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1 Article

2 **Creating a theoretical framework to underpin** 3 **discourse assessment and intervention in aphasia**

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10

11 **Abstract:** Discourse (a unit of language longer than a single sentence) is fundamental to everyday
12 communication. People with aphasia (a language impairment occurring most frequently after stroke,
13 or other brain damage) have communication difficulties which lead to less complete, less coherent,
14 and less complex discourse. Although there are multiple reviews of discourse assessment and an
15 emerging evidence base for discourse intervention, there is no unified theoretical framework to
16 underpin this research. Instead, disparate theories are recruited to explain different aspects of
17 discourse impairment; or symptoms are reported without a hypothesis about the cause. What is
18 needed is a theoretical framework that would clarify the specific linguistic skills that create
19 completeness, coherence, and complexity (i.e. richness) in discourse; and illuminate both the
20 processes involved in discourse production and the reasons for breakdown. This paper reports a
21 review and synthesis of the *theoretical* literature relevant to spoken discourse in aphasia discourse;
22 and we propose a novel theoretical framework which unites these disparate sources. This framework
23 is currently being tested as the foundation for LUNA (Linguistic Underpinnings of Narrative in
24 Aphasia) treatment research. In this paper we outline the novel framework and exemplify how it
25 might be used to guide clinical practice and research. Future collaborative research is needed to
26 progress this framework into a processing model for spoken discourse.

27

28 **Keywords:** 1. discourse, 2. narrative, 3. storytelling, 4. connected speech, 5. aphasia, 6. theory

29

30

31 **1. Introduction**

32 Aphasia is a communication difficulty which can happen after a stroke or other damage to the
33 brain, leaving a person with difficulties speaking and understanding others. Although each person
34 experiences aphasia differently, a commonly expressed frustration is the reduced ability to

35 communicate in everyday situations. Spoken discourse is key to everyday communication and so
36 the detrimental effect that aphasia has on the form and content of discourse can have a huge impact
37 on people's everyday lives and those around them [1].

38 Discourse is often described in the theoretical literature as a unit of language larger than a single
39 clause [2, 3], forming a meaningful unit of language [4], and used for a specific purpose or function
40 [5]. This characterization emphasizes the key role of spoken discourse in everyday interaction, for
41 example talking about your day, describing a beautiful scene, or expressing your opinion about
42 current affairs. In this paper, we focus on monologic discourse although discourse occurs most
43 often within a conversation, for example when one person takes a 'turn' for an extended period in
44 conversation such as recounting an event when talking to friends. This focus on monologic
45 discourse reflects the focus in recent aphasia assessment research [6-7] and in clinical practice [8].

46 Discourse has received a good deal of attention in aphasia research in recent years, most commonly
47 in the form of monologues, as noted above. People with aphasia describe discourse as a *treatment*
48 priority [9], although the evidence base largely addresses *assessment*. The assessment research
49 literature describes people with aphasia as having trouble in a broad range of areas in the
50 production of discourse. The evidence indicates that discourse can be impaired at a number of
51 different linguistic levels: the *language* that speakers use; the *information* that speakers communicate;
52 and the *links* that speakers are able to convey between pieces of information [6, 7, 10]. Therefore,
53 there is a need to assess and treat different discourse and linguistic levels, and an emerging body of
54 work describing multilevel assessment and treatment bears this out [11-14]. Whilst recent reviews
55 revealed more than five hundred ways to measure discourse as reported in aphasia research over
56 the last 40 years [6, 7], thereby reflecting multiple approaches to discourse assessment, the key
57 linguistic levels inherent in discourse production remain currently underspecified. The multiplicity
58 of measures, coupled with the lack of a unifying underlying theoretical framework, leaves the onus
59 on researchers and clinicians to select which aspects of discourse to measure and remediate without
60 explicit guidance.

61 There is a smaller body of evidence to support the treatment of spoken discourse. A recent review
62 of spoken discourse treatment [15] has highlighted the heterogeneity of treatment approaches
63 aimed at improving discourse and to evaluate outcomes, even within this small field (25 papers,
64 reporting on 127 participants). Moreover, eight of these 25 reviewed papers reported *complex*
65 *interventions*, targeting multiple linguistic levels (discourse macrostructure, sentence and word).
66 Best practice with complex interventions [16] is to develop them systematically, using the best
67 available evidence and theory. However, only three of the reviewed papers explicitly reported their
68 theoretical foundation, and they took diverse perspectives. A key theoretical basis for spoken
69 discourse comes from linguistic theory, but there are multiple perspectives to draw on [17] which
70 has created a challenge for researchers and has likely led to the paucity of theory in discourse
71 treatment reporting.

72 Theoretical *frameworks* and *models* are important in guiding clinical assessment to identify intact and
73 impaired processes [18] which then allows a judgement to be made about which linguistic skill to
74 target in treatment (both clinically and in research). In the broad field of psychology (encompassing
75 psycholinguistics and aphasiology), a distinction is drawn between frameworks and models.
76 Although both arise from theory, they differ in their purpose such that: a *framework* accounts for a
77 phenomenon by providing a structure or outline consisting of descriptive categories (theoretical
78 concepts or constructs) and the relations between them; while a *model* represents the system
79 underlying the phenomenon [19, 20, 21]. For spoken discourse, however, there is little or no use of
80 frameworks or models to underpin assessment and treatment planning or research.

81 This lack of theoretical underpinning in spoken discourse is not due to an absence of theory. There
82 are numerous theoretical perspectives available to researchers and clinicians interested in discourse,

83 which arise from diverse linguistic fields (including cognitive linguistics, psycholinguistics,
84 sociolinguistics and pragmatics). These theories differ in the extent to which they are purely
85 theoretical or empirically based, and so they consist of both frameworks and models although there
86 is very little explicit signaling of this difference in the reporting. There are isolated examples of
87 spoken discourse assessment or treatment research referring to these linguistic theories but overall,
88 there is a lack of theoretical underpinning in this field of aphasiology and an absence of consensus
89 about which theory or combination of theories to use. In a review of discourse assessment measures
90 in aphasia by Pritchard and colleagues [7], it was found that although, post hoc, all of the measures
91 surveyed could be broadly related to a clinical discourse processing model [22], none had been
92 *developed* with explicit reference to it, or to any other theory.

93 There is a need for a *unified theoretical framework* to move the field of spoken discourse research in
94 aphasia forward. In the absence of such a framework, the evidence base is characterized by
95 inconsistency, with research tending to report the surface characteristics of impaired discourse (the
96 symptoms) rather than hypothesizing about how they might have arisen linguistically (the cause).
97 Such hypothetical reasoning would require an underlying theoretical model. In the few instances
98 where theory is referred to, disparate theories are recruited to explain different aspects of discourse
99 impairment, thus limiting a synthesis of the evidence. The development and use of a theoretical
100 framework would improve the relevance, comparability and validity of the evidence base for
101 discourse assessment and treatment in aphasia; and furthermore, it would allow us to better
102 synthesize, evaluate, adapt, and expand this field of research. Such a framework could shape
103 clinical discourse practice and future research, and eventually result in a more fully specified
104 processing model of spoken discourse.

105 In this paper, we describe the development of a novel theoretical framework for spoken discourse
106 in aphasia. This was achieved through a review and synthesis of existing theoretical literature,
107 starting with the literature referenced in the evidence base for the assessment and treatment of
108 discourse in aphasia and expanding to also encompass related literature from the field of
109 linguistics. The goal of this review and synthesis was to create the novel, unified, framework and to
110 show how it can be used to describe spoken discourse difficulties in aphasia, and to inform novel
111 treatment research.

