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Production of different types of familiar expressions by individuals with left- and right-hemisphere damage across discourse elicitation tasks

Seung-Yun Yang[a], Akiko Fuse[a], Diana Sidtis[b], and Seung Nam Yang[c]

[a]Department of Communication Arts, Sciences, and Disorders, Brooklyn College/CUNY, Brooklyn, New York, USA; [b]Department of Communicative Sciences & Disorders, New York University, New York, New York, USA; [c]Department of Physical Medicine and Rehabilitation, Korea University College of Medicine, Korea University Guro Hospital, Seoul, South Korea

ABSTRACT

This study aimed to explore the production of familiar expressions (e.g. idioms, proverbs and pause fillers), including different subtypes, and their variation across different types of elicited discourse in individuals with aphasia due to left hemisphere damage (LHD) and those with right hemisphere damage (RHD) to healthy control (HCs). Twenty-nine individuals (12 with LHD, 8 with RHD and 9 hCs) provided elicited discourse samples during four tasks (free speech, picture description, story narrative and procedural tasks) from TalkBank (AphasiaBank and RHDBank). Familiar expressions were categorised into two broad types: nuanced (conveying emotional or attitudinal meaning) and non-nuanced (literal and speech-flow enhancing). Results showed that individuals with LHD produced more familiar expressions, especially nuanced ones, than those with RHD or HCs. A correlation was found between aphasia severity and the production of familiar expressions, with individuals who had more severe language impairments producing a higher proportion of familiar expressions in some tasks. No significant task differences in familiar expression production were observed among the groups. This study revealed that brain damage affects the production of familiar expressions, with individuals with LHD using them more frequently and in a more nuanced manner. In contrast, individuals with RHD had difficulty producing familiar expressions. Clinically, this underscores the importance of considering hemisphere-specific deficits when assessing and treating language impairments in individuals with brain damage, as therapies may need to be tailored to address the distinct challenges faced by individuals with LHD versus RHD.

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Introduction

Familiar language refers to various fixed expressions that are holistically stored and retrieved (Kuiper, 2004; Pawley & Syder, 1983; D. Sidtis, 2021; Wray, 2002). They have a unitary form and conventionalised meaning, in contrast to newly created novel expressions, and can be easily recognised by native speakers of a language. Familiar expressions can vary in both their transparency and structure (Van Lancker Sidtis, 2004). Transparency refers to how easily their meaning can be understood. Transparent familiar

CONTACT Seung Nam Yang snamyang@korea.ac.kr Department of Physical Medicine and Rehabilitation, Korea University College of Medicine, Korea University Guro Hospital, 148 Gurodong-ro, Guro-gu, Seoul 08308, South Korea

expressions maintain a clear link between their literal and figurative meanings, allowing them to be easily understood in context (Nippold & Duthie, 2003). In contrast, other familiar expressions do not have a clear link between their literal and figurative interpretations (Hua, 2017). Structural variation also exists; while some familiar expressions consist of a single word, others are made up of multiple words or phrases. Familiar phrases are prevalent in everyday conversation, and they comprise approximately 25% of spontaneous speech in the context of everyday conversation by healthy individuals (Rammell et al., 2017; D. Sidtis et al., 2009). Their frequent use highlights their importance in language processing. The appropriate comprehension and production of familiar phrases are crucial for successful communication and social interactions (Van Lancker Sidtis & Wolf, 2015; Wray, 2017).

Operational definition of familiar expressions

Familiar language manifests itself in different forms, such as conversational speech formulas, idioms, lexical bundles, collocations and sentence stems (e.g. I think), pause fillers and expletives (Biber & Barbieri, 2007; D. Sidtis, 2021). Despite their heterogeneity, familiar expressions have in common that they are frequently used, highly predictable in nature and stored in a unitary form, with conventional meaning and social contextual appropriateness within a given language community. They are not as an assemblage of lexical items combined by the operation of grammatical rules (Bybee, 2006; Rammell et al., 2017; Van Lancker Sidtis, 2019; Van Lancker Sidtis & Rallon, 2004; Wray, 2002). Due to its heterogeneous forms, it is challenging to define familiar language. However, familiar language can be defined as a word or sequence of words recognised by native speakers of a language as having particular significance within that language community (Altenberg, 1998; Bobrow & Bell, 1973).

Whereas forms of familiar expressions are highly predictable and easily recognised, the meanings of familiar expressions are rather complex, rich in detail, and are not generally predictable from the words in the expressions. The use and meaning of familiar expressions are often tightly bound to context and their appropriate use requires understanding sociolinguistic considerations such as register and other pragmatic features of conversation. For example, the use of idioms can vary based on the social setting, relationship between speakers and cultural norms. As part of their conventional meanings, the majority of familiar expressions contain intrinsic affective content. For instance, the idiomatic expression, 'it's raining cats and dogs' not only conveys the idea of heavy rain but may also evoke a sense of exaggeration or humour (D. Sidtis, 2021).

Familiar language serves different functions (Bridges et al., 2023; Wray, 2017). First, familiar language can help speakers to convey different kinds of information quickly and efficiently, using the complex meaning scenarios packed into unitary expressions. Idiomatic expressions often serve this function (e.g. the tip of the iceberg). Use of familiar expressions also 'buys time' for the speaker to plan for the next propositional utterance, continuing the flow of speech and decreasing the cognitive load/demands of both speakers and listeners (Wray, 2017). For example, pause fillers (e.g. uh, um), planning units (e.g. and, and then) and discourse particles (e.g. actually) serve to manage and continue the flow of speech. Familiar expressions also serve different social functions, promoting connection and bonding between speakers and conveying empathy (Clark & Fox Tree, 2002; Tottie, 2014; Van Lancker Sidtis &

Wolf, 2015; Wray, 2017). Speech formulas (e.g. how's everything going?) serve to promote collegiality.

