Repeating purposefully: Empowering educators with functional communication models of echolalia in Autism

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Abstract

Background and Aims: Echolalia, the repetition of speech, is highly prevalent in school aged children with Autism. Prior research has found that individuals with echolalia use their repetitions to engage in communicatively functional speech, in the absence of self-generated speech. Educators are the natural audience for a wide vary of echoed utterances across environments and in differing contexts. The objectives of this paper were three-fold: (1) to systematically investigate how researchers identify and ascribe communicative function to echoed utterances; (2) to gather and evaluate the evidence that might assist teachers to identify and better understand echoed utterances as being communicatively purposeful; and (3) to provide teachers with evidence-informed response strategies they can use to assist their students on their journey towards more self-generated speech.

Main Contribution: Prior research in the field of echolalia has generally been segmented into opposing viewpoints. A paucity of work in the echolalia field has meant that there is limited work that has sought to view how a communicative function to echolalia has been ascribed from across multiple disciplines and fields. As such, there is limited literature to guide the practice of classroom educators. This review combines communicative models from across various disciplines with the view to supporting classroom educators by providing guidance on how they might assist their students with echolalia. This review represents the first contribution to the research literature in this area.

Conclusions and Implications: Research into echolalia did not originally emanate from the field of education; however, anecdotes from classroom educators were cited as the primary impetus for the creation of some of the communicatively functional models. We found that although there are many techniques that researchers have used to attribute a communicative function to echolalia, some of these can be easily employed by educators in their practice. By adopting these techniques, educators are placed in a position that may assist with the identification of communicative echolalia; subsequently they are better placed to acknowledge and respond to their students.

Keywords

Echolalia, communication and language, special education, Autism spectrum disorder

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Echolalia—the immediate or delayed repetition of previously heard speech from songs, TV shows, movies or communication partners—is frequently produced by individuals with Autism. Historically, researchers estimated that it occurred in up to 85% of all individuals with Autism Spectrum Disorders (ASD) who develop speech (Rutter et al., 1967; Rydell & Prizant, 1995). More recently, Roberts (2014) highlighted that this figure might, more likely, be almost all children with ASD who develop speech; citing that echolalia can be considered as a defining characteristic of ASD.

Research has generally focused on echolalia in school-age children and adolescents (Charlop, 1986; Dyer & Hadden, 1981; Fay, 1969; Gladfelter & VanZuiden, 2020; Local & Wootton, 1995; Marom et al., 2018; McEvoy et al., 1988; Prizant & Duchan, 1981; Prizant & Rydell, 1984; Roberts, 1989, 2014; Sterponi & Shankey, 2014; Tarplee & Barrow, 1999; Wootton, 1999). Some such research has reported that students' forms of echolalia can alter during interactions with various communication partners and across different environments throughout the school day (Charlop, 1986). Echolalia is therefore not necessarily a fixed characteristic of an individual. Rather, echolalia appears as something that is amiable to change with the influence of teachers and other elements of the child's environment. It is therefore important that, teachers in particular, who are in contact with these children for substantial proportions of the working day, are empowered with the knowledge and resources to support students who use echolalia (herein identified as *The Echolalic)* and to better understand their role and influence as a communication partner. This systematic review was therefore conducted as part of a larger project, to gather, develop and synthesise the evidence needed to inform resources for educators working with children with ASD who use echolalia.

As a precursor, it needs to be acknowledged that much contention exists as to whether or not echolalia should be classified as a type of repetitive behaviour. Behaviourally-orientated researchers, who use the term *vocal stereotypy* to encompass echolalia, contend that repetitive speech serves no communicative purpose (Ahearn et al., 2007; Cook & Rapp, 2018; Lanovaz et al., 2016; Shawler et al., 2019). They group echolalia with other stereotypical, repetitive, self-regulatory behaviours such as: hand-flapping, spinning, swinging, swaying, striking objects, and body rocking (Antezana et al., 2019; Kim & Lord, 2010; Leekam et al., 2011). Early researchers, from a behavioural background, labelled echolalic utterances as meaningless, non-functional, and undesirable (Coleman & Stedman, 1974; Lovaas et al., 1974). It was believed at the time that echolalia should be abated through behaviour modification training, and functional language should be taught as a replacement (Lovaas, 1987; Lovaas et al., 1974). This is still the opinion held by some behaviourally-oriented professionals, as evidenced

by an ongoing cascade of abatement intervention trials designed to target vocal stereotypy, including echolalic utterances (Giles et al., 2018; Healy et al., 2019; Lanovaz et al., 2012; Sloman et al., 2022).

At this time, however, there remains a paucity of literature that has examined language longitudinally after abatement procedures have been implemented. As such, it is not yet established if functional language, or indeed more sophisticated self-generated language, can be taught once repetitive speech has been extinguished. The behavioural philosophy rationalises abatement intervention practices based upon the condition that vocal stereotypy is present, without giving due consideration to if communicative intent, or function, exists within echoed utterances. Some researchers have suggested that vocal stereotypy should be attenuated because it is disruptive in the learning environment and is socially stigmatising (Ahearn et al., 2007; Haley et al., 2010). However, as Stiegler (2015) highlighted, much confusing variation is found in the behavioural definitions and descriptions of vocal stereotypy.

By contrast, developmentally-oriented researchers across several disciplines support the notion that echolalia holds value as a communicative resource (Dyer & Hadden, 1981; Fay, 1967; Marom et al., 2018; McEvoy et al., 1988; Prizant & Duchan, 1981; Prizant & Rydell, 1984; Sterponi & Shankey, 2014; Tarplee & Barrow, 1999; van Zyl et al., 1985). This literature includes succinct and consistent descriptions of echolalia, centred around the language/communication components of the phenomenon. For example, among developmentally-oriented researchers and practitioners it is generally accepted that there are four categories of echolalia; pure immediate, pure delayed, mitigated immediate and mitigated delayed.

