interaction are well documented after RHD (Bloom et al., 1992; Hewetson et al., 2017; Myers, 1999). Determining the intended meanings of utterances, adhering to the social rules of conversation, asking questions, and using the appropriate linguistic and nonlinguistic modalities of language for the communicative purpose (Nofsinger, 1991) are essential to producing language that is appropriate for the interaction. These skills provide the basis of communicative competence or the ability to negotiate contextually appropriate language use for various purposes (Hymes, 1972). Some adults with RHD may not adhere to turn-taking norms (Barnes et al., 2019), present delayed or irrelevant contributions to discourse (Myers & Brookshire, 1996), lack the ability to make requests (Brownell & Stringfellow, 1999), ask questions infrequently (Minga et al., 2018, 2020), maintain and initiate topics poorly (Brady et al., 2003; Kennedy, 2000), and use pronoun referents incorrectly and infrequently (Davis et al., 1997; Stockbridge et al., 2021), yielding ineffective, disorganized, and, in some instances, egocentric interactions. Others may produce language that lacks the expected organization and content causing incomplete communication to that is devoid of vital information (Bartels-Tobin & Hinckley, 2005; Brady et al., 2003; Hird & Kirsner, 2003; Sherratt & Bryan, 2012, 2019). When these behaviors occur in the discourse of individuals with RHD, there are many opportunities for miscommunication and incorrect assumptions by the communication partner that have the potential to disrupt successful interaction. Discourse produced in this way not only causes frustrating and unsuccessful interactions for individuals with RHD and their communication partners, but may also lead to difficulty with social and vocational pursuits (Hewetson et al., 2021; Tompkins, 2012). Despite knowledge of production deficits

and their impact, language production after RHD has not been historically prioritized when compared to theoretical accounts of language comprehension in this population (Brownell et al., 1992; Jung-Beeman, 2005; Rehak et al., 1992; Tompkins et al., 2000), with limited clinical training and evidence for development of effective diagnostic and treatment approaches. However, contextual support in the form of redundancy and implicit bias has shown to be useful tools to improve both discourse recognition (e.g., Blake, 2009; Blake et al., 2015; Tompkins, 1991; Tompkins & Flowers, 1987) and production (Zezinka & Tompkins, 2015) with poststroke RHD.

There is growing interest in understanding the complexities of discourse production after RHD (Minga, Johnson, et al., 2021). Discourse production is used to assess impairments in other neurogenically compromised populations (e.g., dementia, Antonsson et al., 2021; aphasia, Fromm et al., 2020; Stark & Fukuyama, 2021; healthy aging, Kim et al., 2019), supporting the potential clinical and empirical utility of employing discourse analysis after RHD. While there are many theories in social and behavioral science that help explain the perceptual, self-regulatory, awareness, and disorder impairments in individuals with RHD (see Tompkins, 2012, for a review; Minga, Johnson, et al., 2021), no consensus has been achieved within this community on a foundational approach to knowledge advancement. At present, there is no widely used, valid, and reliable elicitation approach to help advance our knowledge of the features and underlying mechanisms of discourse production impairments in either individual clients with RHD or in the population as a whole.

The paucity of means to elicit language for a comprehensive view of discourse production after RHD presents a challenge for speech-language pathologists (SLPs), many of whom report that between half and three fourths of their caseload are individuals with RHD with discourse production deficits (Ramsey & Blake, 2020). SLPs report feeling ill-prepared to assess and diagnose impaired communication following RHD, with observation cited as the most utilized assessment tool for this communication skill (76% of respondents; Ramsey & Blake, 2020). Though observation is an important clinical tool, its exclusive use raises concerns about the reliability and validity of diagnosis across clinicians and the possible impact (whether positive or negative) on patient care. Further complicating the challenge of diagnosing communication impairments following RHD is that some of the discourse production characteristics found in RHD are also seen among healthy older adults (Lehman Blake, 2006). Thus, adults with RHD may be incorrectly identified or not identified as impaired and, thereby, underserved by SLPs (Fink, 2005), the very people who are uniquely qualified to address these communicative impairments. This dilemma demonstrates

the need for a systematic approach to eliciting discourse from which the characteristics of the RHD communication profile can be identified and quantified in order to select appropriate treatment targets (S. G. Dalton & Richardson, 2015).

Decades of research have established discourse as the most ecologically valid avenue for the assessment of language after stroke and the form of expression through which the language, contextual variables, and cognition intersect (Bryant et al., 2016; Cherney et al., 1998). Language elicited during discourse tasks is representative of less constrained forms of interaction (Beebe & Cummings, 1996) and can reveal deficits not identified by many standardized measures, but there is not yet an adopted clinical approach for individuals with RHD. Even with the inherent challenges associated with contextual nuances (i.e., idiosyncratic characteristics of communication partners and elicitation within the clinic setting), adopting standardized methods of elicitation provides a foundation for building a population-specific classification system for discourse production deficits after RHD. This approach is commensurate with the long-standing practice of evaluating discourse in pediatric populations; strategic focus on adult neurogenic populations, and more specifically RHD, is needed. In this clinical focus article, we will introduce a contemporary, evidence-based approach to eliciting language using the RHDBank protocol in clinical settings. We position the RHDBank protocol as a viable option for improving not only consistency in the elicitation of discourse but also our understanding of discourse production after RHD via the growing pool of banked data. Then, we outline guidelines for the integration of the protocol into clinical use to demonstrate how the use of the RHDBank protocol stands as one option for eliciting discourse to improve our understanding of discourse production after RHD. Finally, we offer suggestions on discourse measures as they relate to prototypical characteristics of language production after RHD.

