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Short Review

Focus on the building, not the blocks

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Abstract

Objectives: Difficulty with word finding is a pervasive symptom in aphasia and a common target of treatment. This review explored whether therapy-induced naming gains induce improvements to everyday (naturalistic) communication. **Methods:** Online databases were searched for naming interventions that also assessed discourse or functional communication, and for studies of therapies that directly treated them. **Results:** Among the studies that found word production gains following therapy, only about half found that the gains generalized to improved discourse or functional communication. However, discourse and functional communication can be improved by therapies that target them, and often improve word finding as well. **Conclusions:** Generalization of rehabilitation is complex and difficult to achieve. If the therapeutic goal in aphasia is to improve everyday communication, then intervention research needs to shift focus from "building blocks" like word production to the building of discourse and functional communication.

Keywords: Discourse; functional communication; generalization; stroke aphasia; therapy; word finding

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Statement of Research Significance

Research Question(s) or Topic(s): Word finding therapies are some of the most widely used treatments for people with language difficulties (post-stroke aphasia). This review examines whether effects of naming treatment generalize to spoken discourse and functional communication. **Main Findings:** Therapies that target naming do not reliably improve discourse or functional communication. However, these can be improved by therapies that directly target them. **Study Contributions:** This study suggests that, if the goal is improving discourse and functional communication, then aphasia intervention research should focus on treating them.

Introduction

Anomia – difficulty with word finding – is a pervasive symptom in aphasia; indeed, it is often considered the defining feature of aphasia (e.g., Caplan 2012). Many aphasia treatments consider words as the "building blocks" of verbal communication, and focus on improving word-finding as a foundation for improving spoken discourse.

(Spoken) discourse describes language production beyond the single clause (Dressler et al., 1978; Ulatowska & Olness, 2007), which is produced for a specific purpose or function (Dipper et al., 2021a; Halliday, 1978). It includes the lexical, phonological and syntactic aspects of single words and sentences (i.e., microstructure; Glosser & Deser, 1992) and the processes that maintain its conceptual/semantic coherence (i.e., macrostructure; van Dijk, 1980). Discourse is often associated with conversation, such as taking a "turn" to recall an event when talking to someone. In aphasia intervention, discourse is frequently associated with monologue (c.f., Simmons-Mackie et al., 2016 for a conversation-focused review), which is typically assessed through personal narratives or picture descriptions. A closely related concept is "functional communication": the use of language to communicate effectively in the real world (Doedens & Meteyard, 2022). Functional communication assessments tend to rely on the social functions of communication, and the impact of aphasia on a person's everyday activities (e.g., Holland, 1998). Thus, discourse and functional communication are different approaches to capturing naturalistic, everyday communication (e.g., sharing information, establishing and maintaining relationships; Davidson et al., 2003).

A recent article by Cavanaugh et al. (2024) reported a relatively large-scale ($n = 60$) retrospective analysis of discourse production following high-intensity semantic feature analysis (SFA; Boyle & Coelho, 1995; Massaro & Tompkins, 1994). SFA is a well-established treatment for anomia based on rebuilding semantic networks to facilitate retrieval of the correct word during object naming (a closely related treatment uses semantic networks around verbs: Edmonds et al., 2009). A recent meta-analysis showed that SFA is effective at improving naming of trained words and generalizes to untrained words (Quique et al., 2019).

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Cavanaugh and colleagues found that, unfortunately, SFA did not result in improvements in discourse, such as informativeness or grammatical complexity. Even word-level aspects of discourse, such as lexical diversity (type-token ratio) and rate of semantic errors, did not improve. This lack of generalization is potentially a very serious problem: a recent review (Goodman et al., 2026) found that people with aphasia overwhelmingly prioritize function-focused rehabilitation goals, but only a small minority of federally funded aphasia clinical trials measure functionally focused primary outcomes. The vast majority of trials use impairment-based measures; but if improvements in specific impairments (such as word finding) do not generalize to function-focused rehabilitation goals, then our research resources are not aligned with the goals of people with aphasia.