Immediate echolalia has often been referred to as occurring within two conversational turns (Buium & Stuecher, 1974; Dorrian & Potter, 1984; Gladfelter & VanZuiden, 2020). In practice, a communication partner might say "it is hot weather today", and the child may respond with an exact reproduction of the entire previous phrase, or only the last few words, "weather today" or "today". Delayed echolalia on the other hand, is most commonly operationalised as a repeated utterance that is produced, after two conversational turns following the original utterance (Gladfelter & VanZuiden, 2020; Local & Wootton, 1995; Tarplee & Barrow, 1999). The repeated utterance might be heard at a delay of hours, days, weeks or longer—and the original source could be a movie, song, or phrase said by someone significant to the Echolalic (Charlop, 1986; Rydell & Mirenda, 1991; Stiegler, 2015; Wootton, 1999). Take for example the participant in the study by, Wootton (1999) who repeated *"You do not touch anyone's work, Kevin"* (1999, p. 362) a phrase that originated from his class teacher many months prior. In contrast to pure echolalia, a mitigated echo is defined by Fay (1967) and Roberts (2014) as a repeated utterance that contains

additions, deletions or substitutions of words that were in the original utterance. In practice, an original utterance, "I'll show you how it works", was documented in a study by Fay (1967) as ,"how it works, okay".

Further to the unresolved differences between the behaviourally-orientated and developmentally-oriented schools of thought, there is a paucity of echolalia research originating from the discipline of education. It is classroom teachers and paraprofessional classroom assistants that generally spend the greatest amount of time across the course of the day with these children and are consequently the natural audience to a much higher quantity and wider variety of echolalia than any other professional. Teachers and paraprofessionals routinely provide rich communicative opportunities for their students and assist in expanding their verbal repertoires, yet they receive little to no training with regard to managing echolalia.

The academic literature therefore contains mixed messages for teachers and paraprofessionals, and a paucity of evidence-informed guidance on the first-hand experience of classroom teachers and paraprofessionals. A collaborative, interprofessional practice model might lead to improved outcomes for these children. However, to put such a model into practice teachers, paraprofessionals, psychologists and Speech Language Pathologists (SLPs) need to share a better understanding of how to consistently identify, analyse and respond to communicative attempts that are presented in the form of echolalia.

The objectives of this paper were therefore three-fold: (1) to systematically investigate how researchers identify and ascribe communicative function to echoed utterances; (2) to gather and evaluate the evidence that might assist teachers to identify and better understand echolalic utterances as being communicatively purposeful; and (3) to provide teachers with evidence-informed response strategies they can use to assist their students on their journey towards more self-generated speech.

Method

In the first instance, it is important to provide some clarity on several key terms found within echolalia literature: 'model', 'functional model', and 'communicative model'. A model is a theoretical explanation of how various components of a system fit together to form a cohesive whole. A functional model provides an explanation of how these various components work together to achieve an identified purpose or outcome. A communicative functional model is understood to be a model that explains how people interact for the purposes of exchanging information and co-creating meaning and understanding. In the current review, models of echolalia are understood to be explanations of how, and to what purpose, people with Autism might use repetitive speech—in their interactions with peers, parents and teachers—as theorised by researchers from various disciplines, such as those from the behavioural, developmental or educational sciences.

In order to conduct a comprehensive review, it was deemed important by the authors to draw on the functional models from across disciplines in order to understand how function might be attributed to echolalia. As such, a comprehensive review of databases was undertaken. Specifically, the databases of *ProQuest, Web of Science, ERIC, Scopus and PubMed* were systematically searched. Initially, the authors started the search with the broad concepts of 'echolalia', 'function' and 'model', after which diagnostic specific criteria were applied. Diagnostic terms used to ascribe a specific population of study included *Autism, Autism spectrum disorder, Autism spectrum condition and infantile Autism.* Some studies used previous diagnostic criteria such as, DSM-3/DSM-4 or ICD-10, or earlier, and employed different terminology such as, childhood schizophrenia, pervasive developmental disorder, when describing the conditions of their participants. Hitherto, these differing terms were commonly used in place of what would now be considered Autism spectrum disorder in current diagnostic criteria, DSM-5 and ICD-11. It was deemed important to capture the entirety of communicatively functional literature on echolalia within Autism, therefore papers that used 'older' terms to identify Autism were accepted for inclusion.