The RHDBank Protocol

The RHDBank protocol is one resource of the RHDBank, a shared multimedia database established for the study of communicative interactions using discourse from individuals with RHD (https://rhd.talkbank.org/). The structure of the database allows for the systematic elicitation of discourse that can be used to advance foundational clinical knowledge of RHD language production characteristics. There are six discourse tasks, each of which imposes different demands on the speaker: (a) The *Cinderella* narrative retelling (MacWhinney et al., 2011), (b) the *Cookie Theft* picture description (Goodglass et al., 2001), (c) the *Cat Rescue* picture narrative (Nicholas & Brookshire, 1993), (d) the peanut butter and jelly (PB&J)

sandwich procedural discourse, (e) the first-encounter conversation (Kennedy et al., 1994), and (f) the unfamiliar object question elicitation task (Minga et al., 2020).

Models of discourse processing and production (e.g., Peach & Hanna, 2021; Sherratt & Bryan, 2012) have considered the role of cognitive functions on discourse. However, there is much still to learn in this area, especially specific to the RHD population (Minga, Johnson, et al., 2021). The RHDBank protocol includes some cognitive tasks (see Table 1) to elicit nondiscourse behaviors that are often impaired in people with RHD, and, as such, are important tools to include when analyzing cognitive-communication behaviors in clinical settings. For example, the Apples test (Bickerton et al., 2011) assists in the identification of hemispatial visual neglect, an attentional disorder, which, if present, can affect the interpretation of visual stimulus items (usually in the left visual field following RHD) presented during the elicitation of discourse. When administered in conjunction with the discourse production tasks, clinicians and researchers can gain insight concerning communicative behaviors and their potential relationship to cognitive–linguistic capabilities, an underexplored yet important consideration for the advancement of knowledge concerning right hemisphere communication impairments. In addition, the RHDBank protocol includes the General Short Form of the Communicative Participation Item Bank (CPIB; Baylor et al., 2013), which is a self-report questionnaire assessing the perceived impact of a communication disorder on a variety of real-world communication scenarios. In this way, discourse performance can be compared against these self-perceptions, which can provide a window into the person's awareness of any disordered communication. Moreover, because each task is scripted with contextual pieces of information communication cues (i.e., task goal, expectations for response or lack thereof), each task has the potential to shed light on cognitive processes important to discourse production.

RHDBank discourse task selection required thoughtful consideration to include a variety of genres for a comprehensive evaluation of discourse production skills

Table 1. Right hemisphere brain damage (RHD)Bank cognitive tasks and domains measured.

RHDBank protocol task	Reference	Cognitive domains measured
Apples Test	Bickerton et al., 2011	• Unilateral neglect (attention)
Indented Paragraph Task	Caplan, 1987	• Neglect dyslexia (attention)
Cognitive-Linguistic Quick Test	Helm-Estabrooks, 2017	• Attention • Memory • Executive functions • Language • Visuospatial skills

following RHD. By using standardized elicitation tasks, the RHDBank protocol facilitates comparisons across (and within) participants, disorders, and existing literature. Therefore, most tasks draw from well-established monologic discourse prompts found in AphasiaBank (MacWhinney et al., 2011), which samples language in adults with aphasia following left-hemisphere brain damage. For example, the Cinderella narrative found in the RHDBank protocol is very common in American culture, but studies vary in the visual stimuli used to remind participants of the story. The two most common stimulus sets are the Disney imagery available through the AphasiaBank protocol (https://aphasia.talkbank.org/protocol/pictures/Cinderella-book.pdf) and those used in the original Grimm story. The Grimm version of the tale is thought to introduce less gender-biased performance (Fromm et al., 2011); however, in recent years, the Disney version has become culturally ubiquitous. Inclusion of picture description tasks in most standardized assessments of language use motivated the inclusion of the Cookie Theft (Goodglass et al., 2001) and Cat Rescue (Nicholas & Brookshire, 1993) tasks. If standardized, or at a minimum criterion referenced, measures of discourse production are to be developed for adults with RHD, characteristics specific to the population must be outlined and compared to existing data. For information outlining data banking procedures for the RHDBank, visit https://talkbank.org/share/contrib.html. Finally, the structure, predictability, and existing task-specific lexicons for the PB&J task (Fromm et al., 2013) allow for gaining a greater appreciation of the ability of adults with RHD to instruct others, which holds common place in daily communicative interactions. It is important to note that adults' experience with the task topics (or lack thereof) due to gender, race/ethnicity, culture, or other factors may influence their performance. As research in this area progresses, it will be important to consider these factors in developing normative data and assumptions about normal and disordered discourse (Ulatowska & Olness, 2003).

Additional tasks were selected for the RHDBank protocol to target aspects of dialogic discourse production due to the prevalence of conversational discourse impairments among adults with RHD (Ferré et al., 2012) and the functional utility of conversation in everyday life. Kennedy et al.'s (1994) first-encounter conversation task allows for some standardization of the fairly natural communicative occurrence of getting to know an unfamiliar person. The unfamiliar object task elicits questions, a specific type of utterance that naturally occurs during conversation. These two tasks aid in understanding the functional efficacy and efficiency of conversational discourse production after RHD. In short, the diverse range of tasks in the RHDBank

protocol provides clinicians with options for using discourse as a multifaceted evaluative measure of communication characteristics.