112 **2. Materials and Methods**

113 The methods outline here constitute a type of metasynthesis, called metatheory, which is used to
114 review and synthesize existing qualitative data (in this case, the discourse theory literature) for the
115 purpose of theory building [23, 24]. The methodology used for metatheory involves the analysis of
116 theoretical perspectives, sources and assumptions across multiple relevant studies [24]. An
117 expansive literature search was conducted in order to identify the relevant studies. An *expansive*
118 search contrasts with the *exhaustive* search that is necessary for systematic reviews of quantitative or
119 qualitative data. An expansive search (recommended for a metatheory reviews such as this one)
120 aims to find multiple presentations of relevant theoretical concepts, but the search is stopped when
121 the information found is sufficient to clarify, explain and inter-relate those concepts [25].

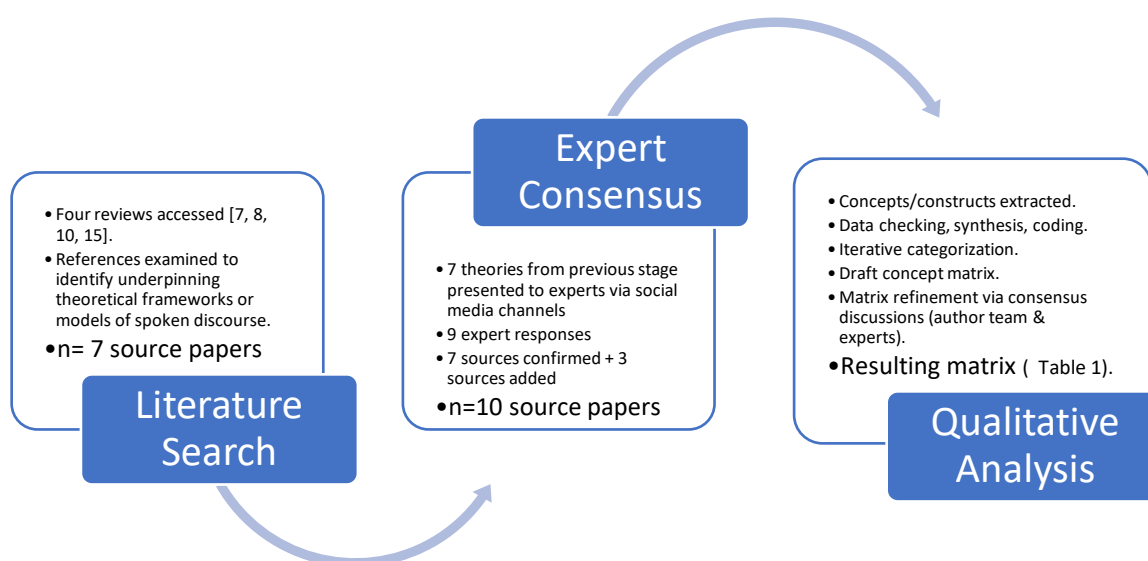
122 As a starting point, we searched the studies reviewed in four published systematic reviews of
123 discourse assessment and treatment in the field of aphasiology [6, 7, 10, 15]. The papers included in
124 these reviews were examined to identify any underpinning theoretical frameworks or models
125 related to spoken discourse. All explicitly mentioned theories (n=7) were compiled into a list,
126 which was then circulated to experts in the field (via social media channels). These experts (as
127 defined by experience, reputation or research track record in linguistics, aphasia and/or discourse)
128 were invited to comment on the completeness of the list of references derived from the reviews and

129 asked to identify any missing frameworks or models. Nine experts responded, confirming the list
130 and suggesting additional theories. The resulting list of theories (n=10) is reported in the Results
131 section.

132 The next stage in the metatheory procedure was to identify a representative publication relating to
133 each of the identified frameworks for reading; this constituted the 'source material'. Half of the list
134 was read in full by the lead author, and the other half by a postdoctoral researcher. Each
135 researcher read the complete publication and made notes about the following: *concepts or constructs*
136 relating to discourse production; their description or definition; and any hypothesized inter-
137 relationships between the concepts/constructs. This note making processes constituted the 'data
138 extraction'. Page numbers relating to where the data was extracted from was recorded. Following
139 usual practice in psychology, a distinction was drawn between *concepts* and *constructs*. While both
140 are considered to be descriptions of generalizable properties, patterns and characteristics associated
141 with a phenomenon (in this case with spoken discourse), a *concept* is a precise and measurable idea
142 used to describe a pattern or property that can be observed (e.g. lexical diversity) whereas a
143 *construct* is an abstract concept which is created to explain a pattern or property and which is
144 hypothesized (e.g. lexical category). The extraction process revealed examples of both concepts and
145 constructs in the source material, with no explicit acknowledgement of the difference. In order to
146 check for the completeness and accuracy of the data extraction, each then read relevant extracts of
147 the publications from the other half of the list, guided by the other researcher's notes. Any
148 differences in interpretation were discussed and resolved at this stage, and missing information
149 was added to the notes.

150 The extracted information contained in the notes (the 'data') was then synthesized and categorized
151 using a qualitative content analysis approach [26, 27]. This entailed coding the extracted
152 concepts/constructs into a categorization matrix, using an iterative process which involved
153 inductive content analysis of the notes as well deductive reasoning. The aim was to separately
154 categorize or to synthesize concepts/constructs based on the extracted description/definition and/or
155 theoretical grounds (i.e. based on reasoning from first principles). All data extracted from the
156 source material was coded for correspondence with the concepts identified in the matrix. A draft
157 concept matrix was created by the first author and the postdoctoral researcher who completed the
158 data extraction. This matrix was then refined by further consensus discussions, firstly with the
159 wider research team (the other authors) and subsequently with experts in the field once again, this
160 time through organized presentation and feedback sessions at three international conferences (2018-
161 2019). The resulting matrix, judged to be the 'best fit' for the data, is outlined in the Results section
162 (Table 1).

163 The methodological process described above is visually represented in Figure 1.



164

165

Figure 1: The metatheory process for the LUNA framework

166

167 3. Results

168 Ten publications were identified to represent the theories (frameworks and models) which emerged
 169 from the expansive literature search process and expert consultation. This source material
 170 spanned the fields of linguistics, cognitive linguistics, psycholinguistics, sociolinguistics, and
 171 pragmatics; and consisted of both books and journal articles. These 10 publications are by the
 172 following authors: Frederiksen and colleagues [28], Halliday & Matthiessen [29], Kintsch & van Dijk
 173 [30], Labov [31], Levelt [32], Rumelhart [33], Sherratt [22], Slobin [34], Sperber & Wilson [35], and
 174 Stein & Glenn [36]. The core concepts/constructs extracted from these 10 publications are
 175 categorised in Table 1 (below) and described in the text that follows, which highlights similarities
 176 and differences in the source material as well as the overall complexity of spoken discourse theory.
 177 The categorisation and descriptive summaries then lead to the proposed unified framework
 178 (depicted later in this section, in Figure 2) that is structured around the core categories: pragmatic,
 179 macrostructure planning, propositional and linguistic. The next section briefly reviews the
 180 theories reported in the 10 publications.

181 **Table 1:** Categorisation matrix for data extracted from the spoken discourse source material

Category	Pragmatic	Macrostructure Planning	Propositional	Linguistic
List of the constructs and concepts extracted	Situational and external influences on discourse	Organisation Structure Gist	Pre-linguistic Micro-planning Conceptualization	Language Syntax Lexical semantics

from the source material	Context	Story content	Thinking for speaking	Lemma & lexeme
	Interpersonal factors	Macro-structure, frames, genres	Propositional information	Phonology
	Interactional factors	Semantic memory ¹	Utterance planning	
		Episodic memory	Sequencing	
		Macro-planning	Semantic content	
		Coherence	Sentence Semantics	
			Information dependency relations	
			Clausal planning	
			Cohesion	

182

183 *3.1 Summary of frameworks and models and in the source material*

184 The 10 publications report six frameworks and four models (Frederiksen; Levelt; Sherratt; Sperber
185 & Wilson). These 10 theories can be grouped into eight distinct groups, each of which is described
186 in a separate paragraph below.