The inclusion criteria, which were: a) participant diagnosis of ASD made though using the most standard evaluation procedures available, *and/or* b) includes two-or-more fully described categories of communicatively functional echolalia. Exclusion criteria included: a) papers that sought to examine the interactive qualities of echolalia, without advancing a communicative functional model, and/or b) intervention trials, and c) other systematic or literature reviews. No date range filters were applied; however, results were limited to English full-text availability. The procedure for examining the literature was as follows and is presented visually in the flow diagram, Figure 1. Initially 185 articles emerged from the first author's keyword searches as possible candidates for inclusion in the review. These articles were all subjected to screening by the first author, at the title and abstract level, by exploring for any evidence that a model of echolalia as functional communication was included. Subsequently, 100 articles were excluded through this process, leaving 85. The articles that were excluded had no explicit mention of echolalia as functional communication. Next, the first author conducted a thorough examination of the introductions and methods sections of the 85 remaining articles, applying the stated inclusion criteria. At this step, 70 articles were found to be ineligible for inclusion based on not meeting one or more criteria, leaving 15 articles. Finally, a complete and thorough reading of the remaining articles was undertaken by the first and second authors. These articles were discussed, debated, and compared to the inclusion criteria
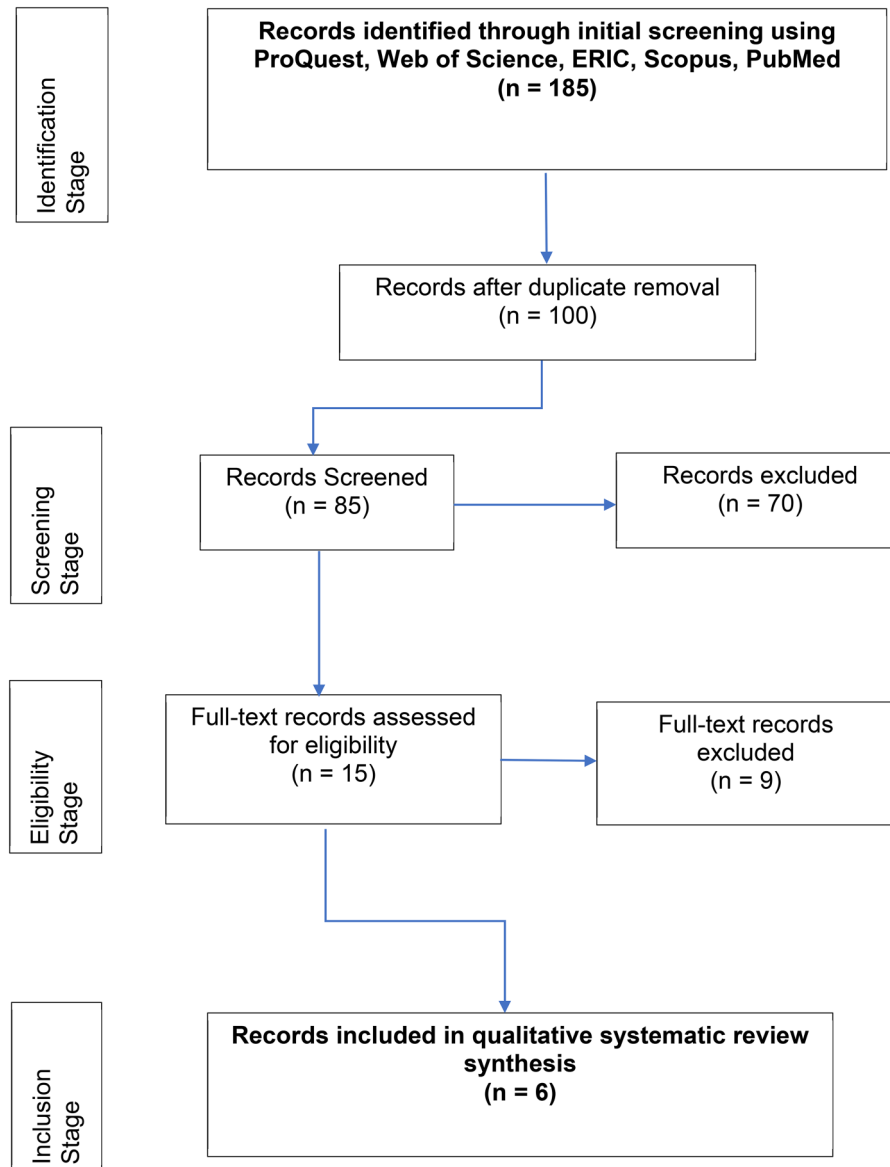
Figure 1. Literature search flow diagram.

one by one, with a further nine eliminated. By the end of the process, six articles remained, and these formed the basis of the current review.