Elicitation Guidelines

Elicitation considerations should include the *type* and *manner* in which the discourse is generated to obtain reliable and valid information. While discourse elicitation approaches are taught in some SLP programs and used by SLPs in clinical evaluation, collecting samples with the intention of transcribing them, analyzing them, and sharing them for future analysis outside the clinic requires the consideration of additional factors. The specific elicitation script for the use of the RHDBank protocol is provided through the RHDBank webpage (rhd.talkbank.org; see also Minga, Johnson, et al., 2021, for a detailed review). Elicitation scripts provide relatively controlled and, thus, uniform across and within participants, contextual background on which the discourse is based. For example, the first-encounter task introduces communication partners who are unfamiliar to each other and provides a clear goal for the interaction. This approach is much like standard speech-language assessments. For purely clinical purposes, the primary elicitation consideration is to ensure that the data are collected in a standardized manner to reliably compare performance, such as pre–post treatment. Use of the RHDBank protocol will fulfill this purpose by providing a consistent and high-quality method to elicit language from individuals with RHD. The focus of this approach is on the language produced during the interactions. Additionally, collecting language production data in this standardized manner affords clinicians the opportunity to share and compare their clinical data to that within the RHDBank. The clinical administration of the protocol and subsequent contribution of language samples by clinicians will likely yield a larger repository of data for future use by clinicians and researchers, unveiling new knowledge on discourse production.

To optimize the quality of the elicited discourse, it is important to use a specific protocol and adhere to guidelines with respect to setup, administration procedures, and clinician communication behaviors. This guidance is provided over and above procedures provided on the website, which include a conversational-style script and tips for administration of the RHDBank protocol (e.g., time allotted and visual stimuli presented for tasks) and focused on capturing discourse production from the individual with RHD.

Setup

The focus of this clinical focus article is on discourse production. As such, commentary related to setup is based on capturing *the individual with RHD* and *their*

response to task prompts and stimuli. This is not to diminish the inherent dynamic interplay of context during nonclinical discourse engagement but rather to ensure focused attention on the individual with RHD and their response to elicitation prompts as the primary outcomes of interest. Importantly, extralinguistic and paralinguistic aspects of language, such as gestures and prosody, are equally important to communication and thus may be later analyzed. Figure 1 gives an example of a room setup designed to ensure that proxemics, lighting, seating, and camera placement are adequate for examining both linguistic and para/extralinguistic characteristics of the adult with RHD. The environment in which the language samples are elicited should be quiet and comfortable with limited distractions.
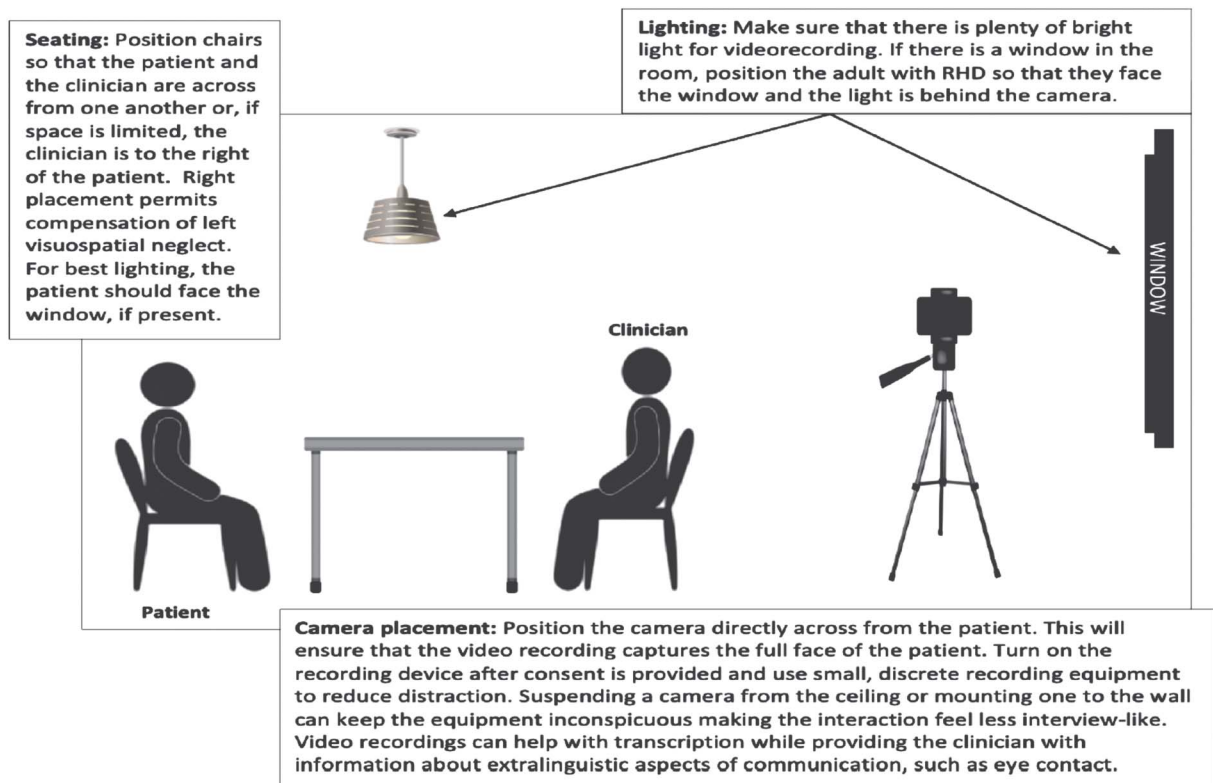
The outlined proxemics are not anticipated to invoke any more of a power dynamic than that typical of a clinician–patient interaction. Positioning the clinician eliciting the language directly across from the adult with RHD helps to ensure that the video recording captures the individual face forward, establishes a basis for examining eye contact/facial expressions/gestures during discourse exchanges, and facilitates ease of sharing protocol stimuli. For those concerned about inadvertently invoking a power dynamic with face-to-face positioning,