187 The framework proposed by Frederiksen and colleagues [28] is derived from a range of discourse
188 types (e.g., narratives and procedural) and describes three main levels of discourse processing
189 (macrostructure planning, propositional, and linguistic), proposed to operate sequentially in
190 discourse production. At the macrostructure planning level, discourse macrostructure is generated
191 or retrieved from memory, as an overall template or frame. Also at this level, the schematic
192 macrostructure is enriched with informational detail (such as factual and descriptive information
193 about the events, participants and context of the discourse); this information must then be further
194 organised in order to select, foreground, prioritise or otherwise arrange informational components
195 as required by the linguistic system. At the propositional level, a set of propositions is generated
196 from the organised information produced earlier at the macrostructure planning level. The
197 sequence of propositions is decided at this level, making use of principles of inference and
198 coherence; propositions are also grouped to ensure that there are an easy number to understand in
199 each subsequent linguistic structure (e.g. in each clause or in each story episode). At the linguistic
200 level, clauses are generated, syntax is assigned, content words within sentences are specified, and
201 cohesion is created (such as by the use of reference chains).

¹ Whilst the distinction between semantic and episodic memory is controversial, we have retained it here because it reflects the content of the source material. Halliday, Kintsch, Frederiksen and Sherratt all use the term to distinguish two sub-systems of long-term memory: 'semantic' for factual knowledge and 'episodic' for recall of events.

202 To the framework described by Frederiksen and colleagues [28], Sherratt [22] adds a more explicit
203 role for pragmatics at each level as well as hypothesising processing (thereby creating a model).
204 Firstly, she highlights the pragmatic purpose of telling a discourse, by noting that there will be an
205 initial 'input trigger' such as a direct request for a narrative or procedure, an auditory discourse to
206 be recalled, or a visually presented narrative (e.g., picture or video) to be described. To the
207 propositional level of the model, she adds a pragmatic component which is used as one of the
208 principles for organising propositions; and to the linguistic level, she notes that pragmatic
209 constraints will also influence linguistic formulation choices. In addition to the greater emphasis on
210 pragmatics in this model, Sherratt also explicitly adds retrieval of information from long term
211 memory, including semantic and episodic information, to the macrostructure planning level,
212 making clearer the role of other cognitive systems and structures in discourse production (such as
213 remembering, evaluating, reasoning, and establishing cause/effect.)

214 In his framework, Halliday (see [29], for example) emphasises both the structure and function of
215 language, thus highlighting the linguistic ways in which meaning is achieved in discourse. Halliday
216 also emphasises the choice inherent in the language system at each linguistic level, asserting that
217 when we analyse the language of a discourse, we are revealing the meaningful choices that have
218 been made [29]. He uses the phrase 'clause as a message' to also emphasise the propositional
219 content of language and creates a taxonomy of ways in which the language of a discourse might be
220 used to achieve different meanings. The meanings he highlights variously underline different
221 aspects of language use: the pragmatic role played by language (the way it affects or reflects the
222 relationship among interactants), the propositional content the language represents (the
223 information conveyed); and the effects of linguistic form used (differential effects from the choice,
224 for example, between declarative vs imperative sentence structures). One effect of linguistic form
225 that is especially emphasised in the Halliday framework is cohesion (see also [2]), which defines the
226 meaning relationships between certain linked words in discourse (for example between pronouns
227 and a related proper noun). Although cohesion consists of semantic links, its form is lexical and
228 structural, and therefore this approach emphasises the linguistic. Overall, Halliday's framework
229 provides a taxonomy of methods for conveying meaning in discourse. The emphasis is linguistic,
230 focusing on the content and form of language, but also referring to propositional information and
231 pragmatic effect. This theoretical framework is descriptive rather than intending to model
232 processing.

233 Kintsch and van Dijk's framework [30, 37] focusses on comprehension of expository discourse,
234 although they explicitly state that the processes they discuss are likely to form the basis for
235 production as well as comprehension. The arrangement and effect of these processes will be
236 different as a reflection of the differential demands of language production versus comprehension
237 [38]. The basis of this framework is the idea that, in order to understand a discourse, a mental
238 representation of the story content must be created through a series of cognitive processes. This
239 model presents a full description of discourse comprehension, but arguably its most distinctive
240 contribution to this theoretical field is in its conception of the cognitive processes underlying
241 propositional information. The authors posit mental representations which consist of propositional
242 information, organised and synthesised into an essential macrostructure (or 'gist'). In order to
243 derive the gist from a text, three main types of processing are used: propositional, local coherence
244 (meaning links between propositions), and global coherence. This processing results in a mental
245 representation of the macro-structural properties of the discourse.

246 Labov's framework [31] describes the resulting structure of discourse, rather than the processing
247 needed to produce it. In his search for authentic, natural language for his sociolinguistic studies of
248 sound change, he analysed personal narratives about a frightening situation. His analysis
249 identified the following six recurring elements: abstract, orientation, complicating action,
250 resolution, coda, and evaluation. Labov proposed that these elements are core to many different
251 types of narratives, not just narratives of fear, and later work revealed similar narrative elements in,
252 for example, oral memoirs, traditional folk tales, and narratives of everyday life. Similarly, Stein
253 and Glen [36] identified seven elements of narrative discourse (setting, initiating event, internal
254 response, internal plan, attempt + resolution, direct consequence, and reaction) and Rumelhart [33]
255 identified ten elements (setting, episode, event, reaction, internal response, overt response, attempt,
256 application, preaction, consequence). Although the elements are labelled slightly differently in these
257 'story grammars', there is a great deal of overlap in terms of the units of information that are being
258 described. In Labov's work, in addition to the findings about recurring macrostructural elements,
259 there is also reference to some aspects of propositional content. For example, he distinguishes 'free
260 clauses', which contain information that can occur anywhere within the story, from 'narrative
261 clauses', which contain information that needs to occur within a particular place or a particular
262 sequence in the discourse. He also describes some linguistic 'devices' which can be used to achieve
263 evaluation, including adverbs, conjunctions, manner adverbs, and comparatives.

264 Levelt [32, 39] provides a processing model to characterise the stages of speech production,
265 incorporating pragmatic, macrostructure planning, propositional, and linguistic levels. The model
266 begins with a 'discourse model' which incorporates pragmatic information (such as context and
267 assumed shared knowledge) and cognitive information (such as information or knowledge from
268 long-term memory). These two sources of information come together through macro-planning,
269 which is "the process by which the speaker decides what to say next" [32] (p. 90) a process which
270 involves planning an overall structure, which monitors reference and controls the discourse focus
271 by guiding attention from topic to topic. This information is fed into a propositional level of
272 processing that Levelt calls 'the conceptualizer', where micro-planning of the discourse occurs. At
273 this stage, a propositional unit called a 'pre-verbal message' is created to turn pragmatic and
274 cognitive components into the conceptual conditions that activate lexical items [39], thus creating
275 the propositional format that will facilitate access to the linguistic system. This same process of
276 synthesis is referred to by Slobin [34] as 'thinking for speaking', who expands on this aspect of
277 processing to describe how information is packaged differently for different languages. Slobin's
278 description of conceptualization processing can be used to explain some of the difficulties
279 experienced by people with aphasia when trying to express their thoughts [38]. As part of the
280 conceptualization process, meaningful connections are also established between propositions using
281 principles of local coherence. At the linguistic level of Levelt's model, propositions (and the links
282 between them) are grammatically encoded, and words are accessed.