It is prudent to highlight that within the literature there have been a number of investigations which have used terminology that suggests functionality and interactivity but are not functional models. Specifically, McEvoy et al. (1988) commissioned an examination that sought to test the functional categories advanced years earlier by Prizant and Duchan (1981). The authors supported the views that echolalia can have a social facilitation function, in addition to showing other signs of interactivity. The McEvoy et al. (1988) article is not included in the review because, whilst the authors support function and highlight interactivity, they did not advance a communicatively functional model comprising two, or more, fully described communicative functions. In a similar vein, van Zyl et al. (1985) suggested that their study participants used immediate echolalia interactively. They devised a six-categorical system for analysing each occurrence of echolalia. The authors noted that their participants used their echoes for initiations at a much higher rate than that was recorded by McEvoy et al. (1988) and Prizant and Duchan (1981) and Prizant and Rydell (1984). Similar to that of the McEvoy et al. (1988) study, van Zyl et al. (1985) did not advance a communicative functional model and was subsequently discounted from inclusion in this review. Others too have found that the individuals with echolalia also showed clear evidence of interactivity with their communication partners whilst echoing (see Local & Wootton, 1995;
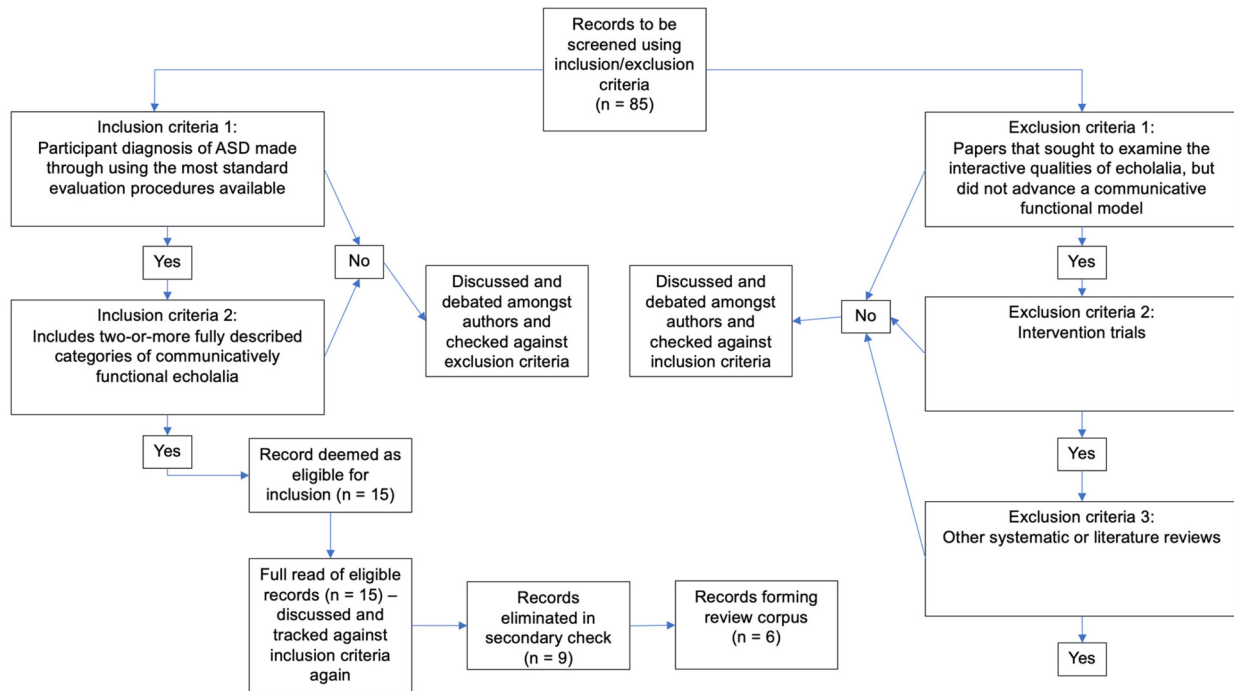
Figure 2. Article inclusion/exclusion flow diagram.

Manning & Katz, 1991; Tarplee & Barrow, 1999; Wootton, 1999). Similarly, however, these authors did not advance communicatively functional models and thus were excluded from the current review.

Here it is important to note that there are key differences between two terms commonly found in echolalia literature—communicatively functional and non-communicatively functional. Specifically, communicatively functional echoes are those that are voiced with the intention of either starting, contributing to, or ending a dialogue between the Echolalic and the communication partner. Non-communicatively functional echoes, termed as 'cognitive echoes' by Prizant and Rydell (1984) are repetitions that may serve a cognitive function, for example rehearsal and memory aid for the Echolalic. While the cognitive functions of echolalia are certainly interesting and worthy of further study, the scope of this article is limited to communicatively functional echoes, and this is reflected in the inclusion criteria. Figure 2 shows the flow of articles against the inclusion/exclusion criteria.

We encountered one article that did not meet the first criterion for inclusion in our review, because it lacked a specific group of participants. Yet, the article seemed particularly relevant and worthy of mention, because it comprehensively addressed many of the same ideas regarding the communicative functionality of echolalia that we aim to illuminate. Dyer and Hadden (1981) offered a six-category model of communicative functions in delayed echolalia, based solely on the authors' extensive clinical

observations and research experience. Categories one, stereotypic, and six, mitigated, represented the endpoints of a continuum between echoes that did not serve a communicative function and those that clearly exhibited the child's attempts at purposeful syntactic rearrangement. Categories between two and five reflected increasing levels of communicative intent. Dyer and Hadden's Category four, labelled "Time Lag", included delayed echoes that may seem out of context when heard by only their surface structure, but held meaning for the Echolalic. The authors pointed out that the onus is on the communicative partner to discover what the Echolalic is attempting to say. They wrote, "Often it is only the person who manages to deduce the 'clue' who can make a response that does not lead to panic in the autistic child at not being understood" (Dyer & Hadden, 1981, p. 339). This paper challenged the prevailing assumption (which existed at the time and persists today, in some disciplines) that echolalia should be eliminated or "replaced" via behavioural treatments.

Results

The six articles considered in this current review are summarised in Table 1. Early research by Wolff and Chess (1965) is seminal in the field of communicative functions of echolalia. The researchers examined the speech patterns of their 14 participants (n = 14), 12 males and two females all under the age of eight years and advanced a two-category model of the possible functions of delayed

Table 1. Communicatively functional models of echolalia.

Study	Participants (n =)	Communicative functions	Notes/Comments
Wolff and Chess (1965)	14 participants 12 x males 2 x females Aged under 8 years	*Delayed Communicative repetitions* Requests Multiple functions refusing items, objecting to action or activity, indicate a need or desire, and direct others to do something Commentary Used to provide information/comment on current situation	Represented the first study to note that delayed repetitions could serve a communicative function.
Dyer and Hadden (1981)	(No participants)	*Delayed Echolalia* Negativistic Blocks intrusion of others in their space Time-lag Multiple functions: refusing items, objecting to action or activity, indicate a need or desire, and direct others to do something Transferred Invites/interests the listener into a conversation Mitigated Invites/interests the listener into a conversation	A total of 6 possible functional categories were described in a continuum style. That is, the 4 categories included in this table represent the most communicatively functional echoes. The remaining 2 (stereotypic and egocentric) were believed to serve possible cognitive and self-regulatory purposes. Transferred and mitigated appeared to serve the same function. However, mitigated echolalia is characterised by modifications to the original utterances.
Prizant and Duchan (1981)	4 x males Aged 4:8, 5:2, 6:3, 9:3	*Immediate Echolalia* Turn taking Used to maintain a social dialogue Declarative Labelling an object or item Yes-answer Agreeance to prior utterance Request Used to request an object	A total of 7 possible functional categories were advanced in the model, however only 4 of these were deemed to serve a communicative function, as seen in the column to the left. The remaining 3 (non-focused, rehearsal and self-regulatory) categories possibly served a cognitive function.
Prizant and Rydell (1984)	3 x males Aged 4:8, 12:4, 14:2	*Delayed Echolalia* Turn taking Used similar to normal conversational 'to-and-fro' Verbal completion Response to verbal routine Label (interactive)	A total of 14 possible functional categories were advanced in the model, however only 9 of these were deemed to serve a communicative function, as seen in the column to the left. The remaining 5 (non-focused, situation association, rehearsal, self-directive and label (non-interactive)) categories possibly served a cognitive function.