In the present study, we conducted a systematic review to determine whether the lack of generalization observed by Cavanaugh et al., is a general pattern. A preliminary literature search showed that much of the work on generalization used single case studies. Such studies are an important cornerstone of the aphasia treatment literature (Thompson, 2006) and can rigorously demonstrate within-subject effects. However, those effects are inherently limited to the particular single-cases, and do not license generalization to other individuals (Backman & Harris, 1999; Shadish et al., 2002). When considering generalization to a population, the size (and representativeness) of the sample is critical, so we decided to focus on the largest available studies. We set the threshold at $N > 15$ participants as a convenient definition of "largest studies." We focused on interventions that targeted naming (primary outcome) and measured discourse or functional communication (secondary outcome). We hypothesized that improvements in naming would not systematically generalize to discourse or functional communication. We also used the same systematic review approach to assess whether discourse and functional communication are amenable to treatments that target them. Our hypothesis was that such treatments would improve discourse and functional communication. We also considered whether these treatment effects generalize to naming, but did not have an a priori hypothesis about whether such generalization should occur or not.

Methods

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Page et al., 2020). Studies were included if they were: a monolingual intervention with 15 or more participants; written in English; conducted in the chronic phase (at least 4 months post stroke, Simmons-Mackie et al., 2016); and measured both picture naming and either discourse or functional communication. Interventions directly targeting discourse or functional communication, without necessarily testing naming, were further included. Studies were excluded if participants had a co-morbid neurodegenerative condition; did not report new data (reviews or meta-analyses); were pharmacological therapies; or interventions that used a speech device or transcranial magnetic stimulation to enhance communicative recovery. Multimodal interventions, which allowed the use of multiple communicative modes (speech, gesture, images, etc.), were included. Multilevel interventions combining more than one linguistic level (e.g., words, micro and macrostructure, pragmatics) were excluded because our focus is on generalization from naming treatment to discourse or functional communication. Studies conducted in the acute or subacute stage were also excluded as there is substantial natural recovery in the days and weeks after stroke (Hope et al., 2017; Stefaniak et al., 2020).

Online literature searches were conducted on 27 July 2025 using PsycINFO, PubMed and Scopus databases (*CINAHL Plus was subsequently searched*[1] *for any additional articles meeting the search criteria)*. The following compound search term was used:

Stroke aphasia
AND
(Naming OR Word finding difficult* OR Anomia)
AND
(Connected speech OR Spoken discourse OR Functional communication)
AND
(Therap* OR Treat* OR Intervention*)

Search results were screened using Covidence systematic review software (www.covidence.org). We added 17 studies through citation searching. Duplicates were removed by the software.

The titles and abstracts were screened according to the inclusion/exclusion criteria. The first author conducted an initial full review of each article, then discussed their inclusion with the second author. The full text of the included articles was read fully to extract the relevant results. A flowchart of the process produced by Covidence is shown in Figure 1.

Results

A total of 16 studies met our inclusion criteria: nine studies that reported successful naming therapies and tested generalization to discourse or functional communication, and seven studies that tested discourse or functional communication treatments.

Naming interventions

The nine naming treatment studies reported improved naming in a total of 344 participants. For discourse measures, three studies found no generalization from successful naming treatment (Cavanaugh et al., 2024; Efstratiadou et al., 2019; Woolf et al., 2016), one found mixed evidence (Silkes et al., 2021, found improvement in discourse informativeness from PMT but not from SFA). Three studies found improvements in discourse (Conroy et al., 2018; Silkes et al., 2019; Upton et al., 2024), though two of these found improvements specifically for the trained items (Conroy et al., 2018; Upton et al., 2024). For functional communication measures, one study found no generalization from successful naming treatment (Palmer et al., 2019), one found mixed evidence (Efstratiadou et al., 2019, reported no change at immediate testing, but improvement in a different measure at follow up), and one study found improvements in functional communication (Masson-Trottier et al., 2024). Thus, although each of these interventions improved naming (direct therapeutic target), only about half of them found that these benefits generalized to discourse or functional communication (often limited to improved production of trained words in a discourse context). See Table 1 for a summary of the results.