283 Sperber and Wilson proposed Relevance Theory [35], which is a processing model for explaining
284 how we express and recognise meaning in language, allowing the exploration of the linguistic and
285 structural choices we make to express meaning in discourse. This model highlights the influence
286 of both cognitive and pragmatic processes, through its two key principles: human cognition is
287 geared to maximise relevance (The Cognitive Principle); listeners expect utterances to be as relevant
288 as possible (The Communicative Principle). In discourse terms this means that, at a pragmatic
289 level, discourse should be constructed with consideration for the way people will interpret it; and,

290 at a macrostructure planning level, structure and story content should be organised in a manner
 291 that facilitates finding the relevant interpretation. Together these principles guide the construction
 292 of a discourse, whenever there is a choice (for example between one word and another; between
 293 sentence structures and ways to link them; and in the overall structure of information), towards the
 294 option that best balances the cognitive effort of the hearer with the reward of finding the relevance
 295 of each part of the discourse.

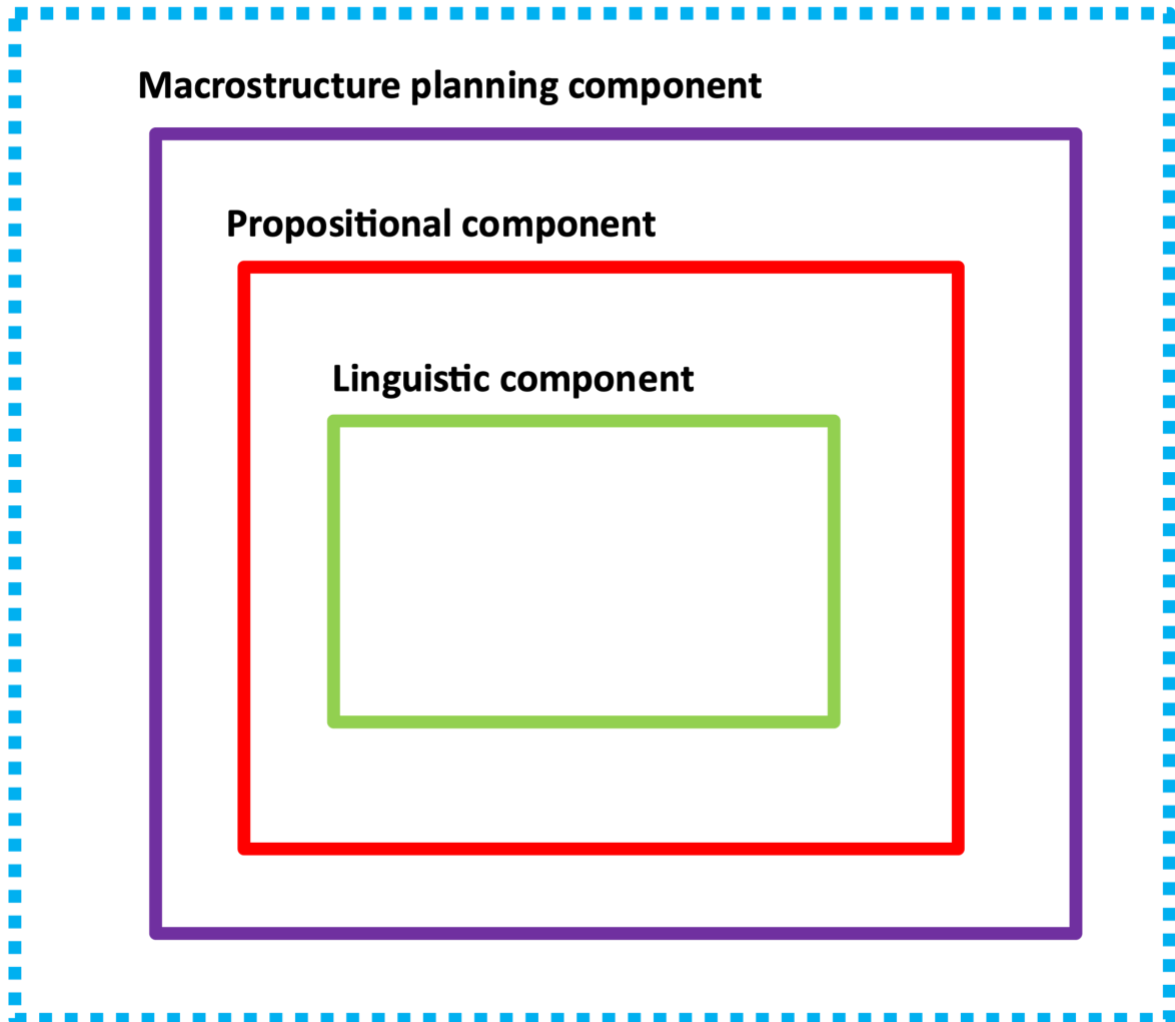
296 As the summaries above show, the source materials refer to a range of concepts and constructs
 297 involved in the description of spoken discourse. Through the metatheory synthesis process, four
 298 categories were identified (linguistic, propositional, macrostructure planning, pragmatic) into
 299 which these concepts/constructs could be grouped. Each theory (framework or model) in the
 300 source material referred to concepts or constructs in one or more of these categories – the categories
 301 are cross-referenced with the 10 theories in Table 2 (any additional texts relating to the same
 302 theories that were consulted are added here, alongside the main text for that theory). On the basis
 303 of this synthesis, we created a unified theoretical framework in which each category is depicted as a
 304 core component underpinning spoken discourse – see Figure 1. The validity of these categories can
 305 be initially evaluated by using the framework to describe case example, to explain assessment
 306 findings, and to motivate treatment (as we do in section 3.3, below) but for a more thorough
 307 evaluation further empirical research is needed.

308 **Table 2:** Source material mapped against four categories of concept/construct in spoken discourse -
 309 the shaded cells indicate which sources contain information relating to each category.

	Pragmatic	Macrostructure Planning	Propositional	Linguistic
Frederiksen and colleagues [28]				
Halliday & Matthiessen [29] Halliday & Hasan [2]				
Kintsch & van Dijk [30] van Dijk and Kintsch [37]				
Labov [31]				
Levelt [32] Levelt & Schriefers [39]				
Rumelhart [33]				
Sherratt [22]				
Slobin [34]				
Sperber & Wilson [35]				
Stein & Glenn [36]				

311
312
313

Pragmatics component



314
315
316

Figure 2: The LUNA framework for spoken discourse – see section 3.2 for information about each component

317 3.2 Overview of the LUNA framework for spoken discourse

318 The individual frameworks and models cover many of the concepts and constructs of spoken
319 discourse commonly referred to in the aphasia literature. However, none of these theoretical
320 perspectives covers all of the relevant concepts/constructs nor covers them in sufficient detail to be
321 clinically useful or to underpin assessment and treatment research. Also lacking was a clear account
322 of the relationship of one concept/construct to another.