Table 1. Continued.

Study	Participants (n =)	Communicative functions	Notes/Comments
		Used to label an action or object	
		Providing information Provides new information to listener	
		Calling Gains attention of others to oneself	
		Affirmation Agreeance to prior utterance	
		Request Used to request an object	
		Protest Used as objection to other's actions	
		Directive Used to order other's actions	
Sterponi and Shankey (2014)	1 x male Aged 5:10	*Immediate Echolalia* After correction Used to correct prior mistake After directive Used to clarify instruction *Delayed Echolalia* Other echoes Used as a way to express an opinion Impersonal echoes Used to direct own behaviour	A 6-category model was advanced, with other non-communicative immediate repetitions possibly serving a function only known to the child, termed *unusual echoes*.
Marom et al. (2018)	3 participants 2 x male 1 x female Aged: 5:2m, 6:6m, 5:8f	Echoing to express strong emotional content Used to express state of emotion Initiate or maintain communication Used as a way to start or continue a social dialogue exchange	This study did not separate echoes pertaining to time (i.e., immediate or delayed). As such communicative echoes were heard as both immediate and delayed repetitions. Model was a total of 6-categories, serving a variety of social-emotional, learning and communicative functions.

Age – respectively (years:months).

echolalia. The two-categories, as seen in Table 1, were separated in accordance with their believed function.

The specific categories were: *noncommunicative repetitions* and *communicative repetitions*. Whilst it is not explicitly stated how the authors arrived at the separations pertaining to communicative value, it can be implied from the examples that repetitions were differentiated based on their surface structures. That is, the authors categorised the echoes according to exactly what the Echolalic repeated and what was subsequently heard by the communication partner. For example, one participant repeated "what happened to your…" instantaneously after their class teacher. Another example was when a participant echoed *"don't worry, sweetheart, it will all be alright"* (p.35), borrowed

from a previously viewed television show. Pragmatics researchers, who study how language is used in different contexts, argue that determining a speaker's intent to communicate solely by the utterance topography, or surface structure, is not sufficient (Bates, 1976; Bruner, 1975; Dore, 1975; Lund & Duchan, 1983). Similarly, Bates et al. (1977) and Recanati (1986) argued that a proportion of determining the intent of a communicative act lies with the communication partner involved in the communication exchange. Communication partners play a major role in determining the functional interpretation of utterances. For example, they can either decide to ignore the communicator by turning away or they could attend to the communication. Either way, the communication partner is required to make a determination on if the speech uttered is intentional. Unfortunately, the communicator is at the mercy of the other and can do little, linguistically at least, to persuade their judgement surrounding their intention (Bruner, 1975; Recanati, 1986; Searle, 1969).

As previously highlighted, the paper by Dyer and Hadden (1981) did not meet the first inclusion criteria in that they did not base their research off actual participants of study. However, through clinical experience the authors did advance a communicatively functional model. Dyer and Hadden (1981) put forth a six-category model ranging from least to most communicative (refer to Table 1). Their work further extends the literature on communicatively functional echolalia in that they highlight the pivotal importance of the communication partner in such exchanges. To this end, the authors repeat the message through the literature that Echolalics can mobilise their repetitions and use these to engage in a variety of communicative endeavours. Essentially, Echolalics do *something* with their echoes.

The work by Prizant and Duchan (1981) is frequently referenced as being seminal authoritative research in the area of attributing function to immediate echolalia. Studying the immediate echoes of their four participants (n = 4), aged between four and nine years, the researchers' video-recorded approximately 500 h of interactions across contexts, from which they identified 1009 repetitive utterances. Citing suggestions by pragmatic linguists, the researchers considered the paralinguistic elements in addition to the surface structure qualities of the echoes (Bates, 1976; Dore, 1975; Lund & Duchan, 1983; Searle, 1969). That is, echoes were not ascribed a function purely based upon what was heard; rather, the co-occurring interaction between the Echolalic and the surrounding environment was considered essential to comprehensively determining function. Specific measures were: a) what was gaze behaviour of the Echolalic, b) was the communication partner fully attentive, c) what was the body language/orientation of the Echolalic, d) did the environment call for an utterance to be made, and e) was the utterance appropriate to the task being undertaken (Prizant &

Duchan, 1981). For example, if a communication partner asks, "Would you like some juice?" and the echo reply is "Would you like some juice?" whilst the Echolalic is holding up a cup, the authors could reason that whilst the utterance might be unconventional to the communication partner, the act of extending the cup is indicative of a communicative function. From these considerations, the researchers advanced a seven-category functional model. In their model, the authors divided the uttered repetitions into two-broad categories, interactive and non-interactive. Four types of echoes such as, turn-taking, declarative, yes-answer and requests, within the interactive categorisation were considered to be communicatively functional (Prizant & Duchan, 1981).