consider the use of a round table rather than a square or rectangular table. If this camera setup is not possible, positioning the examiner to the right of the individual with RHD is optimal to minimize the effect of left neglect on an individual's ability to attend to the examiner and the presented stimuli. Careful consideration of lighting can help ensure that the expressions and gestures can be captured. The natural lighting from a window, if available, can accomplish this goal if the individual is seated directly across from it. It is important to make sure that the individual with RHD is not primarily lit from the back as this kind of "backlighting" can cause the captured figure to appear darker and obscure the view of important facial and gestural features. Likewise, it is important for clinicians to check that the individual with RHD does not have to look directly into bright light from a window or lighting fixture to ensure comfort and optimize performance.

Protocol Administration

A reasonable assumption when considering discourse production is that the elicitation approach can and does mediate the quality and type of language collected. We outline three key concepts to keep in mind while eliciting discourse using the RHDBank protocol.

Figure 1. Example room setup for eliciting discourse samples from patient.

Seating: Position chairs so that the patient and the clinician are across from one another or, if space is limited, the clinician is to the right of the patient. Right placement permits compensation of left visuospatial neglect. For best lighting, the patient should face the window, if present.

Lighting: Make sure that there is plenty of bright light for videorecording. If there is a window in the room, position the adult with RHD so that they face the window and the light is behind the camera.

Camera placement: Position the camera directly across from the patient. This will ensure that the video recording captures the full face of the patient. Turn on the recording device after consent is provided and use small, discrete recording equipment to reduce distraction. Suspending a camera from the ceiling or mounting one to the wall can keep the equipment inconspicuous making the interaction feel less interview-like. Video recordings can help with transcription while providing the clinician with information about extralinguistic aspects of communication, such as eye contact.

1. *Stick to the script.* Each discourse task has elicitation materials and specific administration guidelines, which include time allotted and a script for administering the task. Eliciting discourse using the RHDBank protocol script may seem markedly different, restrictive, or even artificial as compared to naturally occurring discourse. However, these tasks are being used to systematically identify areas of impairment and are, therefore, more structured than typical, real-world communicative exchanges. This approach also provides an avenue for greater efficiency of the communicative interaction. In addition, inappropriate and/or prolonged silences can be prevalent in the discourse of adults with RHD, so it is vital to use an appropriately slow rate of speech and become comfortable with these atypical pauses throughout the exchange rather than provide additional verbal content beyond what is indicated in the script. These silent periods may be evidence of pragmatic impairment, but they also allow time for the individual with RHD to process previous utterances, plan upcoming language use, or initiate new conversational topics, all important pragmatic discourse skills.

2. *Mind the time.* Time is often in short supply in both research and clinical settings, so maximizing the information gathered within a given assessment session is essential. Indeed, as Stark & Fukuyama (2021) note, time is nonnegligible and can impact the assessment of discourse. The RHDBank protocol is designed to elicit about 40 min of language in a 60-min assessment period. Thus, administering the protocol, in part or in full, can be clinically feasible for most rehabilitation or outpatient settings. If administration of the complete protocol is not feasible (e.g., due to time constraints, fatigue, or reduced attention), clinicians may select tasks based on expected or reported areas of impairment.

It is recommended that clinicians make note of and abide by the time allotted for completion of each task. Per the protocol, additional time is not recommended, even if output is relatively minimal or verbose. Instead, the RHDBank protocol script suggests using the following approach to redirect a verbose communicator: "If the participant is still telling the story after 5 min have elapsed, then prompt: 'Sorry to interrupt, but please try to finish up with the rest of the details of the story so we can get to the other things we still have to do.' If the participant does not finish after an additional minute or 30 s (depending on the task), then prompt: 'Okay, just tell me how the story ends. We have to move on.'" To be clear, this means the clinician is expected to provide 1-min or 30-s warnings to the end of the elicitation and to conclude tasks by saying, "thank you, let's move on to another task." This method of controlling for time spent on most tasks provides the most consistent basis for comparisons across performances of the same and/or different individuals.

3. *Consider unscripted communication behaviors.* Clinician behaviors during elicitation can affect the language produced. Some adults with RHD will need more structure or scaffolding from the clinician. Without deviating from the script, clinicians may prompt adults to add more detail to their story narratives, such as saying, "and what happened next" as outlined in the *Troubleshooting* section of the protocol script. While this prompt works well with narrative discourse, for other genres, it is important that the clinician does not contribute to an inadvertent change in the quality or quantity of discourse in the process. For example, during the conversational discourse task, refrain from the use of an open-ended prompt such as, *Tell me about yourself,* since some adults with RHD produce discourse that is highly egocentric and may not ask for information or otherwise actively including their conversation partner. Providing this prompt can change what is supposed to be a dialogic conversation task into a monologic narrative task, thus obscuring the intended conversational discourse between the two communication partners as well as reducing the types of utterances produced. Instead, the clinician should consider broaching a topic of discussion pertinent to meeting the task goal. For example, after the task is introduced, the clinician can reiterate the purpose of the task (e.g., So, we are supposed to get to know each other) or begin the conversation with a question or comment that can initiate a topic related to the task goal and the context (e.g., Are you from North Carolina?; Your art is beautiful—for the individual with RHD with art displayed in their room; What do you think about this weather we're having?; Summer is my favorite time of year. How about you?). Comments and questions of this sort allow for the clinician to obtain new information to use in the conversation while learning more about the individual with RHD, which also helps to build rapport. The natural occurrence of nonverbal cues to continue a turn of talk (e.g., nodding head, smiling) and verbal cues (e.g., yeah, okay, uh-huh) occur naturally during this type of interaction. It is important for the clinician to try to time their communicative contribution of the verbal continuation markers (e.g., yeah, okay, uh-huh) such that there is no overlap in the turns of talk between the adult with RHD and the clinician/clinical researcher. In this way, transcribing the discourse will be much easier (as opposed to parsing the individual with RHD's discourse from the clinician's due to use of verbal back-channels).