Discourse and functional communication therapies

Our search yielded seven studies that targeted and improved discourse or functional communication in a total of 364

[1]We thank an anonymous reviewer for suggesting this database. All relevant articles were already captured by the other databases, so no new articles meeting our criteria were identified.

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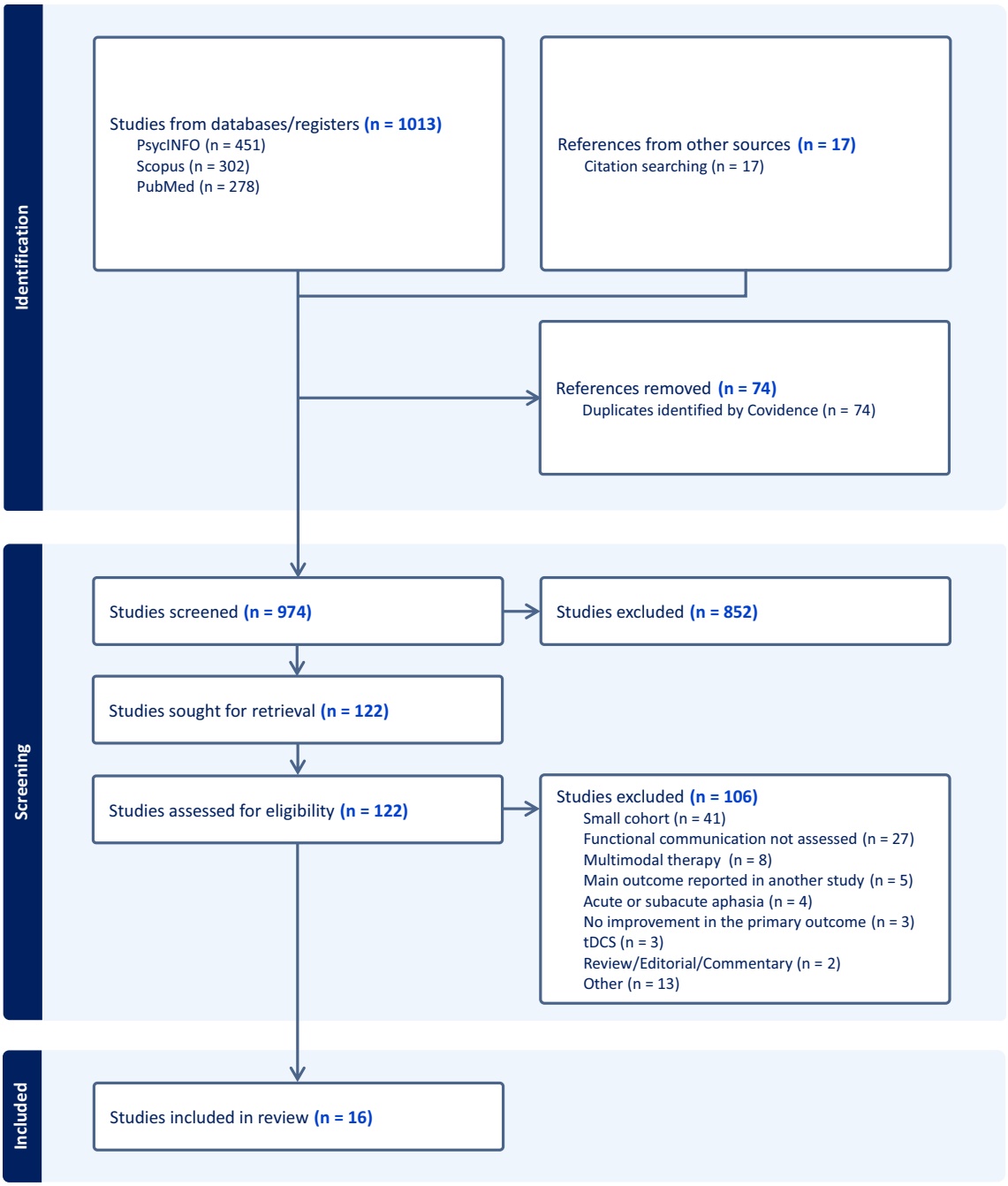


Figure 1. PRISMA flow diagram of search results.

participants (Hoover et al., 2025; Macoir et al., 2017; Marshall et al., 2016; Meinzer et al., 2005; Pierce et al., 2024; Rose et al., 2022; Tetnowski et al., 2021). Four of these interventions also improved naming (Hoover et al., 2025; Meinzer et al., 2005; Pierce et al., 2024; Rose et al., 2022), one did not find improved naming, and two studies did not test naming. See Table 2 for more detailed descriptions of the interventions and their findings.