A recent model of familiar language has categorised it into three different types based on their linguistic characteristics: (1) traditional formulaic expressions (well-known, fixed phrase that convey specific meanings beyond the literal interpretation of individual words, such as idioms and conversational speech formulas: e.g. 'break the ice', 'how are you?'), (2) lexical bundles (recurrent sequences of words and other formulaic expressions such as pause filler and sentence stems: e.g. 'you know', 'I think that') (Biber & Barbieri, 2007; D. Sidtis, 2021) and (3) collocations (combinations of words that commonly occur together due to conventional usage: e.g. 'happily ever after', 'back and forth') (D. Sidtis, 2021). These three classes all contain subsets, which are identified in this research, and re-classified into two broad categories corresponding to their characteristic of being nuanced or non-nuanced. This categorisation is critical since it emphasises how certain expressions communicate layers of emotional and attitudinal meaning, while others convey more direct, unambiguous information. Nuanced familiar expressions carry subtle, layered, complex emotional and attitudinal connotations, whereas non-nuanced familiar expressions convey straightforward meaning. Some traditional formulaic expressions (conversational speech formulas, expletives, idioms/proverbs) universally have a 'nuanced' nature, whereas lexical bundles and some other formulaic expressions (e.g. pause fillers, discourse particles, planning units and sentence stems) are considered as being in the 'non-nuanced' group of familiar language (Bridges et al., 2023; D. Sidtis, 2021). Collocations can be either nuanced or non-nuanced; non-nuanced versions are featured in this study. Non-nuanced familiar expressions, which typically have literal meanings and mainly serve to continue the flow of speech (Bridges et al., 2023; D. Sidtis, 2021), have not had much attention in research. By introducing this nuance/non-nuanced distinction, this research provides a more detailed framework that acknowledges the varying communicative functions of familiar language. This approach offers a way to understand how language can either enrich communication with subtle emotional cues or maintain clarity with direct expressions. One purpose of this study was to compare different categories of familiar expressions produced by individuals with unilateral brain damage (LHD and RHD) and HCs using this important distinction. LHD throughout this paper refers specifically to people with aphasia due to left hemisphere damage. Eight different subtypes of familiar language utilised in this study are presented in Table 1.

Production of familiar expressions by individuals with left or right hemisphere damage

Neurological damage to lexical-semantic and/or syntactic networks is linked to a decrease in producing novel language, with a compensatory increase in the use of familiar expressions. For example, individuals with severe aphasia due to left hemispherectomy presented with preserved familiar expressions including expletives, pause fillers and conversational speech formulas (Hillier, 1954; Smith, 1966; Zangwill, 1967). This pattern also appears in other forms of aphasia resulting from left-hemispheric damage, with studies indicating that the right hemisphere may support this residual pragmatic competence (Lum & Ellis, 1994;

Table 1. Categories, definition and examples of familiar expressions.

Categories	Definition	Examples
Nuanced familiar expressions		
Conversational speech formula	A sub-class of pragmatic word- combinations. They are expressions, typically of sentence length, used in organising discourse, conveying a speaker's attitude to other participants and their messages and generally easing the flow of interaction.	*it's okay; I'll be fine*
Expletive	An interjectory word or expression, frequently profane; an exclamatory oath.	*oh; oh my god*
Formulaic expression (idiom, proverb)	A string of words for which the meaning is not simply derivable from the meanings of the individual words comprising that string. (Katz, 1973)	*she has him eating out of her hand*
Non-nuanced familiar expressions		
Lexical bundle	Multi-word sequences that occur commonly in spontaneous speech. Lexical bundles are not structurally complete and not idiomatic in meaning (Biber & Barbieri, 2007).	*a great deal of*
Collocation	Two or more word-expressions that correspond to some conventional way of saying things. (Manning & Schutze, 1999)	*back and forth; once upon a time*
Discourse element	Words and phrases that are used to connect and organise the utterances, or to express attitude. (Fraser, 1990)	*anyway; actually; to begin with*
Pause filler	A filler word. Traditionally, considered as a meaningless word, phrase, or sound that marks a pause or hesitation in speech. (e.g. Levelt, 1983). More recently viewed as a pragmatic marker (Clark & Fox Tree, 2002; Tottie, 2017).	*uh; um*
Planning unit	The surface structure utilised to continue the speech flow. (e.g. Bever et al., 1974; Fodor et al., 1974)	*and then; and*
Sentence stem	A phrase or part of a sentence used to begin the utterances.	*I think; it's like*

D. Sidtis, 2021; Van Lancker Sidtis & Postman, 2006; Van Lancker Sidtis & Yang, 2016; Van Lancker Sidtis et al., 2004; Wray, 2017). This preserved familiar language in aphasia underscores the pragmatic functions served by the right hemisphere, which allows some level of social communication despite deficits in novel language production (e.g. D. Sidtis, 2021).