The same primary author, Prizant, posited a somewhat similar model on functionality in an investigation that examined delayed echolalia. Prizant and Rydell (1984) citing the Prizant and Duchan (1981) study, as a base for their work, included additional measures that they believe are important for ascribing function. Specifically, the authors note that they also considered the interactional aspects of their three study participants (n = 3), aged between four and 14 years. In addition to this, Prizant and Rydell (1984) also contemplated if the increasing volume of an utterance, or the continued repetition of the same utterance, were components of function. In practice, if a communication partner did not respond to an initial repetition, did the Echolalic then repeat their prior repetition, if so, did they do this in the same volume, or did they use a louder voice. The authors argued that if the Echolalic continues to repeat after a non-action by the communication partner, then the Echolalic was demonstrating that they were attempting a communicative endeavour. Essentially, the repetition of a prior repeat and raise in volume were strategies the Echolalic called upon as a method to 'add value' to the surface structure of their utterances: informing the communication partner that their utterance is communicative. From their analysis, the authors derived 14 functional categories. Of the categories, nine showed clear evidence of interactivity with the remaining five showing no evidence. Of the nine interactive echoes, eight of these, turn-taking, label, providing information, calling, affirmation, request, protest and directive, were deemed to serve the Echolalic a communicative function (Prizant & Rydell, 1984).

Drawing on previous theoretical work, Sterponi and Shankey (2014) advanced a functional framework for echolalia in their case study of one male participant (n = 1) aged five years. Linguists themselves, the researchers took a different approach when ascribing function to their participants' echolalia. Referencing Conversation Analysis techniques by Sacks (1965) and Sacks et al. (1974), the researchers wondered if the position and alterations of pitch, rhythm, contour and tone by Echolalics could be used as a measure to ascribe function. Speech pitch,

rhythm, contour, and tone, collectively known as speech prosody, has been studied in ASD widely (Arciuli, 2014; McCann et al., 2010; Oller et al., 2010). In practice, Sterponi and Shankey (2014) believed their participant would alter his prosodic features as a way to inform the communication partner that he was making a communicative attempt.

Specifically, the authors reasoned that if the participant provided a repetition with more speech stress placed on a particular word or word group, this could be indicative of a communicative attempt. It is known that neurotypical individuals alter their speech prosody (i.e., speech stress, inflections, and pitch, amongst others) to infer meaning and inform of interactive intention (Arciuli, 2014). Continuing, the authors recorded over 16 h of their participant interacting at his kindergarten and with his mother in the family home. Using speciality software 'Praat' (Boersma & Weenink, 2007) the authors were provided with increasing equaliser bars every time a change of prosody occurred (e.g., if an inflection or similar speech stress on a particular word or word-group was heard, this was reflected on the computer software). Through their data, the authors were able to posit a six-category functional model, including both immediate and delayed echoes. Within immediate echoes, three types were identified, with two of these, after correction and after directive, evidencing a communicative function. Other authors have also found instances in which their participants used alterations in speech prosody as a means for indicating their echolalia was intended to be interactive with their communication partner (Local & Wootton, 1995; Tarplee & Barrow, 1999; Wootton, 1999). It is interesting to note that echolalia (by clinical definition an invariable and restrictive behaviour) would appear to be intentionally configurable by the Echolalic for a variety of interactive and communicative endeavours in their interactions with different people and across different environments.

The most recent study in the data set, takes a novel approach to analysing echolalia by viewing the phenomenon through a music therapy lens. Marom et al. (2018) experimented with analysing the echoes of their three participants (n = 3) whilst they were involved in music therapy sessions. There are a number of similarities in the present study to that of the aforementioned examination by Sterponi and Shankey (2014). Like the previous study, Marom et al. (2018) sought to ascribe function to echolalia by using potential alterations of prosodical features—pitch, volume and rhythm. Unlike the previous model, however, Marom et al. (2018) also took into consideration the 'non-musical' elements of their participants. These non-musical elements refer to what Prizant and Duchan (1981) and Prizant and Rydell (1984) term as paralinguistic behaviours. Recalling that these paralinguistic/non-musical elements are gaze behaviour, body position, facial expressions and object interaction, these were measured in conjunction with the aforementioned prosodic features. Further, the

same computer software, 'Praat' (Boersma & Weenink, 2007), was used to provide visual confirmation that prosody alterations had occurred.

The model proposed by Marom et al. (2018) differs from the previous model in that alongside ascribing communicative functions to the heard repetitions, the authors also ascribed social-emotional functions to echolalia. Through their analysis of over 40 segments of repetitions, the authors devised a six-category functional model. In their descriptions of each category, three of the categories are related to social-emotional functions, such as, echoing to regain emotional equilibrium, echoing while maintaining focus, echoing to block or mask others, with two categories, five and six, serving communicative functions. In their model, category five was *echoing to express strong emotional content* and category six was titled *echoing as an attempt to initiate or maintain communication*, as seen in Table 1. One category, category three - echoing to explore sounds or words, perhaps served neither a communicative nor social-emotional function, but rather a learning function. Repetition as a learning function has also been supported by numerous others (Manning & Katz, 1989, 1991; McEvoy et al., 1988; Prizant & Duchan, 1981; Prizant & Rydell, 1984; van Zyl et al., 1985). It is also interesting to note that one other author, Prizant (2015), was identified to make reference to category one, emotional equilibrium. Prizant (2015) highlights the importance of finding, and maintaining, emotional equilibrium in children with Autism; noting that repeating previously heard speech, because of its familiarity, may provide emotional homeostasis. Marom et al. (2018) report that for the categories they deemed to serve a communicative function, the most salient feature was that these echoes were produced with a sharp increase in volume.