Together, these guidelines provide a consistent opportunity for responses to the elicitation prompts and facilitate the collection of language samples that can be compared with existing RHD data and/or for pre- and posttreatment comparisons. It can be highly beneficial for clinicians who are new to eliciting structured discourse samples to have opportunities to practice with more seasoned evaluators to gain comfort with the elicitation

procedures. For example, peer-to-peer administration with role playing and live feedback has proven helpful to clinicians with little to no training or experience interacting with adults who have RHD.

Transcription Methods

The discourse samples in the RHDBank are transcribed in a format called Codes for the Human Analysis of Transcripts (CHAT; MacWhinney, 2000). It is acknowledged that transcription practices may not lend themselves well to the productivity-driven practice of most SLPs in medical settings (Duncan & Murray, 2012). Therefore, there is growing interest in defining measures of discourse production that are more feasible for clinical use (for an example, see Richardson & Dalton, 2020; S. G. H. Dalton et al., 2020) and that would also facilitate data collection in research settings. For RHD, approaches to measurement are developing in concert with advances in knowledge about the performance characteristics that make up the RHD communication profile. To facilitate efficient and accurate transcription, clinicians may elect to use dictation software to transcribe audio recordings of the language samples to text (e.g., Transcribe, Amazon Transcribe, native keyboard dictation accessibility functions). Once a basic transcript is created and edited for accuracy, it can be modified to create a file in CHAT format, which allows for a variety of automatic analyses of the transcripts using the software Computerized Language ANalysis (CLAN; MacWhinney, 2000). CLAN is freely available (see https://www.talkbank.org/) and can be used to calculate a wide range of linguistic features (i.e., those outlined in Table 2) that hold clinical utility for SLPs (e.g., mean length of utterance [MLU]; linguistic diversity in type–token ratio and vocabulary lexical diversity; frequency counts by word, morpheme, or class). Clinicians can make use of the speech-language pathology guide for written instructions on the use of CLAN (see https://talkbank.org/manuals/Clin-CLAN.pdf). There are also ways for users to develop codes to assess additional characteristics of discourse production, if desired.

## RHD Discourse Production Characteristics and Measures

Discourse production characteristics that are commonly associated with RHD can be measured across various discourse genres and assessed clinically using the RHDBank protocol. We highlight characteristics of discourse production and potential measures, recognizing that clinicians and researchers may use this information in many other creative and informative ways. Discussion is focused on four distinguishing discourse features after RHD: cohesion, coherence, informativeness, and the quantity and quality of utterances produced (see Figure 2).

Verbosity or paucity of output reflect discourse production differences classically attributed to cohesion and coherence (Davis et al., 1997; Marini, 2012; Stockbridge et al., 2021; Uryase et al., 1991). Cohesion refers to the relationship of a sentence or proposition to the previous one and can include linguistic markers of anaphora (e.g., correct noun–pronoun reference) or determiners (e.g. articles, possessives; see Sherratt & Bryan, 2012; Van Leer & Turkstra, 1999, for further discussion). Coherence can be defined as how well the speaker maintains the topic or theme across sentences or propositions and includes local (utterance to utterance) and global (utterance to overall

Table 2. Right hemisphere brain damage (RHD)Bank tasks and suggested outcome measures.

RHDBank protocol task	Genre of elicited discourse	Examples of prior work using this task in RHD	Suggested outcome measures
First-encounter (Kennedy et al., 1994)	Conversation	Kennedy et al., 1994 Minga, Johnson, et al., 2021	• Mean length of utterance • Vocabulary diversity • Fluency • Types/frequency of turns • Question types • Topic initiations
Unfamiliar object (Minga et al., 2020)	Question elicitation	Minga et al., 2020	• Question type variations • Total questions used
Cinderella (MacWhinney et al., 2011)	Narrative retelling	Barker et al., 2017	• Cohesion • Coherence • Story grammar
Cookie Theft (Goodglass et al., 1983)	Picture description	Agis et al., 2016 Stockbridge et al., 2021	• Right versus Left content units • Total content units • Content units/minute
Peanut Butter & Jelly	Procedural description	Cummings, 2019 Bartels-Tobin & Hinckley, 2005 Brady et al., 2005	• Informational content • Correct information units • Main concepts • Lexical information units