Experimental research comparing the production of familiar expressions in individuals with focal damage to either the left or right sides of the brain revealed significant disparities between the two groups (Van Lancker Sidtis & Postman, 2006; Wolf et al., 2014; Zimmerer et al., 2018), which also further supports the role of right hemisphere in the production of familiar expressions. A high incidence of familiar phrases in spontaneous speech by individuals with LHD subsequent to stroke has been reported compared to HCs (Baldo et al., 2016; Bruns et al., 2018; Code, 1994; Lum & Ellis, 1994; Van Lancker Sidtis & Postman, 2006; Van Lancker Sidtis & Yang, 2016; Van Lancker Sidtis et al., 2004; Zimmerer et al., 2018). For example, Zimmerer et al. (2018) conducted an analysis of language production during semi-structured interviews involving individuals with fluent aphasia, non-fluent aphasia and RHD, focusing on frequency-based patterns. Their findings revealed that individuals with aphasia, unlike those with RHD, tended to rely more heavily on familiar phrases. The production of familiar expressions by individuals with RHD has also been documented in some studies. Research has shown that individuals with RHD produce fewer familiar phrases in spontaneous speech (Baldo et al., 2016; D. Sidtis et al., 2009; J. J. Sidtis et al., 2018; Van Lancker Sidtis & Postman, 2006). This reduction in the use of familiar expressions contributes to conversational deficits, as these phrases play a critical role in smooth social interactions. Although individuals with RHD may have intact grammatical, phonological and semantic abilities, their decreased use of familiar expressions hinders effective communication. Given that familiar expressions are often tied to social appropriateness, it is likely that the right hemisphere – recognised for its role in pragmatic language functions – significantly influences the use of these expressions. These findings from empirical research, hemispherectomy studies and other neurological investigations provide robust evidence for the right hemisphere's role in supporting familiar language use.

A few studies examined the production of different types of familiar expressions by individuals with brain damage compared to HCs. Code (1982) conducted an analysis of recurrent utterances (RUs) across different types of aphasia, noting that real-word RUs predominantly comprised frequently used words (e.g. I told you, so so) and were typically observed in Broca's aphasia. The occurrence of pronoun + verb combinations (e.g. I want to) were frequently observed as well. Van Lancker Sidtis and Postman (2006) analysed the spontaneous speech by the three study groups (LHD, RHD and HCs) for incidence of different categories of familiar expressions (conversational speech formulae (e.g. how are you?), idioms (e.g. he is skating on thin ice), expletives (e.g. damn it), sentence stems (e.g. I think), discourse particles (e.g. actually, you know) and pause fillers (e.g. uh, um), proper nouns). Different patterns of the production of specific types of familiar expressions were reported in different groups. A paucity of proper noun production in individuals with LHD was observed, while pause fillers and discourse particles were less produced in the RHD group. In a subsequent study by Sidtis et al. (2009), different categories of familiar expressions (speech formulae, fillers, sentence stems and proper nouns) produced by individuals with brain damage were examined. Individuals with LHD demonstrated a very high proportion of speech formulae compared to individuals with RHD. A more recent study (Eaton & Burrowes, 2021) examined production of nine different types of familiar expressions across language contexts by individuals with aphasia: Individuals with aphasia produced proportionally more specific types of familiar expressions (i.e. pause fillers, interjectional phrases and speech formulas) compared to other types (i.e. sentence stems, discourse particles). However, there still exists limited knowledge of the production of different types of familiar expressions, particularly nuanced vs non-nuanced familiar expressions, by LHD and RHD (Bridges et al., 2023; D. Sidtis, 2021).

Familiar expressions and discourse genres

Various discourse tasks (e.g. free speech elicitation, picture description, story narrative and procedural discourse) are often utilised to elicit a sample of an individual's spoken language for language evaluation (Bryant et al., 2016). The two most common methods are expositional narrative and narrative discourse. Expositional narrative involves describing a picture or picture sequences, while narrative discourse entails telling a personal or familiar story without visual aids (Coelho et al., 2005; Nicholas & Brookshire, 1993; Wright & Capilouto, 2009). Another method is procedural discourse, which involves describing a procedure or task, often eliciting action words and gestures (Cannizzaro & Coelho, 2013; Hird & Kirsner, 2003; Murray & Chapey, 2001). Using a combination of these methods provides a comprehensive language sample reflective of the individual's language use. Thus, it is important to understand how each method impacts spoken language performance. Different elicitation techniques may impose different cognitive and linguistic demands

(Brady et al., 2005; Nicholas & Brookshire, 1993). Narrative discourse tends to elicit more complex language due to its reliance on memory and larger linguistic structures (MacWhinney et al., 2010). Compared to other types of discourse, it may be more challenging for individuals with aphasia, who often experience linguistic deficits, as well as cognitive challenges, which are distinct from one another and important to consider both in research and clinical settings.

Despite the importance of understanding how each method of eliciting discourse impacts spoken language performance, few studies have evaluated different types of discourse in individuals with aphasia. In the study of Stark (2019) comparing language production during different discourse tasks in a large group of persons with aphasia and HCs, different language performance was reported across discourse tasks. Results indicated that despite reduced output from the aphasia group, discourse type had a significant effect on linguistic variables in both groups, highlighting the varying demands each discourse type places on the spoken language system. A more recent study (Eaton & Burrowes, 2021) also reported that the production of different types of familiar language varied across discourse tasks by individuals with aphasia. Combined, these results indicate that language tasks may be an important variable to consider during the evaluation and treatment of the production of familiar expressions by individuals with brain damage.

Purpose of study/hypotheses

The present study examined the relationship between the brain damage and the production of familiar expressions, particularly with respect to the affective load carried by these expressions (nuanced vs. non-nuanced) in various discourses. The research questions and their hypotheses are as follows:

(1) Research question: How do LHD and RHD affect the overall production of familiar expressions?
Hypothesis: Individuals with LHD, who often rely on familiar expressions due to cognitive and linguistic deficits, were expected to produce more familiar expressions overall compared to those with RHD and HCs. Additionally, due to the right hemisphere's role in pragmatic language, individuals with RHD were expected to produce fewer familiar expressions compared to other groups.
(2) Research question: Does affect load (nuanced vs non-nuanced) influence the production of familiar expressions differently in individuals with LHD versus RHD?
Hypothesis: The LHD group was expected to produce a higher proportion of nuanced expressions than the RHD group due to right hemisphere control over affective language and the particular reliance of individuals with aphasia on familiar, affect-laden expressions.
(3) Research question: Are there differences in the types and variants of familiar expressions produced by individuals with LHD and RHD compared to HCs?
Hypothesis: Given the considerable role of familiar expressions in everyday language and the deficits experienced by each group, it was hypothesised that LHD and RHD groups will show different patterns in the types of familiar expressions they use compared to HCs.