In conclusion, as is seen in Figure 3, the six communicative models of echolalia included in the review each have their own defining metric used to determine the communicative nature of echoed utterances. Whilst a variety of different measures have been used, it is perhaps a mixture of all these techniques, when combined, that can aide with determining the communicative endeavours of the Echolalic.

Discussion

The models yielded a set of core observations/perspectives, summarised in Table 2 and Table 3, which form an orienting framework to assist teachers who seek to better understand and respond to their students' echolalia. Guidance gleaned from these six research-based models could be used to empower professionals who teach children with ASD and promote interdisciplinary collaboration in the classroom. Here it should be noted that while the research did not directly emanate from the discipline of education, anecdotes from teachers were cited as a primary impetus for the research that led to the creation of some of the
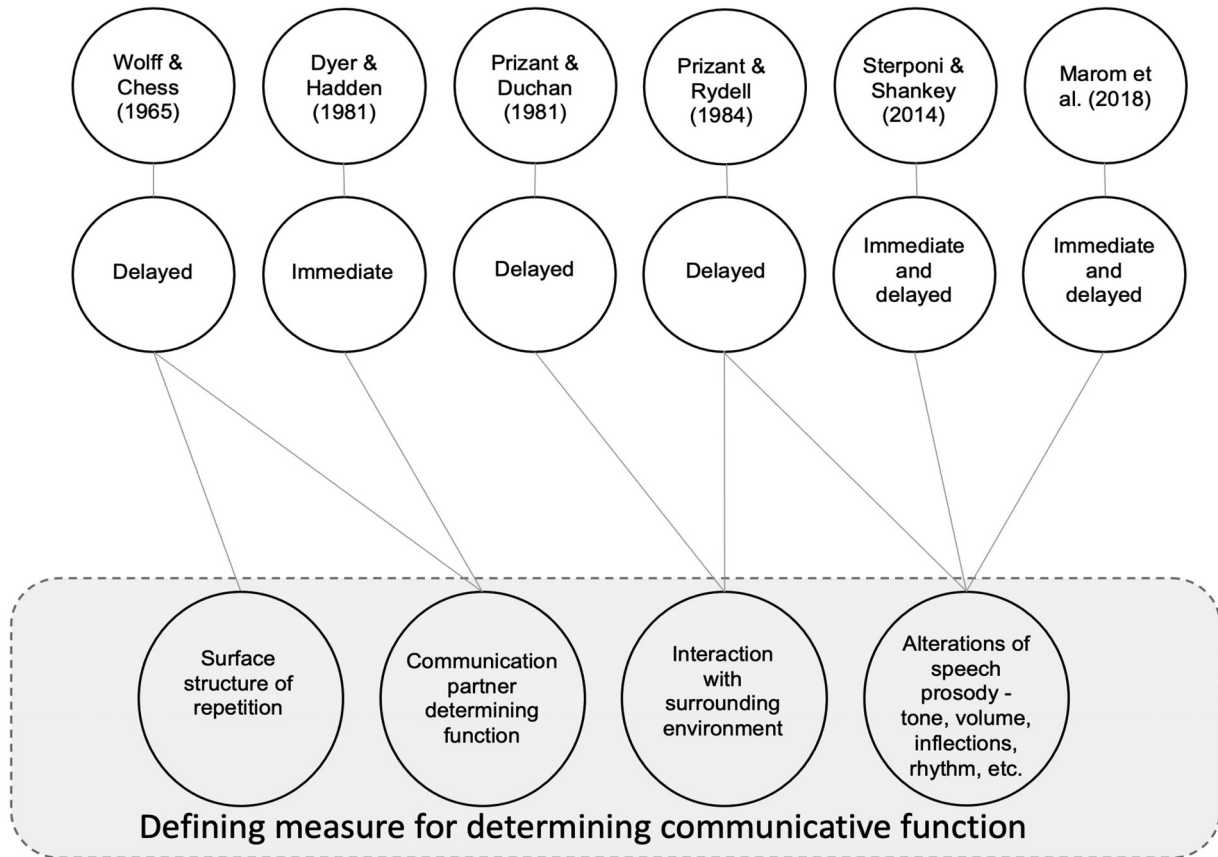
Figure 3. Defining measures used for determining communicative function in echolalia models.

models, for example, Marom et al. (2018) and Prizant and Duchan (1981).

Expectation of a response

The first core observation, summarised in Table 2, is that many echoes are expressed with *the expectation of a response* from a conversation partner. The models provided examples of children maintaining meaningful back and forth conversations, which included: using immediate echolalia only; complex combinations of immediate and delayed echolalia, self-generated utterances and non-verbal communication, such as gestures, and gazes. Prizant and Duchan (1981) noted that turn-taking echoes appeared frequently in their data, and were clearly a device for maintaining communicative interactions, even when language comprehension was poor. These echoes were observed to be either preceded or followed by a gaze check toward the communication partner. Further, Prizant and Rydell (1984) noted that children who used turn-taking echoes would clearly wait for an opening in a verbal exchange before offering their echoed contributions.