Discussion

Our review reveals two major points: first, treatments that target naming can successfully improve naming, but only about half of these studies found that improvements generalized to discourse or functional communication, and much of that benefit was tied specifically to improved production of the treated words. Second, treatments that explicitly target discourse and functional communication can successfully improve them, and often improve naming also. That is, naming improvements are more common as a side effect of improving discourse or functional communication (found in 4 out of 5 studies), than as a "building block" or "active ingredient" in the success of aphasia treatment (found in only half of the studies).

Generalization from more complex treatment targets (discourse production) to simpler ones (single word production) appears to be more effective than generalization from simpler to more complex levels. A similar asymmetry has been labeled the

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Table 1. Interventions targeting naming (primary outcome) that also measured discourse

Authors	Number of participants	Therapy	Outcomes on naming	Outcomes on discourse or functional communication
Cavanaugh et al. (2024)	60	• Semantic feature analysis (SFA; Boyle & Coelho, 1995) • Participants received SFA 4–5 days per week over 4 weeks for a total of approximately 60 hours • *n = 40* treated on three lists of five words; *n = 16* treated on three lists of 10 words; *n = 4* treated on four lists of 10 words • The therapy was delivered by a speech therapist	Improvement in word finding (treated and untreated items; reported for *n = 44* in Gravier et al., 2018; Evans et al., 2021)	No improvement in discourse-level measures, including: • lexical-semantic processing • lexical diversity • grammatical complexity • discourse informativeness
Conroy et al. (2018)	20	• Standard treatment (sound-based naming cues, *n = 10*) • Novel treatment (repeated, increasingly speeded production, *n = 10*): speed- and accuracy-focused treatment that encouraged participants to name treated words progressively quicker • Treatment intensity and length: 2 sessions per week (lasting between 30 and 50 minutes) for 3 weeks • Each participant worked on 40 words per therapy type	Improvement in word finding (treated items)	• Improvement in word finding (treated words) during picture description. (The effect was larger for the novel treatment); and the number of unique nouns produced (but no improvement to nouns per minute, type/token ratio or average imageability rating) • Decrease in the average word frequency of the nouns used
Efstratiadou et al. (2019)	38	• Elaborated – SFA (E-SFA; Papathanasiou & Mihou, 2006), delivered either individually *(n = 12)* or in a combination (both individually and in a group setting, *n = 14*) • In E-SFA, once the word is retrieved, the person with aphasia is asked to use it together with its semantic features in a phrase or sentence • Delayed treatment control group *(n = 12)* • Treatment intensity and length: 3 hours of E-SFA per week for 12 weeks (individual therapy) • Two 45-min individual therapy sessions and one 1.5 h group session per week for 12 weeks (combined therapy) • Treatment stimuli were chosen from a set of 260 words that each participant had failed twice to name • The therapies were delivered by speech therapists	Improvement in word finding (treated and untreated items)	• No improvement in discourse effectiveness and a measure of functional communication (immediate testing) • Improvement in a different measure of functional communication (follow up testing)
Masson-Trottier et al. (2024)	18	• Phonological component analysis (PCA; Leonard et al., 2008) in French • Treatment intensity and length: fifteen 1-hour sessions, with a frequency of three weekly sessions for 6 weeks • Participants were treated on 20 words (there were an additional 40 words which were untreated) • The therapy was delivered by a speech therapist	Improvement in word finding (treated and untreated items)	Improvement in functional communication
Palmer et al. (2019)	83	• Usual care & computerized speech–language therapy (word finding exercises, *n = 83*) • Usual care & attention control (puzzle activities, *n = 71*) • Control: Usual care (no/minimal therapy, *n = 86*) • Treatment intensity and length: 20–30 minutes of daily, at-home, practice over a 6-month period. Volunteers or therapy assistants were further asked to visit for at least 1 hour once a month. • Participants were treated on 100 words • The therapies were delivered by speech therapists or therapy assistants	Improvement in word finding (treated items) for the usual care & computerized speech–language therapy group	No improvement in functional communication
Silkes et al. (2019)	26 *	• Phonomotor therapy (PMT) to strengthen a patient's ability to produce phonemes in progressively longer words and nonwords • Participants were provided two hours of therapy per day, five days per week for six weeks, for a total of 60 hours • Participants were trained on 42 words and 72 nonwords • The therapy was delivered by speech therapists	Improvement in word finding (reported in Kendall et al., 2015)	• Improvement in discourse effectiveness at immediate and follow up testings post-therapy • Improvement in discourse informativeness at follow-up only