Figure 2. Right hemisphere brain damage (RHD)Bank discourse genres and clinical measures of interest. The RHDBank elicits discourse from four different genres and four distinguishing features can be used to assess all discourse types.
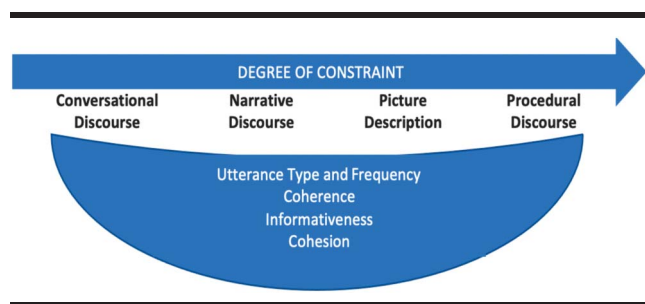
theme or gist) elements (Glosser & Deser, 1991; Kintsch & van Dijk, 1998). These constructs differ between types of discourse in healthy adults (James et al., 1998; Marini et al., 2005; Wright et al., 2014) and adolescents with and without traumatic brain injury (Van Leer & Turkstra, 1999), but there remains much to learn about differences in coherence and cohesion across discourse genres following RHD.

Differences in *cohesion* can lead to localized breakdowns in meaning and global breakdowns of the entire message when ties between related information are inadequate or missing. The literature on cohesion in RHD, while limited, suggests that RHD may result in difficulty using closed-class markers unambiguously (e.g., Barker et al., 2017). This is a skill that relies heavily on both tracking referents and accounting for the listener's knowledge over time. Unsurprisingly, referential ties also appear to be impacted by RHD as these ties require speakers to provide a distinguishing label for an item or object and to unambiguously use that label from sentence to sentence (Chantraine et al., 1998). For example, in the utterances "The cat and dog ran inside. It jumped on the sofa. The pet sat down," *it* and *pet* are used ambiguously as they could refer to either the dog or the cat introduced in the first sentence, resulting in a breakdown of cohesion and, ultimately, meaning among the three sentences. In addition, adults with RHD tend to rename referential targets (e.g., "The woman is cleaning. The lady has a dress. The mom isn't paying attention." All subjects refer to the same referent.) rather than repeating the same label as is more often observed after left hemisphere damage (Stockbridge et al., 2021). Individuals with RHD demonstrate difficulty maintaining accurate gendered pronoun selection and self-correct erroneous pronoun use more slowly in continuous speech. RHD also appears to influence the use of conjunctions, with many individuals demonstrating an overuse of "and" as a sentence initiator and conjunction (Davis et al., 1997; Stockbridge et al., 2021).

In contrast, when *coherence* impairments occur, they can derail the purpose of the discourse, making

communication tangential or overly egocentric. Global coherence can be assessed as a surrogate for topic maintenance using a 4-point scale ranging from a completely unrelated, egocentric, and/or off-topic utterance (score of 1) to a completely on-topic utterance directly related to the topic at hand (score of 4; Wright et al., 2013). For example, an adult with RHD in the RHDBank began retelling the Cinderella story, but then transitioned to his own family, stating "I had pretty much the same life to the point where I call my older sister my elderly ugly sister" (score of 1). It is currently not known whether such deficits are pragmatic (i.e., speaker does not adhere to the social norms surrounding a particular form of discourse), cognitive (e.g., executive function impairments related to difficulty with organization and prioritizing information), or both is not well understood (Martin & McDonald, 2003).

Communication by individuals with RHD may also differ in "informativeness" or the ability to provide the most important information about a particular topic (S. G. Dalton & Richardson, 2015; S. G. H. Dalton & Richardson, 2019). One measure of informativeness is main concept analysis. The more main concepts that are accurately included in the sample, the more informative the sample is judged to be. A list of main concepts for specific discourse tasks (e.g., Cinderella retelling or Cookie Theft picture narrative) was developed from the discourse of healthy adults (S. G. Dalton & Richardson, 2015; S. G. H. Dalton & Richardson, 2019; Nicholas & Brookshire, 1993). Using these lists, Johnson et al. (2019) found that a small sample of people with RHD did not differ significantly from healthy controls in the Cinderella story retelling task, but they did use significantly fewer main concepts in the procedural discourse (PB&J) task compared to healthy adults. More research is needed in this area to better understand the characteristics of main concept use across discourse types and tasks as well as to continue to assess the utility of main concept analysis in this clinical population.

Recent work has further implicated conversational interaction (Barnes et al., 2019) and the use of utterance-level productions, like questions (Minga et al., 2020; Minga, Fromm, et al., 2021), as measures for discourse production differences following RHD. Eliciting conversational discourse offers an avenue to examine turn-taking and question-asking—two important facets for constructing order and meaning in discourse. Question-asking can be challenging for adults with RHD (Kennedy et al., 1994; Minga et al., 2020; Minga, Fromm, et al., 2021) and can be easily measured via conversational turns. Differences in question-asking include a reduced number of questions and failure to use specific types of questions to meet a discourse task goal. The use of "polar" questions, or questions that present a choice between two dichotomous

responses (e.g., Are you from North Carolina or South Carolina?), is significantly reduced in adults with RHD compared to controls during the first-encounter task and the unfamiliar object task of the RHDBank protocol (Minga et al., 2020; Minga, Fromm, et al., 2021). Investigation of question use is especially important when considering that polar questions are the most frequently used question type for healthy adults (Enfield et al., 2010) and serve a host of functions, including initiating and maintaining conversation, identifying details needed to draw hypotheses about the conversational context, and clarifying missing or ambiguous information (e.g., "Is this the place?" or "Have you worked here for long?"). Discourse performance differences of this sort substantiate the need to sample language use across genres and diverse speaker groups, both with and without RHD, for a comprehensive view of RHD communication impairments.