323 Our unified framework (the LUNA framework - see Figure 2) aims to address these concerns . We
324 propose that discourse production involves four categories (hypothesised processing components).
325 The first is 'Pragmatics'. This acts as a 'filter' or overall influence on spoken discourse. Here the
326 speaker makes decisions based on environmental, interpersonal and interactional factors. For

327 example, the context in which the discourse is delivered must be taken into account (at home vs an
328 institutional setting) and the effect of different interlocutors (a familiar conversation partner vs a
329 stranger) must be considered. These factors will, for example, influence language formality and the
330 degree to which shared knowledge can be assumed. Interactional factors involve monitoring what
331 is said against the developing linguistic context. For example, the speaker has to be aware whether
332 s/he is introducing a novel topic or building on what has already been said. The interactional
333 purpose of the discourse must be understood: is it to inform or entertain, reassure or surprise?
334 Abilities required by the pragmatic component include working memory, to monitor the
335 environmental and linguistic context, and Theory of Mind, in order to reflect on the informational
336 needs of the conversational partner. Social awareness will also be required, so that judgements can
337 be made about whether particular usage (slang, swearing) is appropriate for the context.

338 The 'macrostructure planning' component involves the creation of an organisational frame or
339 macrostructure for the discourse. The literature suggests that this frame is often composed from
340 recurring structural elements, for example, to set the scene, outline the developing events, resolve
341 the narrative and evaluate/react to it [31, 33, 36]. This, in turn, suggests that the macrostructure
342 planning component may draw on familiar templates, rather than having to build structures 'de
343 novo' on each occasion. However, online structural decisions will be required. For example,
344 different genres (telling a narrative vs describing a procedure) require different frames and the
345 speaker will need to ensure that all key information is covered. Some information may also need to
346 be given more prominence in the structure than others, for example, in response to the pragmatic
347 and social context. Although cognitive skills are relevant to all components of the LUNA
348 framework, there are number of cognitive skills and structures that are of particular importance in
349 macrostructure planning. In addition to working memory, access to episodic memory will be
350 needed, for example, to recall relevant events. Planning will call upon executive function, as will the
351 need to monitor what has and has not been conveyed in the developing narrative (prospective
352 memory and working memory).

353 The third, 'propositional' component is a prelinguistic organisational component that feeds into
354 linguistic processing. This parcels the structural organisation or macro- 'plans' into the micro-
355 'plans' for individual utterances. For example, orientation elements of the structure will map onto
356 utterances that set the scene ('This happened last year in Italy') while event elements will require
357 utterances that convey actions ('I was sailing the boat'). Local decisions are needed about entities to
358 include (or omit) from propositions, and their role. For example, one entity may play the role of
359 agent in a proposition while another may be the theme, or the object that is acted upon. The
360 sequence of propositions is also determined, according to information dependency relations. For
361 example, this may follow the logical steps of a procedure, cause and effect relationships, or a
362 chronology. The propositional component builds the meaning relationships of individual
363 utterances, and so involves semantic processing. As covered in our overview of the literature, it
364 calls upon what Slobin [34] describes as 'thinking for speaking' and Levelt [32] describes as
365 'conceptualization', which involves cognitive skills such as perspective taking, selection,
366 organisation, and attention; as well as linguistic skills such as lexical and sentence semantics skills.

367 The fourth, 'linguistic' component translates each proposition into fully realised utterances. The
368 syntactic form is constructed, and lexical access takes place. Phonological assembly occurs and the
369 utterances are articulated. Linguistic skills in syntactic construction, lexical retrieval and

370 phonological processing are key to this component. These skills are familiar to clinicians and
371 researchers working in aphasia, and there are other theoretical frameworks and models that can be
372 used to describe and/or explain the hypothesised processing in this component.

373 Moving on from a description of the *content* of each component, to consider the *structure* of the
374 components, the LUNA framework proposes a specific relationship between components. In line
375 with two of the theoretical frameworks [22, 28] reviewed above, the components of spoken
376 discourse are not considered to be sequential. In the LUNA framework, the relationship between
377 components is conceptualized and depicted using a ‘Russian doll’ analogy, whereby linguistic
378 processes sit inside propositional processes which sit inside macrostructure planning and
379 pragmatic processes. According to this analogy, each component has the potential to influence
380 every other one. Thus, pragmatic features (such as social context) will influence the overall
381 organisation of the discourse, the composition of propositions and even linguistic factors, such as
382 vocabulary and syntax. To illustrate the latter, a formal context will impose vocabulary preferences
383 (‘gentleman’ vs ‘bloke’) and may encourage the use of particular syntactic options, such as the
384 passive voice. We envisage that feedback can occur both ‘upwards’ and ‘downwards’ between all
385 components in the LUNA framework, such that each component from pragmatic through linguistic
386 will feed into the next one but components can also exert an influence in the other direction through
387 revisions and reshaping as the discourse evolves. This would allow, for example, a word-finding or
388 sentence formulation difficulty in the linguistic component to trigger a restructuring of information
389 in the propositional component so as to drive an alternative formulation (a different word or
390 sentence structure). This, in turn, may have wider ramifications for the macro-structure of the
391 discourse.

392 The proposed LUNA framework enables us to reflect on the possible impact of aphasia on
393 discourse production. For people with aphasia the most obvious site of difficulty will be in the
394 linguistic component. Here, for example, word-finding or sentence processing impairments will
395 limit discourse utterances. It has also been argued that aphasia can lead to difficulties in the
396 semantic/conceptual processes required by the propositional component [38, 40]. For example,
397 individuals may be unable to process event roles, or map these onto semantic verb-argument
398 structures. The interconnected nature of the framework means that ‘local’ impairments may have
399 wide reaching consequences for discourse production. For example, failure in propositional or
400 linguistic processing may derail the macro-structure, or at least make it difficult to realise that
401 structure. Similarly, even if the speaker is sensitive to pragmatic factors, they may be unable to
402 reflect such subtleties in their output. There is the further possibility that the multi-faceted nature of
403 discourse production (reflected in the LUNA framework) prevents the speaker from realising their
404 full linguistic potential. For example, it is known that some people with aphasia have linguistic
405 competencies that are not fully realised in their discourse in all contexts [41]. For example, some
406 individuals who can produce discourse in constrained conditions, such as picture description,
407 cannot do so when faced with a different kind of discourse task, such as recounting their day. It
408 may be that discourse, with its many components, imposes a processing cost that cannot be met by
409 these speakers (especially those with more severe aphasia). Conversely, there is also evidence that
410 for some individuals with aphasia less constrained discourse tasks can reveal a more nuanced
411 pattern of competence and difficulty. For example, Dipper and colleagues [42] compared the
412 discourse produced by healthy speakers and those with mild-moderate aphasia in a picture
413 description and more open discourse task (answering questions related to quality of life). They

414 found that the more open task generated more mental verbs for both healthy speakers and those
415 with aphasia, revealing competence in the linguistic component of the LUNA framework. There
416 were also differences between the groups, such that the open discourse task resulted in less
417 complex sentence structures for speakers with aphasia only, revealing an impact of genre in the
418 propositional component of the framework.

419 Problems with discourse may additionally arise from impairments in attention, memory, and
420 executive functions that often accompany aphasia. Murray [43] demonstrated that people with
421 aphasia performed significantly more poorly than a control group in these cognitive domains, and
422 that attention deficits were correlated to language and communication status. In terms of discourse
423 production, any involvement of attention, memory, or executive function would impair the
424 generation of macrostructure and make it difficult to track whether all essential information was
425 being conveyed, resulting in omissions or loss of coherence.

426 3.3 Use of the LUNA framework for spoken discourse

427 The overall aim in creating this new framework was to address a gap in the theoretical literature
428 and to provide a structure to guide the assessment and treatment of spoken discourse in research
429 and practice. Our literature synthesis suggested that none of the existing frameworks described all
430 of the theoretical categories of spoken discourse in sufficient detail, nor fully addressed the
431 relationship of one category to another. In the following sections, we exemplify ways in which the
432 LUNA framework proposed here might address these gaps. Firstly, we provide two clinical case
433 examples which are described using the framework. Next, we explore the complexity of spoken
434 discourse assessment in aphasia, from the perspective of the proposed framework; and finally, we
435 briefly outline a new treatment for personal narrative discourse (LUNA treatment – an
436 investigation of which is currently in progress) which has been informed by this framework .