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Table 1. (*Continued*)

Authors	Number of participants	Therapy	Outcomes on naming	Outcomes on discourse or functional communication
Silkes et al. (2021)	57 *	• SFA ($n = 29$) • PMT ($n = 28$) • Participants were treated either an 80-noun, low-frequency or high-frequency, word sets (depending on their naming severity) • Treatment intensity and length: 8–10 hours/week over the course of 6–7 weeks, for a total of between 56-60 hours • The therapies were delivered by speech therapists	Improvement in word finding (reported in Kendall et al., 2019)	• No improvement in discourse informativeness for the SFA participants • Improvement in discourse informativeness for the PMT participants at follow up only †
Upton et al. (2024)	27	• iTalkBetter: a digital confrontation naming intervention with error-reducing, phonological cues • Treatment intensity and length: six weeks of self-managed, app-based therapy (iTalkBetter), with a target dose of 60 hours (~90 min/day) • The therapy consisted of 220 words. Half were'core therapy' items of very high frequency and were the same for all participants (they were not assessed on the primary, word retrieval test). The other 110 were "treated" items, and they varied across participants	Improvement in word finding (treated items)	Improvement in word finding (trained items) during picture description
Woolf et al. (2016)	15	• Word finding therapy delivered in person ($n = 5$); or virtually at the University ($n = 5$) or at a clinical site ($n = 5$) • Attention control group in supported conversation ($n = 5$) • Treatment intensity and length: 8 one-hour therapy sessions delivered twice a week • Each participant worked on 50 words • The therapies were delivered by speech therapists	Improvement in word finding (treated items)	No improvement in word finding during discourse (conversation), as assessed by: • proportion of substantive turns • mean number of content words per turn • mean number of nouns per turn

* The participant cohorts were different.
† This finding was in line with the authors' hypothesis based on their previous work (Silkes et al., 2019).

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Table 2. Interventions targeting discourse or functional communication