(4) Research question: Do different language tasks (free speech monologue, picture description, story narrative, procedural task) influence the production of familiar expressions in individuals with brain damage?
Hypothesis: Due to the increased cognitive and linguistic demands associated with narrative discourse, it was hypothesised that individuals with LHD would rely more heavily on familiar expressions in narrative tasks compared to other types of discourse tasks.
(5) Research question: How does the severity of aphasia impact the production of familiar expressions, particularly nuanced expressions:
Hypothesis: Due to the increased cognitive and linguistic demands associated with free speech monologue, it was hypothesised that individuals with LHD would reply more heavily on familiar expressions in narrative tasks compared to other types of discourse tasks.

Method

Speakers

Spontaneous language samples by 29 individuals (12 with LHD, 8 with RHD and 9 hCs) were selected from AphasiaBank (MacWhinney et al., 2011) and RHDBank (http://rhd.talkbank.org). AphasiaBank is a shared database of discourse by individuals with LHD across a wide range of tasks. RHDBank was initiated in 2015 as a critical resource to increase our understanding of language production in RHD. Based on the demographic information available on AphasiaBank and RHDBank, all individuals from three different groups were right-handed native speakers of English and were age- and education-matched. The mean ages of individuals with LHD and RHD, and HC were 64.35 (SD = 10.95), 58.25 (SD = 5.57) and 66.97 (SD = 9.09) with a mean education of 14.33 (SD = 2.64), 16.63 (SD = 3.02) and 15.78 (SD = 2.28), respectively. Speakers with brain damage had all suffered a single unilateral lesion due to cerebrovascular accident (CVA) and ranged in time post-onset of CVA from 1.9 to 13 years with a mean of 5.6 years (SD = 3.31) (LHD) and 5.65 years (SD = 3.58) (RHD). The severity of aphasia, as determined by the Aphasia Quotient (AQ) of the Western Aphasia Battery (WAB) (Kertesz, 2007), was mild to moderate. Types of aphasia associated with the LHD group, which was also determined by WAB, varied. Detailed demographic information of participants is presented in Table 2.

Language tasks

TalkBank includes four different types of language tasks: two free speech elicitation tasks (responses to some personal questions such as 'how do you cope with stroke?' for individuals with brain damage and 'can you tell me a story about something important that happened to you in your life' for HC), four picture description tasks (describing a single picture), one story narrative (retelling the Cinderella story) and one procedural task (explaining the steps to make a peanut butter and jelly sandwich). For the free speech elicitation tasks, participants were prompted to 'tell a story about something important that happened to you in your life'. In the picture description tasks, participants were given a picture and asked to 'tell a story with a beginning, middle, and end'. For the Cinderella story task, they reviewed a wordless

Table 2. Information about speakers with unilateral cerebral lesions and healthy controls (WAB (AQ) = Western Aphasia Battery (Aphasia Quotient)).

Group	Age (year)	Gender	Education (year)	Time post onset (year)	WAB (AQ)	Type of aphasia
LHD						
1	53.1	Female	14	3.3	74.6	Transcortical Motor
1	75.6	Male	12	7	57.7	Broca
1	65.9	Male	13	4.1	50.8	Broca
1	52.7	Female	14	4.7	69.4	Broca
1	76.9	Female	16	1.9	45.5	Broca
1	56.2	Female	13	7.9	80.1	Conduction
1	48.4	Male	12	9.8	57.4	Wernicke
1	61.7	Male	16	2.2	48.9	Wernicke
1	83.1	Female	12	7.8	79.5	Conduction
1	58.9	Male	12	1.25	86.8	Anomic
1	69.8	Male	20	5.5	74.9	Conduction
1	69.9	Female	18	11.8	63.9	Anomic
Average	64.35	–	14.33	5.60	65.79	–
SD	10.95		2.64	3.31	13.71	
RHD						
2	68.5	Female	18	7.1		
2	56	Male	15	3.1		
2	64.2	Female	21	13		
2	53.7	Female	18	5.5		
2	55.3	Male	20	2.2		
2	57.8	Male	13	2.5		
2	58.7	Male	14	4.33		
2	51.8	Female	14	7.5		
Average	58.25	–	16.63	5.65		
SD	5.57		3.02	3.58		
HC						
3	61	Female	17			
3	69.8	Female	16			
3	55	Male	16			
3	75.6	Female	18			
3	64.05	Male	16			
3	54	Female	17			
3	80.5	Female	12			
3	71.3	Female	18			
3	71.5	Female	12			
Average	66.97	–	15.78			
SD	9.09		2.28			

Cinderella book and were then instructed to ‘tell as much of the story of Cinderella as you can, including any details you know’. Finally, in the procedural task, participants were asked to ‘explain how to make a peanut butter and jelly sandwich’. According to Talkbank, trained researchers transcribed the language samples, segmenting each utterance by syntax, intonation, pause and semantic content, following the guidelines by Saffran et al. (1989). Raters reviewed videos as well as transcription of selected participants.