437 3.3.1 Clinical case examples²

438 To exemplify the use of the LUNA framework, consider the following examples of discourse
439 produced by speakers with aphasia.

440 Case 1: this is a speaker with moderate non-fluent aphasia , responding to the prompt, “can you tell
441 me about something that happened on a holiday you’ve been on recently?”.

442 *Good er plane and er er went near it’s er near there and er me and Linda and the bloke says go to the*
443 *road and get that and oh alright ok oh stupid sorry it was quite good it was two weeks and that was good*
444 *it was brilliant oh you know people it was quite good it was brilliant it was quite good oh I’m sorry.*

445 The linguistic component of this discourse is characterised by a limited range of nouns and use of
446 semantically light verbs; sentences are mostly single clause (e.g., ‘[it]’s [near there]; [it] was [quite
447 good]); and there is some unclear use of pronouns (e.g. ‘it’s near there’, ‘go and get that’). In the
448 propositional component, there is evidence that the overall topic has been organised into
449 propositions for language, as evidenced by the overall sequence of words used and the combination

² These examples have been extracted, with the speakers consent, from discourse produced either in a research project undertaken by the authors or as part of clinical work with one of the authors.

450 of words, even where they are not complete utterances (e.g. ‘went near’, ‘the bloke says go and get
 451 that’, ‘it was two weeks’) but difficulty accessing words has limited the ability to convey this. In
 452 additional there is a lack of coherence - what is being communicated, how it relates to the question,
 453 and how each utterance relates to the previous utterance. In the macrostructure planning
 454 component, the discourse does not have a clear macrostructure, although some of the expected
 455 elements of the orientation section are conveyed - introduction of the characters/participants
 456 (‘Linda’, ‘the bloke’), a location (‘it’s near there’) - and there are attempts to describe key ‘events’
 457 (‘go to the road and get that’). In the pragmatics component the key factor is that this discourse
 458 was produced in response to a question about a holiday and so the relevance of the informational
 459 content should be considered in this context. In this context there are some aspects of the discourse
 460 that are clearly relevant (e.g. the word ‘plane’, the information that ‘it was two weeks’ and the
 461 evaluation that ‘it was good’, ‘it was brilliant’). Overall though, the relevance of what is being
 462 communicated and why is unclear.

463 Case 2: this is a female speaker with moderate conduction aphasia responding to the prompt, “tell
 464 me about when you had your stroke”.

465 *Well I I was on the on the fla ... I was ... I think I was teluk right here on the on the teliff in the feliff*
 466 *first. And um my brother was coming to come over to bazzit. And she was just gone me call me. And all*
 467 *of a sudden that’s ... I did ... that’s that’s all I know. I I was ... I he he and m and she wife t t came*
 468 *from they had to with a cop and get it in min to go the line. And um they had to ma they he went over*
 469 *and da t went went to ... from the t tea the the the light through the kazh and ... When he and my*
 470 *brother and his life come come came they come in the they they found it by uh sent us by the f floor in the*
 471 *... And that’s all I can remember. I ended up in the hospiter. That was it.*

472 The linguistic component of this discourse is characterized by incomplete and inaccurate word
 473 retrieval and use of a limited range of semantically light verbs; sentences are revised and
 474 abandoned; some complex sentence structures are attempted, but not successfully; and pronouns
 475 are used incorrectly or ambiguously (e.g., “and she was just gone”). In terms of the propositional
 476 component, there appears to be some organization of the topic into propositions as evidenced by
 477 the sequence of verbs and the word combinations (e.g. ‘I was on the X’, ‘I was coming to come over
 478 to X’, ‘she was just gone me call me’), but the problems retrieving words and formulating sentences
 479 prevent them from being realized. The word and sentence impairments also compromise cohesion
 480 and coherence: it is not clear how (or if) an utterance relates to the previous utterance or to the
 481 overall topic. In the macrostructure planning component, some elements of the expected
 482 macrostructure are attempted, but not always achieved. For example, the sample seems to start
 483 with a setting, but we’re not quite sure what the location actually was or why her brother was
 484 coming over. There are attempts to convey key events, but since the verbs “came” and “went”
 485 predominate, often without their respective arguments, it’s not clear exactly what transpired. In the
 486 pragmatic component, some elements of the discourse are clearly relevant to the topic of her stroke
 487 (e.g., “they had to with a cop and get it in”, “they found it by uh sent us by the f floor”, “that’s all I
 488 can remember”, “I ended up in the hospiter”), while others are more ambiguous (e.g., “I think I was
 489 teluk right here on the on the teliff”).

490 In each case examples above, the word-finding difficulties are notable but this is not the case for all
 491 speakers with aphasia. There are people with milder aphasia who nevertheless experience
 492 difficulties producing spoken discourse, difficulties that might manifest as coherence and cohesion

493 issues, as well as and milder linguistic issues such as not being able to access the vocabulary that
494 they were previously able to and having to rely instead on more rudimentary/more accessible
495 vocabulary. The LUNA framework is useful for tracking these 'higher-level' difficulties, since it
496 allows for consideration of the skills needed in the components of propositional, macrostructure
497 planning and pragmatic processing, as well as linguistic skills; and furthermore prompts us to look
498 at the impact of one component on another. .