Authors	Number of participants	Therapy	Outcomes on discourse or functional communication	Outcomes on naming
Hoover et al. (2025)	104*	• Setting therapeutic targets to increase the effectiveness of conversation (e.g., increasing the number of turns, or the accuracy of key words, in conversation). • Participants were equally divided into: Dyads, large groups ($n = 6$–8), and controls (no/delayed therapy) • Conversation group treatment was 1 hour, twice weekly, over 10 weeks (20 hours in total) • The therapies were delivered by either by speech therapists or trained speech therapy students (supervized by speech therapists)	Improvement in functional communication in the primary outcome (but not as a secondary outcome) for the large group only	Improvement in word finding for both dyads and large groups
Macoir et al. (2017)	20	• Promoting Aphasics' Communication Effectiveness (Davis & Wilcox, 1985) delivered virtually: participants were encouraged to use any residual verbal and non-verbal strategies (e.g., drawing, gesturing, writing) to convey information • Treatment intensity and length: participants received 9 therapy sessions (3 per week) over a 3 week period • Participants were treated on 30 words • The therapy was delivered by speech therapists	Improvement in functional communication, as assessed by: • an increase in communication effectiveness • an increase in the number of different communication strategies used • a decrease in communication exchange duration • a decrease in the number of communication acts	N/A
Marshall et al. (2016)	20	• Participants practiced their communicative skills with other people in a virtual reality platform, called EVA Park. The simulated locations included everyday environments and more fantastical locations and elements • Participants chose functional communication goals they wanted to achieve (primary therapeutic outcome) • Treatment intensity and length: Each participant had unlimited access to EVA Park for 5 weeks, in which they received supported language stimulation. They had daily sessions with a support worker (25 sessions in total), each lasting approximately one hour. They could also virtually meet and communicate with other participants any time they wanted. Once a week all participants and their support workers met for an hour long group discussion • Participants accessed EVA Park virtually from their home	• Improvement in functional communication (clinician-rated) • No improvement in word finding in conversation, or narrative production	No improvement in single word production
Meinzer et al. (2005)	27	• CIAT Plus *($n = 15$)*: included written materials and photographs of everyday situations; and daily communication exercise with a family member • CIAT *($n = 12$)* • Treatment intensity and length: 30 hours of training over a 2-week period (3 hours/day)	Improvement in functional communication	Improvement in word finding
Pierce et al. (2024)	33	Low–moderate intensity therapies: • M-MAT *($n = 16$)* • CIAT *($n = 17$)* • Treatment sessions ran 2 hours a day, 3 days per week for 5 weeks (30 hours). • Participants were treated on 80 words	Improvement in: • functional communication • discourse effectiveness	Improvement in word finding (treated items)
Rose et al. (2022)	140	High intensity therapies: • Multimodality Aphasia Therapy ($n = 70$): it allowed the use of any multimodal communicative features (M-MAT, Rose & Attard, 2011) • CIAT Plus *($n = 70$)* • Usual care *($n = 61$)* • Treatment sessions ran 3 hours a day, 5 days per week for 2 weeks (30 hours). Participants were further instructed to do a daily, 15-minute, home practice communication task • Participants were treated on 80 words • The therapies were delivered by speech therapists	• Improvement in functional communication • No improvement in discourse effectiveness	Improvement in word finding (treated items)
Tetnowski et al. (2021)	20	• Conversation-based treatment (based on Facilitating Authentic Conversation, Damico et al., 2015) • Participants were divided into dyads ($n = 2$), or groups ($n = 4$-6) • Treatment intensity and length: participants underwent 40 hours of treatment • The therapies were delivered by either by speech therapists or trained speech therapy students (supervized by speech therapists)	The discourse (conversations) of people with aphasias improved, as determined by: • more efficient conversation • fewer trouble sources • shorter repair sequences	N/A

* Preliminary analyses on a subset of these participants were reported in previous studies (e.g., DeDe et al., 2019; Hoover et al., 2020, 2021).

Complexity Account of Treatment Efficacy (Thompson et al., 2003, p.11): training the production and comprehension of syntactically complex structures induces improvements to less complex forms, but the opposite effect (i.e., simple syntactic structures generalizing to more complex ones) does not occur.

On generalization

The term "generalization" is used to refer to (at least) three different cases: (1) "within level" improvement at the same linguistic level as the focus of treatment (e.g., picture naming intervention generalizing to untreated words), (2) "across level" improvement at a different linguistic level (e.g., picture naming intervention generalizing to discourse) (Webster et al., 2015, p. 1241), and (3) transfer of trained behavior(s) to a new context or environment (e.g., improved production of trained words in a discourse context).

The logic of single-word naming treatment research is that improved naming of treated words will generalize to other words (near transfer to untreated words), which will improve word production in discourse (far transfer to communication success). However, generalization is a difficult problem in cognitive training (e.g., Sala & Gobet, 2019), sometimes called the "curse of specificity" (Bavelier et al., 2012, p.392). Despite anomia being a pervasive symptom in aphasia, improved naming of isolated objects usually does not generalize to more naturalistic tasks, even closely related ones that should be based on the same cognitive mechanisms (Doedens & Meteyard, 2022; Herbert et al., 2014). Indeed, it may be wrong to assume that human communication is decomposable into building blocks like naming, which can be removed from the context of discourse production, listening, turn taking, and non-verbal features (Matusz et al., 2019). Interventions targeting only naming are multiple therapeutic steps away from discourse, and should not be assumed to generalize to it.