Analyses

Familiar expressions were identified and categorised based on previously established methods (Van Lancker Sidtis, 2019; Van Lancker Sidtis & Rallon, 2004) by two native speakers of English who had extensive experience in familiar language analysis. Cohen’s kappa (k) was calculated to assess the level of agreement between the two independent raters on the identification of familiar expressions. The kappa value was

0.88 (95% CI [0.82, 0.94]), suggesting almost perfect agreement between the raters. A consensus was achieved by the two raters for the final analysis. Familiar expressions were initially categorised into two broad categories (nuanced and non-nuanced), which were further specified by nine different subtypes as indicated in Table 1 (conversational speech formulas, expletives, formulaic expressions, lexical bundles, collocations, discourse particles, pause fillers, planning units and sentence stems). The proportion of words in familiar expressions out of the total number of words in the speech sample was calculated. Further analyses were conducted by calculating relative proportions of words with total word counts in each subtype. Proportions of words in nuanced and non-nuanced familiar expressions were compared between groups and language tasks.

Nonparametric statistics were employed to address the research questions, as the distributions of the groups did not satisfy normality assumptions. Kruskal–Wallis H tests were conducted to determine the difference between groups (LHD, RHD and HC) and language tasks (free speech elicitation tasks, picture description tasks, story narrative, procedural task). The Mann-Whitney U test was conducted as *post-hoc* analyses to further examine between-group and within-group comparisons and to compare between language tasks. Values calculated for the Mann-Whitney U test were Bonferroni-corrected for comparisons. Spearman correlation was conducted to examine the relationship between the severity of aphasia and the production of familiar expressions. In the present study, an alpha level of 0.05 was adopted to determine statistical significance.

Vocabulary diversity (Vocd-D) was calculated for each speaker to examine variations in familiar expressions across groups. This measure, available in the CLAN program (MacWhinney, 2000), assesses lexical diversity in speech or text. A high Vocd-D score indicates rich lexical diversity within a given discourse and accounts for how vocabulary diversity operates within specific discourse contexts. For the Vocd-D analysis, the LHD group was categorised further into two different groups (fluent vs nonfluent).

Results

Effect of LHD and RHD on the production of familiar expressions: How do LHD and RHD affect the overall production of familiar expressions?

There were group differences in the overall proportion in familiar expressions produced across language tasks. Individuals with LHD produced more familiar expressions (31.54%) compared to the RHD group (10.54%) and HCs (15.90%). As shown in Figure 1, all three groups produced a high proportion of pause fillers and planning units compared to other types of familiar expressions. Kruskal–Wallis H tests revealed that there were significant differences in the proportion of expletives [H (2) = 15.848; $p < 0.001$], pause fillers [H (2) = 20.391; $p = <.001$] and conversational speech formulas [H (2) = 20.252, $p < 0.001$] between groups. *Post-hoc* analyses revealed that individuals with LHD produced significantly higher proportions of expletives, pause fillers and conversational speech formulas compared to the RHD and HC groups. The RHD group produced significantly lower proportions of pause fillers compared to the HCs. The detailed results of Kruskal–Wallis H tests and Mann Whitney U tests are presented in Table 3.

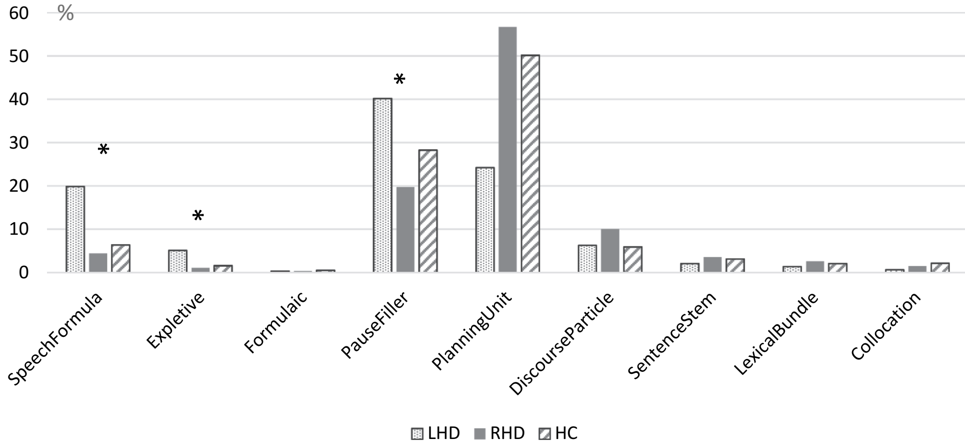

Figure 1. Percentages of each type of familiar expressions out of the total number of familiar expressions by the LHD, RHD and HC groups (nuanced familiar expressions: conversational speech formula, expletive, formulaic expressions vs. non-nuanced familiar expressions: pause filler, planning unit, discourse particle, sentence stem, lexical bundle, collocation).

Impact of affective load on the production of familiar expressions: Does affective load (nuance vs. non-nuanced) influence the production of familiar expressions differently in individuals with LHD vs. RHD?

Regarding nuanced (expletives, formulaic expressions, conversational speech formulas) versus non-nuanced (collocations, discourse particles, lexical bundles, pause fillers, planning units, sentence stems) expressions, there were significant group differences in the production of nuanced familiar expressions [H (2) = 18.61; $p < 0.001$]. The *post-hoc* analyses revealed that the LHD group produced significantly more nuanced familiar expressions compared to the RHD and HC groups, whereas the RHD group produced significantly fewer of those nuanced familiar expressions compared to the HCs. However, no group differences were found for non-nuanced expressions.

Variants of familiar expressions across groups: Are there differences in the types and variants of familiar expressions produced by individuals with LHD and RHD compared to HCs?

The modified vocd-D of familiar expressions was calculated to examine if any groups of participants produced a relatively greater variety of types of familiar expressions. Each unique familiar expression was counted as one type and each subsequent, repeated familiar expression was counted as one token. For example, 'I don't know', 'you know' and 'well' were counted as one type. When different types of familiar expressions were produced more than once, each occurrence was counted as a token.