499 3.3.2 Assessment of spoken discourse

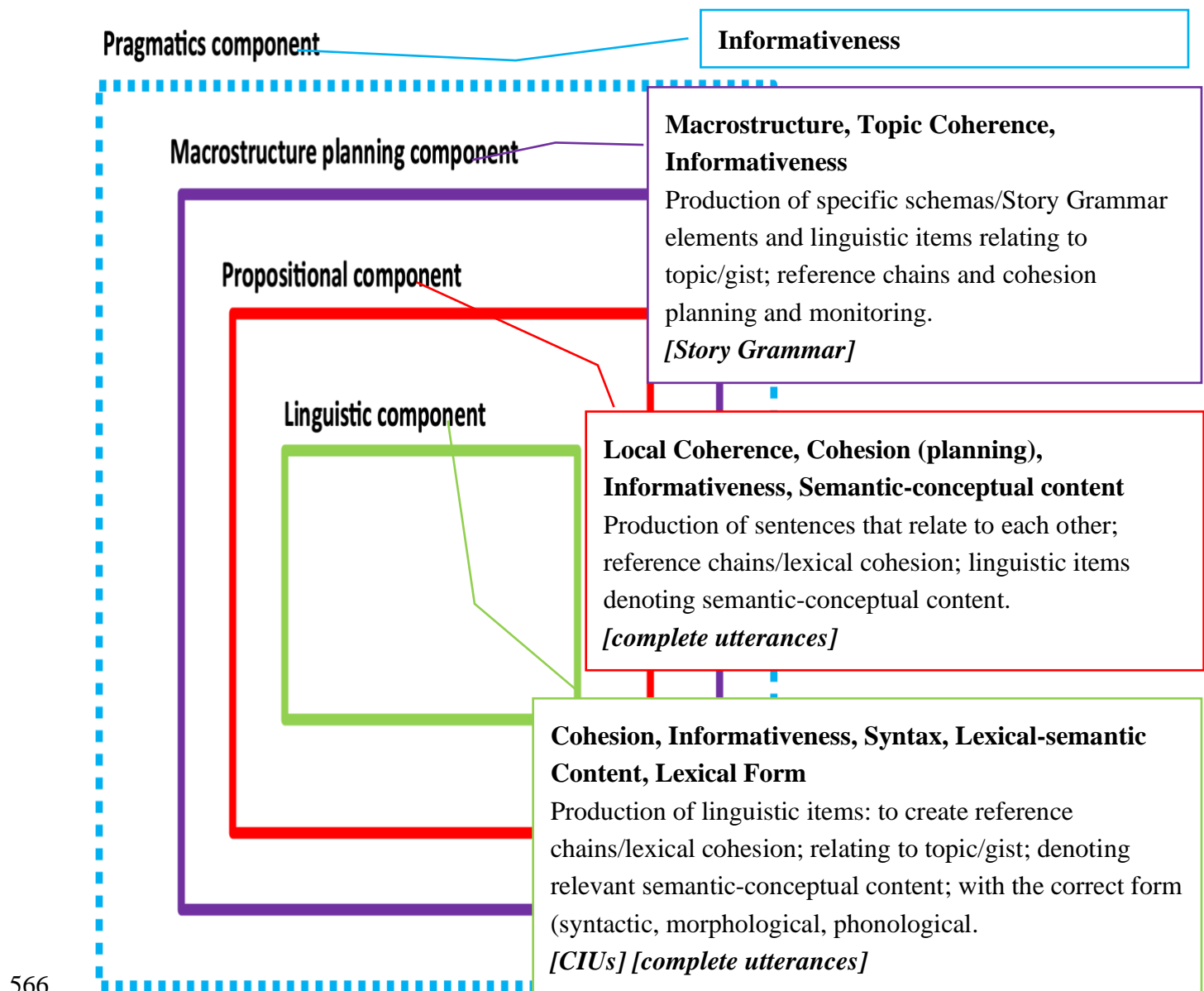
500 In the aphasia evidence base, there are numerous ways to assess discourse skills; however, it is not
501 always clear what construct or skill each measure is evaluating, how each measure relates to
502 another, nor how measures should be selected in clinical practice and research. Under
503 consideration here are not discourse protocols or specific tools but rather a metric for measuring
504 aspects of discourse (such as lexical diversity or correctness) which we are referring to with the
505 term 'measure'. To illustrate the point about lack of clarity in the use of measures, consider the 500+
506 discourse-related measures identified in two recent reviews of the assessment literature [6, 7] with
507 no guidelines about which measure to use with which clients and why. Typically, the objective of
508 researchers and clinicians is to choose one or more discourse-derived outcomes that are
509 representative of an element of a person's spoken discourse skills. For example, assessing the
510 proportion of complete sentences produced in a discourse would provide an assessment of sentence
511 production skill and provide information related to the theoretical construct of syntax.

512 This distinction between theoretical constructs and related skills is not one routinely made in the
513 aphasia literature, and this has led to some lack of clarity about what it is that discourse measures
514 are measuring. Amongst the mass of discourse measures in the aphasia literature, the following
515 range of constructs have been addressed: macrostructure; coherence; cohesion; informativeness;
516 semantic-conceptual content; syntax; lexical-semantic content; lexical form; and verbal productivity.
517 This has involved the assessments of the following skills, amongst others: production of specific
518 schemas, or story grammar elements; production of linguistic items (words, sentences) relating to
519 the topic or gist of a discourse; production of sentences that relate to each other; production of
520 reference chains, and chains of lexical cohesion; production of linguistic items (words, sentences)
521 denoting relevant semantic-conceptual content; production of linguistic items (words, sentences)
522 with the correct form (syntactic, morphological or phonological); and production of fluent/
523 productive speech. These skills have been assessed by various methods including counts,
524 proportions, evaluations of error or incompleteness, rating scales, and in the case of productivity,
525 by counts per unit of time (e.g. words per minute). It would be helpful to be able to map these
526 constructs and skills onto a framework of spoken discourse so as to begin to highlight the similarities
527 and differences between them (and to illustrate gaps and overlaps in the discourse measures
528 available). This mapping process is attempted in the following sections (and depicted in Figure 2,
529 below).

530 The connections among the skills and constructs are complex, as demonstrated in the clinical case
531 examples presented earlier. It is difficult, if not impossible, to uniquely assess many of the
532 theoretical constructs listed above because of their interrelatedness and the feedback between
533 components of the LUNA framework. For example, an assessment of the proportion of complete
534 sentences would provide information related to the constructs of syntax, semantic-conceptual
535 content, lexical-semantic content, and lexical form. Some measures assess a theoretical construct

536 only partially such as Correct Information Units (CIUs, [44]), a measure used to assess the skill of
537 word production and provide information about word-level informativeness, but which does not
538 provide information about the informativeness of the discourse more broadly. In addition, there
539 is often more than one way to measure the same skill, such as assessing sentence production skill
540 using the proportion of complete sentences, a mean predicate-argument structure (PAS, [45]) score,
541 or the proportion of treated sentence structures produced. Finally, there is complexity arising from
542 the lack of theoretical frameworks underpinning discourse assessment, which leads to a lack of
543 specification about what a measure is measuring and how it might relate to another measure. This
544 makes it difficult for researchers and clinicians to decide which measure(s) to use in an assessment,
545 and how impairment in the skill being assessed might affect multiple levels of discourse
546 production. Whilst the unified theoretical framework proposed in this paper cannot solve all of
547 these problems, it can provide a structure in which to organise these interrelated strands
548 (constructs, skills, measures) and which may help identify gaps and overlaps.

549 In Figure 3, below, we have proposed how the constructs and skills outlined above might be
550 mapped onto the LUNA framework, along with three commonly used discourse measures (CIUs,
551 complete utterances, and Story Grammar). Whilst it is beyond the scope of this paper to map all
552 500+ discourse measures onto this framework, this could be an informative exercise to pursue in a
553 future endeavour. As Figure 3 shows, there is overlap in terms of which components of the LUNA
554 framework best fit some of the theoretical constructs (e.g. Informativeness, and Cohesion),
555 discourse skills (e.g. production of reference chains) and measures (e.g. CIUs). This overlap might
556 indicate that these constructs, skills and measures would benefit from further specification and
557 decomposition. Alternatively, this overlap might be an intrinsic feature of the hypothesised
558 interaction and feedback among the framework's components. In the latter case, the aim of
559 depicting these overlaps within the framework would be to map them precisely and to be aware of
560 them in planning discourse assessment. There are also gaps in the aphasia literature identified
561 through this mapping process, such as the lack of assessment of pragmatic skills relating to spoken
562 discourse. Although speech and language therapists report *informally* assessing pragmatic skill
563 using discourse [8], there are no commonly used *formal* tools to do this. Thus, mapping the
564 measures onto the LUNA framework could provide direction for the development of needed
565 assessment measures and discourage the proliferation of redundant measures.



567 *Figure 3: An example of the use of the LUNA framework: mapping skills, constructs and the three*
 568 *most commonly used discourse measures*

569 Being able to situate a measure in the LUNA framework would also suggest targets for treatment,
 570 and might reveal links among performance in different components, as illustrated in the clinical
 571 cases above. For example, word-finding difficulties indicated by a low score in a linguistic
 572 measure such as CIUs [44] might occur alongside sentence level difficulties indicated by a measure
 573 that sits on the boundary between the linguistic and propositional components of discourse, such as
 574 mean PAS score [45]. In the macrostructure planning component, there may additionally be a lack
 575 of macrostructure indicated by a measure such as story grammar [14]; and difficulties in the
 576 pragmatic component might be indicated by a low score on a measure of listener judgement [46].
 577 Rather than presenting these as the results from diverse assessments of different aspects of
 578 processing, the proposed framework unites them into components of spoken discourse. This, in
 579 turn, motivates and structures the search for a link between them and guides treatment design.