Clinical Use of Elicited Language

Language sampling and analysis is considered complementary to the clinical evaluation for most pediatric populations; however, more standardized approaches are needed for adult neurogenic populations. The methods of collecting and analyzing discourse described in this clinical focus article on ensuring an accurate and meaningful avenue for pre-to-post treatment assessment that can enhance awareness of communication changes after injury for individuals with RHD and others with a vested interest in clinical outcomes.

Assessment Before and After Treatment

In the absence of standardized assessments for discourse production, the RHDBank protocol can be used to first determine a baseline level of function and to then assess changes during and/or after language intervention. The collection of discourse samples as described in this clinical focus article ensures that accurate and meaningful pre- and posttreatment comparisons are possible, much like a standard diagnostic tool. Discourse characteristics of interest are perhaps the most important in this approach; clinicians must decide what to measure within the sample to determine progress. This decision may prove challenging as there are few treatment approaches for discourse production deficits in general, and there are none that we are aware of that have been shown to be effective for people with RHD (Blake, 2017). The absence of protocolized treatments, however, does not preclude clinicians from targeting discourse production skills. Instead, the clinician must employ other aspects of evidence-based practice to target the communication skill of concern. Determination of which discourse characteristics to measure can be made with the consideration of observations and insight from the individual with RHD, their family, the clinician, and evidence from the existing literature. Each of these facets of evidence-based care is as important as the other, especially in communication domains where the extant treatment literature is limited (Higginbotham & Satchidanand, 2019).

Outcome measures outlined in Table 2 for the corresponding RHDBank tasks are a good place to start when determining how to assess and track discourse production skills. For example, when there is paucity of expression, the clinician may wish to provide therapy to increase the quantity of words produced during discourse tasks. Linguistic changes of this sort are easily quantified using CLAN (e.g., MLU; frequency counts by word or word class; MacWhinney, 2000). Comparisons of one or more discourse samples will aid in the identification of changes in production characteristics. For example, code was written to assist in the analysis of global coherence, main concept usage, and question-asking in the RHDBank discourse sample (Cator et al., 2017; Johnson et al., 2019; Minga et al., 2020). Difficulty maintaining topics with frequent tangential and/or egocentric utterances may support the calculation of global coherence, for which the Cinderella storytelling task provides an established avenue for its measurement (Wright et al., 2013). Comparisons of baseline and posttreatment global coherence measures can provide a quantitative measure of progress. Another commonly used measure is the full story grammar for Cinderella. Cinderella story grammar includes 41 previously established propositions reflecting the story's setting, initiating events, conflict (or "complicating action"), resolution, and coda (Stark, 2010) based on the schematic structure put forth by Labov and Waletzky (2003). Of these 41 propositions, 23 were identified by consensus of 10 healthy control participants to be the "constituent events," in other words, those propositions considered to be crucial for the (re)telling of this fairy tale (Stark, 2010). Clinicians may also measure periods of silence (e.g., mean time elapsed, and/or average number of pauses per task) pre- and posttreatment. When discourse samples are collected in a careful, systematic manner, the ability to select and measure aspects of discourse production can be determined to match any relevant clinical goal.

Increasing Awareness of Deficits

By measuring key characteristics in discourse production before and after treatment, the clinician has the opportunity to use these data to assess and address impaired awareness of deficits, or anosognosia, a frequently encountered challenge for people with RHD (e.g., Blake, 2017). Gauging awareness of discourse production deficits after RHD is essential to assess and address buy-in for treatment in this area and, ultimately, behavioral improvement.

The CPIB (Baylor et al., 2013) is one tool that can be used to assess how an individual perceives their

communication capabilities. For this 10-item self-assessment, respondents evaluate their perceived level of impairment on a 0–3 scale based on statements regarding daily communicative situations such as conversing with an unknown person, asking questions, and providing information. Greater scores indicate no perceived communication impairment. The CPIB can be completed by the individual with RHD and a care partner or other support person to assess proxy perception of communicative ability. Proxy CPIB completion should be strongly considered if anosognosia is suspected. This assessment can be used to not only track perceived awareness of discourse skills over time and across respondents but also facilitate communication counselling and care partner communication training. Of course, caution should be observed in interpreting care partners' scores, as they may have reasons, such as denial or caregiver fatigue, for conflating or underestimating the communication of adults with RHD (Clare et al., 2013).

If anosognosia is identified using the CPIB or another measure, discourse production samples can be used as an intervention medium to enhance awareness of discourse production capabilities. Clinicians can pose specific questions about whether or not a particular discourse feature exists and then track improvement in the individual's ability to identify that feature over time. For example, an individual with RHD can be asked whether utterances produced are considered off-topic or tangential, whether the content included in a narrative retelling is complete, or what they learned about their partner during conversation. Then, the individual with RHD and clinician can discuss the self-assessment together. This approach demystifies the bigger picture of discourse production for individuals with RHD and facilitates the development of concrete and accessible goals.

Stakeholder Education

Clinicians, physicians, nurses, caregivers, and loved ones comprise a nonexhaustive list of stakeholders who are essential for optimizing communication outcomes after RHD. These stakeholders may have a difficult time understanding the communicative changes and gauging progress after RHD, especially in an area as inherently fluid and subjective as discourse. Limited education of health care practitioners concerning the effects of RHD on communication is one factor that may contribute to reduced referrals for speech-language pathology services (Lehman Blake et al., 2003; Ramsey & Blake, 2020). Use of the RHDBank protocol by clinicians can enhance understanding of the effects of RHD on communication while arming the clinician with data to support the need for services. As knowledge grows, clinicians can serve as advocates for individuals with RHD and engage caregivers, loved ones, and other health care professionals in dialogues that may result in population-specific protocols for improving

referrals, diagnostic approaches, and treatments for discourse-related deficits. Clinicians may also decide to educate stakeholders using the RHDBank Grand Rounds (Minga, Johnson, et al., 2021; https://rhd.talkbank.org/) and the Right Hemisphere Brain Damage webpage (https://www.righthemisphere.org/). Both provide text-based resources for understanding communication after RHD, and the RHDBank Grand Rounds provide accompanying video snippets that demonstrate respective areas of impairment to supplement educational efforts.