Kruskal–Wallis H tests have shown that there were significant group differences regarding the production of a variety of types of familiar expressions [H (3) = 24.36s9; $p < 0.001$] (Figure 2). *Post-hoc* analyses revealed that the highest vocd-D is associated with individuals with nonfluent aphasia, while the lowest vocd-D is

Table 3. Statistical analyses of different types of familiar expressions (number, ratio) between groups. Values are presented as medians (interquartile range); *p* value was calculated by Kruskal–Wallis analysis; median (interquartile range) followed by the same letter in the same column did not differ significantly. These differences were calculated by Mann-Whitney U tests; H was test statistics by Kruskal–Wallis analysis.

		LHD	RHD	HC	*p*-value	*H*
words (number)	Collocation	0.50 (0.00–2.00)[a]	2.50 (1.00–5.25)[a]	2.00 (1.50–6.50)[a]	0.134	4.016
	Discourse element	9.00 (2.25–25.25)[a]	12.50 (9.50–26.25)[a]	7.00 (5.50–9.00)[a]	0.172	3.524
	Expletive	8.00 (4.00–16.75)[a]	2.00 (0.00–3.50)[b]	3.00 (2.00–3.00)[b]	0.002*	12.145
	Formulai[c]	0.00 (0.00–1.75)[a]	0.50 (0.00–1.00)[a]	1.00 (0.00–1.00)[a]	0.834	0.362
	Lexical bundle	2.00 (0.25–6.50)[a]	4.00 (1.25–7.50)[a]	2.00 (1.00–8.00)[a]	0.787	0.480
	Pause filler	67.50 (50.00–147.00)[a]	27.50 (15.00–64.00)[a]	36.00 (29.50–64.00)[a]	0.024	7.448
	Planning unit	53.50 (27.25–80.25)[a]	89.50 (62.50–134.25)[a]	93.00 (55.50–122.50)[a]	0.088	4.867
	Sentence stem	3.50 (0.25–8.50)[a]	4.00 (3.00–7.50)[a]	4.00 (2.00–7.50)[a]	0.851	0.322
	Conv. Speech formul[a]	34.00 (27.25–55.25)[a]	8.00 (3.50–10.00)[b]	10.00 (6.50–14.00)[b]	0.000*	19.446
words (ratio)	Collocation	0.33 (0.00–0.93)[a]	0.16 (0.79–0.25)[a]	0.19 (0.92–0.37)[a]	0.228	2.957
	Discourse element	1.21 (0.58–2.69)[a]	0.98 (0.55–1.25)[a]	0.44 (0.37–1.06)[a]	0.146	3.843
	Expletive	1.31 (0.42–2.27)[a]	0.11 (0.00–0.17)[b]	0.18 (0.14–0.19)[b]	0.000*	15.848
	Formulai[c]	0.00 (0.00–0.16)[a]	0.21 (0.00–0.08)[a]	0.04 (0.00–0.12)[a]	0.917	0.173
	Lexical bundle	0.27 (0.03–0.67)[a]	0.20 (0.09–0.44)[a]	0.18 (0.07–0.48)[a]	0.886	0.243
	Pause filler	11.98 (8.82–18.46)[a]	1.82 (1.07–2.31)[b]	2.63 (2.24–5.01)[c]	0.000*	20.391
	Planning unit	6.91 (5.70–9.39)[a]	6.01 (4.82–6.84)[a]	5.76 (4.99–6.50)[a]	0.274	2.592
	Sentence stem	0.50 (0.03–1.07)[a]	0.24 (0.19–0.63)[a]	0.27 (0.15–0.53)[a]	0.835	0.360
	Conv.Speech formul[a]	6.11 (2.39–8.96)[a]	0.41 (0.29–0.50)[b]	0.68 (0.50–1.09)[b]	0.000*	20.252

*All *p*-values < 0.05 were considered significant.

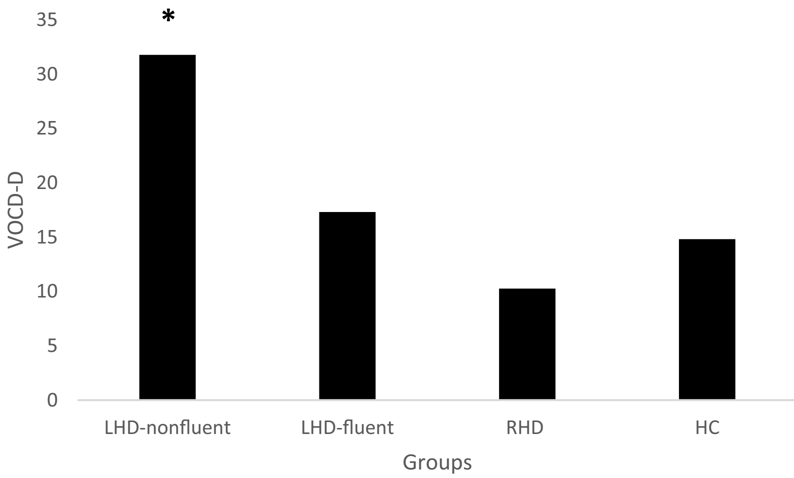

Figure 2. VOCD-D of different groups (LHD – nonfluent: individuals with nonfluent aphasia due to left hemisphere damage; LHD – fluent: individuals with fluent aphasia due to left hemisphere damage; RHD: individuals with RHD; HC: Healthy Controls).

associated with the RHD group (Figure 4). A significant higher vocd-D was seen in the nonfluent aphasia group compared to the fluent aphasia group [Z = −2.847; p = 0.003], the RHD group [Z = −2.928, $p = 0.002$] and HC [Z = −3.000, $p = 0.001$]. It was also revealed that individuals with RHD have shown a significantly lower vocd-D compared to HC [Z = −3.368, $p = 0.001$]. These results indicate that the LHD group, especially individuals with nonfluent aphasia, produced more various types of familiar expressions compared to other groups. The results also indicate a low degree of variation of familiar expressions in the RHD group.