580 3.3.3 Treatment of spoken discourse

581 In proposing a unified theoretical framework, the aim was to guide both assessment and treatment
582 of spoken discourse in aphasia. In our recent systematic review of discourse treatment [15], we
583 found 25 studies reporting on 127 participants with aphasia, indicating that discourse is an under-
584 researched aspect of aphasia treatment. In the LUNA treatment research study currently in
585 progress, we are aiming to develop a feasible and acceptable new discourse treatment for people
586 with aphasia to improve their personal narratives, using the theoretical framework proposed here
587 as a guide.

588 As noted earlier, LUNA stands for Linguistic Underpinnings of Narrative in Aphasia. It is a novel
589 multi-level intervention which treats the linguistic skills required to tell effective personal
590 narratives. In LUNA, the participant tells a personally-chosen story about themselves, from which
591 treatment targets are identified in the form of words, sentences and elements of discourse
592 macrostructure via linguistic analysis of the story transcript. Based on this analysis, potential lists
593 of treatment targets are offered to the participant for discussion. The discussion aims to find out
594 more about the purpose of the personally-chosen story, the intended audiences for it, and
595 ultimately to select which items (words, sentences, story elements) are to be treated. Treatment
596 targets are then cumulatively addressed over 10 weeks.

597 The treatment in LUNA is thus organized into activities that target all components of the proposed
598 theoretical framework. Word and sentence activities target the linguistic component; sentence
599 activities simultaneously target the linguistic and propositional components; macrostructure
600 activities target the macrostructure planning component; and the selection of treatment targets
601 addresses the pragmatic component by considering the purpose and audience of the story. The
602 cumulative approach ensures that words targeted at the start of the intervention also occur in the
603 phrases, sentences and story structures targeted later, giving the intervention a strong coherence
604 and allowing the person with aphasia to see the cumulative effect of each week's work towards the
605 improvement of the final story. The coverage of all components of the theoretical framework
606 similarly strengthens the approach and ensures that all core elements underpinning successful
607 spoken discourse are explicitly targeted in treatment.

608

609 **4. Discussion**

610 The aim of this paper was to review and synthesize the theoretical literature underpinning clinical
611 approaches to discourse in aphasia. Theoretical frameworks and models are important both for
612 research and practice. In clinical assessment they can be used to identify intact and impaired
613 components of processing and to inform treatment planning [18]. There is currently no unified
614 framework routinely used to guide treatment of spoken discourse, either clinically or in research.
615 In a recent review of discourse treatment [15], most studies made no reference to any theoretical
616 rationale for the methods they used. Where theory was explicitly mentioned, it related to just one
617 level of language: discourse macrostructure [14, 47, 48]. The frameworks and models cited in these
618 three treatment studies were part of the current review: Halliday and Hasan [2] for cohesion; and
619 Labov [31], Rumelhart [33], and Stein and Glenn [36] for story grammar. However, discourse
620 macrostructure is not the whole story. There are other levels of language involved in spoken
621 discourse, such as words and sentences, and so there is a need to have an extended framework that
622 covers all components of spoken discourse and which allows the identification of links between

623 them. If our goal is to improve spoken discourse, then we must be aware that focusing treatment
624 on a single discourse component (or single skill from within a component) might or might not affect
625 other discourse components. Understanding how the skills and components are related can help us
626 to predict which components of discourse production might change as a result of our treatment, to
627 monitor for those changes and, if they do not occur, to implement treatment that focuses on the
628 remaining impairments. The LUNA framework can provide a structured, systematic means for
629 researchers seeking to understand how a treatment affects multiple components of discourse
630 production and for clinicians seeking to ascertain whether their client's overall discourse
631 production has improved or needs further intervention.

632 Our review has resulted in the proposal of a novel unified framework outlining theoretically
633 derived components of spoken discourse, with the intent of supporting assessment and treatment
634 in research and practice. The framework is deliberately simple in its graphic presentation, which we
635 hope increases its accessibility for range of audiences including students, clinicians, and
636 researchers. However, the concepts, constructs and interrelationships that it seeks to encapsulate
637 are complex. The next step in developing LUNA as a useful tool would be to conduct an
638 'exhaustive' review of the concepts, constructs, skills, and related measures in order to map some of
639 the major connections delineated in the LUNA framework. In the previous sections we have aimed
640 to emphasize the need for a unified theoretical framework that incorporates multiple components
641 and to illustrate its uses. The need to consider multiple components (the four categories we
642 propose here) in spoken discourse (and not just, for example, word production) is supported by a
643 consideration of the evidence base, which indicates that aphasia affects discourse in a range of
644 ways, including the language elements that speakers use, the information communicated, and the
645 structuring of information in terms of linking ideas to each other and to the discourse
646 macrostructure [6, 7, 10]. What is currently missing is an indication of how these difficulties
647 overlap or otherwise relate to each other. The framework proposed in this paper should allow us
648 to map discourse measures onto skills in a structured way, by organizing those skills into discourse
649 components (linguistic, propositional, macrostructure planning and pragmatic), indicating areas
650 where there are multiple measures that assess the same thing while other components lack any
651 measure.

652 The evidence base for discourse treatment in aphasia would be strengthened by more treatment
653 research underpinned by an explicit theoretical rationale, which would allow for an evaluation of
654 what works and why [49]. Additionally, consensus about which theoretical framework to use
655 would allow for a more systematic approach to assessment and treatment.

656 There are limitations in the current study that should be considered. Although the expansive
657 literature search used here is the appropriate method for theory-building [25] it allows for the
658 possibility that relevant literature has been omitted from the review. Whilst we can be confident
659 that there were no omissions of theory from the field of aphasia assessment and treatment research,
660 since the search method here (inspection of reference lists of papers included in systematic reviews)
661 was exhaustive, we cannot be so sure about relevant theories from wider fields. However, as
662 Finfgeld and Johnson [25] point out, the aim of an expansive search is to find enough source
663 material to fully explicate concepts/constructs and the interrelationships between them. Another
664 limitation is that the review and synthesis presented here was able only to propose a theoretical
665 framework to guide future work, and not a processing model. As noted in the Introduction, a

666 distinction is commonly drawn between frameworks and models. Both arise from theory although
667 they differ in purpose: a framework *describes* a phenomenon whereas a model *explains* it. There is a
668 consequent difference in the methods used for each approach, with frameworks arising largely
669 from *deductive* (theoretical) methods and models additionally needing *inductive* (empirical) data to
670 validate them [20]. A clear example of model use in assessment and treatment planning (and
671 research) at the single-word level is the PALPA model (Psycholinguistic Assessments of Language
672 Processing in Aphasia) [21]. Here, the data from test results can be used to generate clear
673 hypotheses about strengths and impairments with words; and then treatment aims, methods and
674 tasks can be selected or devised to address a client's specific area of lexical difficulty. A next
675 important step, requiring future collaborative research, would be to validate the framework with
676 empirical findings in order to build a more detailed processing model of spoken discourse,
677 including a consideration of the dynamic nature of the brain.

678

679 5. Conclusions

680 The review and synthesis presented here has resulted in a novel unified theoretical framework for
681 spoken discourse. Our aim in proposing the LUNA framework is to bring order and structure to
682 the aphasia discourse assessment evidence base; and to provide a roadmap for emergent aphasia
683 discourse treatment research. The objective is to improve discourse treatment for people with
684 aphasia by clarifying the specific linguistic skills needed to create completeness, coherence, and
685 richness in their discourse. Just as discourse is fundamental to everyday communication, we believe
686 that theory is fundamental to moving the field of aphasia discourse research forward.

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