Multilevel intervention studies have expressly argued that in order to improve discourse, it should be targeted directly. One such example is Language Underpins Narrative in Aphasia (Dipper et al., 2024), a theory-based, codesigned, discourse intervention that integrates multiple standard treatments (e.g., SFA, mapping therapy, story grammar) to provide metalinguistic tools for improving discourse (personal narratives). Another example is Narrative and Discourse Intervention in Aphasia (Whitworth et al., 2015; Whitworth, 2024), a structured therapy targeting discourse microstructure to build macrostructure for a range of monologues (e.g., telling stories, giving opinions, explaining procedures, recounting events). The success of such therapies suggests that word finding tasks can be useful as a "stepping stone" on the way to discourse treatment.

Considerations

The naming interventions that measured "discourse" as a secondary outcome had considerable variability in their choice of assessment. For example, some studies used Correct Information Units (e.g., Cavanaugh et al., 2024; Efstratiadou et al., 2019), which were unrelated to the treatments, and generally did not elicit the production of treated words (naming targets). Other studies tailored the discourse stimuli to the treatments, and found better generalization outcomes (e.g., Conroy et al., 2018; Upton et al., 2024). This indicates that generalization of naming improvements may be limited to improved production of those specific words in a slightly different context rather than improved discourse or communication more broadly.

"Functional communication" is often assessed by person- or partner-rated measures, and could reflect personal biases in ways that more objective discourse measure do not. For example, the Communicative Effectiveness Index, (CETI; Lomas et al., 1989) is a widely used, psychometrically validated, partner-reported measure of functional communication that was administered in several of the functional studies we reviewed (Meinzer et al., 2005; Pierce et al., 2024; Rose et al., 2022). The naming interventions (Table 1) tended to use more objective discourse measures while the functional communication interventions (Table 2) tended to use more subjective measures, so it is not a direct comparison. Although discourse and functional communication are often correlated, we should not assume that functional communication improvements are equivalent to discourse improvements. In fact, the functional communication therapy described in Marshall et al. (2016), which addresses users' functional goals (e.g., ordering food at a restaurant) did not improve discourse production, and only improved confrontational role play tasks (in the Communication Activities of Daily Living, CADL; Holland, 1998) that were very similar to the therapy. Across all of the studies we reviewed, the most consistent pattern is that interventions (both naming and discourse/functional) tend to improve their primary outcome, with limited generalization to anything else.

The ease of measuring object naming probably contributes to its prominence in aphasia research. Discourse and functional communication are multi-dimensional and interactive in nature, making it more challenging to capture change (pre vs post therapy), and there are many – possibly non-equivalent – measures of discourse and functional communication (Bryant et al., 2016). Recently, there has been an increased interest in formally standardizing discourse measures for aphasia (Cruice et al., 2022; Dipper et al., 2021b; Dutta et al., 2023). For instance, the FOQUSAphasia (FOstering the QUality of Spoken discourse in Aphasia) working group has begun to systematically collect and analyse the neuropsychological/psychometric properties, and normative data, for some of the most commonly used discourse measures (Stark et al., 2021). Additionally, the functional assessments that have been developed often emphasize time-efficiency and ease of administration to facilitate adoption in research and clinical settings. For example, the CADL and CETI have been developed to be used by clinicians as well as non-clinicians/researchers, and they only take 30 minutes and 10–15 minutes to administer, respectively (Holland et al., 2018; Lomas et al., 1989). Such measures should be included in tests of naming treatments whose overarching goal is to improve communication.

Concluding remarks

The "curse of specificity" is remarkably prevalent within speech–language therapy. Treatments targeting naming can improve naming, but only about half found improvements in discourse or functional communication. In contrast, treatments that target discourse and functional communication can improve them, and often improve naming performance as well. Future research should follow the lead of interventions that targeted discourse or functional communication, build on them, and uncover cognitive and neural basis of improving discourse and functional communication.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S1355617726102252.

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