Effect of different language tasks on the production of familiar expressions: Do different language tasks (free speech monologue, picture description, story narrative, procedural task) influence the production of familiar expressions in individuals with brain damage?

For the production of familiar expressions in four different language tasks (free speech, picture description, story narrative and procedural task), statistically significant results were found between groups in all four language tasks as shown in Table 4. Kruskal–Wallis H tests revealed that the LHD group produced a higher proportion of familiar expressions compared to other groups (RHD and HC) in all language tasks [Free speech: H(2) = 17.522, $p < 0.001$; Picture description: H(2) = 20.022, $p < 0.001$; Story narrative: H(2) = 19.256, $p < 0.001$; Procedural task: H(2) = 19.088, $p < 0.001$]. As shown in Table 4, the significant differences in median percentage (ratio) of familiar language were observed among all groups across the four language tasks (LHD: 27.2%–31.9%; RHD: 7.0%–11.1%; HC: 8.1%–11.3%). However, the range of the proportions of words within the LHD group, as indicated by the interquartile range, was wide compared to other groups in all four language tasks (Table 4). When

Table 4. Statistical analyses of familiar expressions across language tasks. Values are presented as medians (interquartile range); *p* value was calculated by Kruskal–Wallis analysis; median (interquartile range) followed by the same letter in the same column did not differ significantly; H was test statistics by Kruskal–Wallis analysis.

		LHD	RHD	HC	*p*-value	*H*
words (number)	Free speech	73.5(41.5–124.0)[a]	65.0 (46.5–116.8)[a]	75.0 (30.5–81.0)[a]	0.790	0.472
	Picture-description	51.0(34.0–68.8)[a]	24.0 (12.3–33.0)[b]	29.0 (23.0–40.5)[a]	0.012*	8.784
	Story narrative	63.5 (38.0–96.3)[a]	58.0 (42.5–79.0)[a]	51.0 (36.0–82.0)[a]	0.851	0.322
	Procedure task	9.0 (5.3–15.5)[a]	8.5 (5.5–13.5)[a]	7.0 (4.5–13.5)[a]	0.812	0.417
	Total	188.0 (154.0–295.5)[a]	122.3 (86.0 ~ 146.0)[a]	159.0 (118.5–249.5)[a]	0.401	1.828
words (ratio)	Free speech	30.6 (24.3–43.8)[a]	11.1 (8.5–13.7)[b]	11.3 (10.1–15.8)[b]	0.000*	17.522
	Picture-description	27.2 (19.8–43.7)[a]	7.0 (5.57–9.4)[b]	9.6 (8.7–14.0)[b]	0.000*	20.022
	Story narrative	31.9 (23.9–41.4)[a]	10.6 (9.9–13.1)[b]	10.7 (10.3–12.8)[b]	0.000*	19.256
	Procedure task	31.5 (20.5–38.6)[a]	9.2 (7.8–9.6)[b]	8.1 (5.5–12.3)[b]	0.000*	19.088
	Total	30.1 (22.4–43.2)[a]	10.4 (8.6–12.0)[b]	10.8 (9.6–15.0)[b]	0.000*	19.088

*All *p*-values < 0.05 were considered significant.

comparing nuanced and non-nuanced familiar expressions across tasks between groups, no significant patterns were observed.

Correlation between aphasia severity and the production of familiar expressions: How does the severity of aphasia impact the production of familiar expressions, particularly nuanced expressions?

Spearman correlation analyses revealed a significant negative correlation between the aphasia quotient and the proportion of words in familiar expressions ($r^2 = -0.727$; $p = 0.007$). Such correlations were seen in three of the language tasks (free speech: $r^2 = -0.678$; $p = 0.015$; picture description: $r^2 = -0.699$; $p = 0.011$; story narrative: $r^2 = -0.573$; $p = 0.051$). No such correlation was seen in the procedural task. No significant correlation was also seen between the aphasia quotient and each subcategory of familiar expressions. The results indicate that individuals with mild-to-moderate aphasia produced higher proportions of familiar expressions in the three language tasks (free speech, picture description and story narrative). However, no significant such link was found for the procedural task.

Discussion

Effect of LHD and RHD on the production of familiar expressions

The findings of the present study showed that individuals with LHD produced more familiar expressions compared to other groups (RHD and HC). This result is in accordance with previous studies (Baldo et al., 2016; Lum & Ellis, 1994; D. Sidtis et al., 2009; Van Lancker Sidtis & Postman, 2006; Van Lancker Sidtis & Yang, 2016; Van Lancker Sidtis et al., 2004), providing further evidence for the possible right hemisphere involvement. Also, the results showing the paucity of overall familiar expressions in the RHD group compared to other groups further support the possible right hemisphere contribution to the production of familiar expressions (Brownell & Martino, 1997; Brownell et al., 1995; Kempler & Van Lancker, 1993).