Benefits of Using the RHDBank Protocol

The use of the RHDBank protocol holds both clinical and empirical utility for the characterization of discourse production deficits that may not be evident in standardized language testing alone. Its use also aligns with the International Classification of Functioning, Disability and Health approach to the classification of communication impairments (see (Threats, 2006). Varying the discourse genres likely place different demands on domain-general cognitive capacities causing some discourse tasks to be more challenging than others and ultimately impacting the quality of productions. For instance, story retelling likely places a greater demand on working memory than picture description, which may result in production differences for the same individual. The nature and relative contribution of cognitive processes to RHD discourse production has not been fully elucidated, and a detailed discussion of this is beyond the scope of this clinical focus article (but see Blake, 2017, for a review). However, given that discourse is related to cognitive processing, including executive functioning, recall, and attention, in healthy individuals (e.g., Lundine et al., 2017; Wright et al., 2014) and adults with stroke (Peach & Hanna, 2021; Rogalski et al., 2010), knowledge gained by the clinical application of the RHDBank protocol, in conjunction with assessment of cognitive skills, can promote population-specific theoretical and practical frameworks for communicative behaviors in people with RHD.

We suggest that discourse is a more ecologically valid basis for examining language compared to other decontextualized assessments of language, such as picture naming or word/sentence-picture matching. We acknowledge that there are ecological limitations to the elicitation of discourse using a structured task, but hold that the clinical use of the RHDBank protocol is a viable option for the burgeoning understanding of language production after RHD. Discourse requires the integration of numerous cognitive–linguistic capacities in order to manifest well-formed communication. Telling a story or participating effectively in conversation requires adaptation to context, responsiveness to listener needs and breakdowns, topic maintenance, and smooth transition. All of this can

be challenging after RHD, which often results in qualitative changes in discourse in the absence of aphasia. Tools designed to evaluate aphasia are not sensitive to what is perceptibly different about RHD discourse, such as the inclusion of fabricated or confabulated information into a classic story or any atypicality in cohesion or coherence. We also acknowledge that there are limitations and accommodations that we, as SLPs, contend with when trying to obtain information about the communication deficit profile of our patients. The clinical use of the RHDBank protocol is not exempt from such limitations; the cultural relatedness of the elicitation tasks and time needed to administer, transcribe, code, and analyze the language are among inherent limitations. As of this writing, sample corpora within the database are not of a size or diversity to conduct appropriate sample norming for any task. This drawback limits the generalizability within the clinical setting. Twenty English-speaking adults with RHD and 11 healthy adults are available for comparison using the protocol. Additional samples are available for specific tasks. A sample of 48 English-speaking adults provided a Cookie Theft picture description. Another sample of 29 completed the Unfamiliar Objects task. Conversational samples from 11 Peninsular Spanish-speaking adults also are available. This limits the generalizability to the population as is the case with any growing corpus of data. The utility of the bank can only grow through the efforts of those willing to take the extra steps to gain ethical approval from their institutions to store and bank clinical data. Nevertheless, when adults with RHD return from the hospital to their roles in domestic and professional life, SLPs are in arguably the best position to address the resulting challenges related to discourse production and communication capability more broadly; we hope clinicians will feel increasingly empowered and supported by tools like the RHDBank in doing so.

Conclusions

Discourse production can be a key source of information regarding communication ability following RHD. Here, we have introduced the RHDBank protocol for discourse elicitation and provided an argument for its value both in terms of its clinical and research utility as well as the long-term value of clinicians as researcher contributors to the banked data. The bank is both independent from and synergistic with the ability to use banked discourse samples for the building of greater knowledge about discourse after RHD. This approach, both in its formal inclusion of structured tasks and in its real-world application, provides a sound basis for the comprehensive evaluation of an individual with RHD discourse production skills. The protocol can be repeated over time to track recovery or to examine treatment efficacy and generalization. Utilizing the protocol found in the bank further affords clinicians the ability to compare performance to a growing pool of other adults with RHD to better contextualize that performance within RHD-related discourse deficits. The more that clinicians use the banking protocol and contribute their data, the more data that will be available for the future establishment of norms for existing measures to aid in identification of specific deficits within the discourse domain and the development of novel, improved diagnostic and treatment approaches. As of this writing, the RHDBank, much like our understanding of RHD discourse deficits, is in its relative infancy, especially compared to our understanding of speech and language deficits that can follow from left hemisphere damage. The clinical application of the RHDBank protocol can help clinicians better understand the nature of discourse impairments in individuals with RHD.

Author Contributions

Jamila Minga: Conceptualization (Lead), Resources (Lead), Writing – original draft (Lead), Writing – review & editing (Lead). **Melissa D. Stockbridge:** Writing – original draft (Equal), Writing – review & editing (Equal). **Alexandra Durfee:** Writing – original draft (Supporting). **Melissa Johnson:** Writing – original draft (Supporting), Writing – review & editing (Supporting).

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