Impact of affect load on the production of familiar expressions

The categorisation of familiar expressions (nuanced versus non-nuanced) is critical since it emphasises how certain expressions communicate layers of emotional attitudinal meaning, while others convey more direct and unambiguous information. The results of the production of different types of familiar expressions by individuals with brain damage further support the right hemisphere contribution and possible left hemisphere involvement in the production of non-nuanced expressions. As was hypothesised, the LHD group produced more nuanced expressions compared to the RHD and HC groups. The findings showed a higher incidence of nuanced familiar expressions, particularly conversational speech formulas and expletives in persons with LHD and a paucity of those expressions in the RHD group. However, such differences were not observed for non-nuanced familiar expressions. These results reference hemispheric specialisation, indicating the right hemisphere involvement in the production of nuanced familiar expressions. It may also indicate the possible contribution of the left hemisphere to the production of non-nuanced familiar expressions. Conversational speech formulas serve social and pragmatic functions, facilitating social connections between speakers (Van Lancker Sidtis & Wolf, 2015; Wray, 2017). Expletives, carrying emotional/affective properties, also serve social functions (building harmonious relations and/or expressing affiliation) (Stapleton, 2010; Wajnryb, 2005). Lack of emotional expression and impaired social communication have been known to be associated with RHD (Blonder et al., 1991; Cummings, 2019; Minga et al., 2021), which can be a possible explanation for the paucity of conversational speech formulas and expletives in the RHD group. Reduced representation of those nuanced familiar expressions may impede social aspects of communication in individuals with RHD (Brownell et al., 1983; Myers, 2005; Van Lancker & Kempler, 1987; Weed, 2008).

Variants of familiar expressions across groups

The current study also examined the production of variants of familiar expressions between the groups. The LHD group produced a greater variety of familiar expressions compared to other groups, RHD and HC, as observed in the modified vocd-D results. These findings may also be explained by the difficulties in formulating novel utterances and high reliance on familiar expressions by individuals with LHD. Individuals with nonfluent aphasia typically have more overt speech and language difficulties characterised by effortful speech and agrammatic speech compared to ones with fluent aphasia. By producing various familiar expressions, individuals with nonfluent aphasia can manage and continue the flow of speech somewhat more easily (Holmes, 1990; Wray, 2017).

Effect of different language tasks on the production of familiar expressions

Contrary to the hypothesis, there was no significant difference in the overall production of familiar expressions across language tasks among groups. However, different patterns were observed in the production of nuanced and non-nuanced familiar expressions by the LHD and RHD groups across language tasks. Individuals with LHD produced higher proportions of nuanced familiar expressions in the free speech and picture description tasks and lower proportions of those expressions in the story narrative and procedural tasks. In contrast, the proportions of nuanced familiar expressions produced by the RHD and HC groups did not vary across language tasks.

Regarding non-nuanced familiar expressions across language tasks, individuals with LHD produced more in the story narrative and procedural tasks, while the RHD group produced a higher proportion of non-nuanced expressions in the free speech and picture description tasks. This suggests that language tasks may differentially manifest language characteristics, with specific language tasks being more effective in eliciting familiar expressions.

Another observation was the wide range of proportion of familiar expressions by the LHD group in all language tasks. This may indicate individual variability in the production of familiar language within the LHD group across different language tasks.

Correlation between aphasia severity and the production of familiar expressions

This study also hypothesised that individuals with more severe aphasia produce more familiar expressions, likely associated with their difficulty with formulating novel language. Spearman correlation analysis revealed significant correlation between language deficits due to aphasia and the proportion of familiar expressions. A higher proportion of familiar expressions were produced by individuals with more severe language difficulties within the LHD group. Participation in communicative activities is significantly limited to individuals with severe aphasia due to these difficulties. Such reliance on familiar expressions in discourse observed in individuals with aphasia may help speakers convey information more quickly and efficiently, decrease cognitive demands and support flow of conversation (Lum & Ellis, 1994; D. Sidtis, 2021; Van Lancker Sidtis & Postman, 2006; Van Lancker Sidtis & Yang, 2016; Van Lancker Sidtis et al., 2004; Wray, 2017).

Limitations and future directions

It is acknowledged that the generalisation of these findings may be limited due to the different types of aphasia of individuals with brain damage and small sample sizes of experimental groups. Future studies might examine productions of familiar expressions and their variants in a larger number of individuals with different or uniform lesion sites. A previous study did highlight differences in lexical diversity across different language elicitation tasks (Fergadiotis & Wright, 2011). Additionally, decisions regarding familiar language types may impact the study outcomes. Although raters' agreement on identifying familiar expressions and their types was high, coding errors may influence the results.

This study further extended current knowledge on the effect of brain damage on the production of familiar expressions, specifically by examining nuanced versus non-nuanced expressions across LHD and RHD. Previous research has shown differences in how these hemispheres process familiar language, but few studies have directly investigated how each hemisphere influences nuanced and non-nuanced familiar expressions. This study fills this gap by offering a clearer understanding of neural mechanisms involved in producing these types of familiar language, which is essential for identifying how specific forms of brain damage influence social communication.

The findings from this study offer a critical foundation for clinical applications. By differentiating the strengths and difficulties in the use of familiar expressions between individuals with LHD and RHD, clinicians can more precisely tailor therapeutic programmes to target specific communication needs. For instance, individuals with RHD could benefit from targeted interventions to increase the use of nuanced familiar expressions, which are crucial for social connectedness. Enhanced understanding of these differences also supports designing interventions that prioritise familiar expressions to improve social interaction and quality of life for individuals with RHD. This study also informs treatment strategies for individuals with LDH by confirming that preserved familiar expressions can be systematically integrated into therapy to enhance communicative competence (Stahl & Van Lancker Sidtis 2015, 4; Stahl et al., 2013, 2020). This research not only clarifies how each type of brain damage affects the production of familiar expressions but also lays a foundation for future studies to explore how these expressions can directly impact social interaction quality, ultimately guiding more effective clinical interventions.

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Data availability statement

The datasets generated during and/or analysed during the current study are available on TalkBank (AphasiaBank: https://aphasia.talkbank.org/and RHDBank: https://rhd.talkbank.org/) corpus.

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