Teachers, who come to know their students with ASD so well through close daily work across months or years, could enable the possibility of dialogue by simply providing

conversational responses to echoed utterances, in turn. The content of teachers' responses should, of course, differ based on the ongoing context and their perceptions of what their students are attempting to communicate. If the teacher interpreted an echo as a means of conversational turn-taking in the presence of poor language comprehension, they could respond by providing additional information in visual form, to augment the verbal information. For example, if the teacher said, "Today we have a visitor," and the child echoed, "We have a visitor," the teacher might respond by pointing to the visitor or showing a picture of the visitor, saying "Mr. X is our visitor today." This might be followed by more exchanges in which the word "visitor", and related forms, were highlighted by the teacher as a method to enhance comprehension. Likewise, if the teacher interpreted an echo as a request for an object or action, the teacher could respond by granting the request, if possible, or by denying the request and either offering an alternative or clearly, perhaps with visuals to support comprehension, communicating the reason for the denial. The two preceding examples demonstrate the notion that echoed utterances can reflect varying degrees of language comprehension abilities, as comprehension is not an all or nothing phenomenon (Prizant & Duchan, 1981).

Table 2. Considerations for understanding echolalia.

Considerations	Elaborations
The Echolalic expects a response	Whilst on the surface echolalia may appear to be one-directional, frequent eye gaze checks and body positioning shifts have been reported immediately following echoes. Classroom educators should therefore come to appreciate that the Echolalic expects, and often prepares themselves, for a response.
Echolalia is often contextual	Classroom educators should take note of things happening, and people in, the environment when echolalia occurs—as it is likely that these elements will present themselves in the echoed utterances. Such elements, for example the classroom or sensory room, will likely provide key clues to aid the educator when preparing their response.
Echolalia occurs with a communicative context	High-constraint language, such as commands, and questions requiring specific answers, may contribute to an increase in immediate echolalia. A more open-ended questioning style, which generally provides for a less restrictive answer, may assist the Echolalic and classroom educators to reduce the frequency of immediate echolalia. Educators can also break down lengthy instructions or comments into more short and sharp segments, which may decrease immediate echolalia.

Table 3. Considerations for professional practice.

Considerations	Elaborations
Echoes are often disguised	The surface structure, or what is heard, of delayed echolalia may not reflect the meaning or purpose of the communicative attempt. Classroom educators may need to discuss these echoes with parents and other caregivers in attempts to unravel the true meaning. The true meaning can often be ascertained but will likely require a collaborative approach.
Changes to echoed utterances represents progress	When a change to a word-for-word repetition is heard, this may be understood by the educator as a developmental progression point. Adaptations to echoes may include word additions, verb changes, word substitutions, or word removals; regardless of which change is heard, progression toward more self-generated language may be evident through these echo mitigations.
Data collection through audio recording is key	Classroom educators, in attempts to monitor echolalia, should try to capture snippets of echoed utterances at frequent time intervals as a way to analyse, and discuss, ascribed meanings with other professionals and parents.
Echolalia should not be stopped	Abating echolalia may be counterintuitive given that there is limited evidence to suggest that functional language can taught after stopping echolalia. Rather, classroom educators might try to unravel and decipher echoed utterances with the view to supporting the communicative attempts of the Echolalic.

What would one do if one spoke to a communication partner and there was a miscommunication or breakdown? One would repair. The simplest way to repair would be to repeat the message, but a more sophisticated way to repair is to change the previous message in some way, by adding elements that would improve comprehension. This is what teachers can do with their students – if the Echolalic is producing immediate echolalia with equivocal evidence of comprehension, the teacher can repair the interaction by providing further non-linguistic information such as a demonstration or gesture. The main idea here is that the teacher should respond to echoed utterances based on the interpreted meaning, in hopes of providing validation to the Echolalic that their message has been effectively received and encouraging further communicative interaction. Importantly, responding to echoed utterances can also help decrease what is perhaps the sharpest of all frustrations – that of not being able to successfully communicate – and perhaps decrease the resulting challenging behaviour as well. In the papers under review, several authors spoke about the tension that may occur when a conversation partner ignores echolalia or responds inappropriately, for example Dyer and Hadden (1981) and Marom et al. (2018).

Echolalia occurs within a physical and communicative context

The second core observation, summarised in Table 2, is that each echoed utterance *occurs within a physical context and a communicative context*. The physical context includes the

location and environmental surroundings in which the interaction takes place, the activity that is happening at that moment, and the people in the area, especially the communication partner(s). The communicative context includes the linguistic or paralinguistic elements that surround the echoed utterance. Prizant and Duchan (1981) provided a detailed accounting of contextual elements of which teachers may be aware, including whether or not the previous utterance in an interaction was spoken directly to the Echolalic, and how it was structured.

Subsequent research has shown that children are more likely to use echolalia when they are addressed with high-constraint utterances, such as direct verbal commands and questions that required single, specific responses (Gladfelter & VanZuiden, 2020; Rydell & Mirenda, 1994). Teachers can choose to use low-constraint communication styles, such as more open-ended questions and statements/comments, with their students who use echolalia. Further to this, teachers and paraprofessionals may also benefit from using simplified directives or comments. For example, the lengthy directive, of "go to the blackboard and pick up the marker and write your name in capital letters", can be easily broken down into smaller segments for the benefit of the Echolalic. Other contextual elements that teachers could look for are physical behaviours that occur during echoed utterances, such as reaching for an object or moving toward a space, or gaze behaviour that occurs before, during, or after an utterance, even if it is fleeting in nature (Prizant & Duchan, 1981). Teachers who attend to the physical and communicative contexts in which echolalia occurs will be better equipped to craft appropriate responses.

Echolalia disguised by its surface structure

A third core observation, summarised in Table 2, is that delayed echoes often have *meaning and purpose that may not be immediately apparent from their surface structures*. Many behaviourally oriented researchers have described delayed utterances as being inappropriate, out of context and/or not relevant to the current activity/environment. In contrast, the authors of the six models stressed that children with ASD often use delayed echoes to convey functional meanings, so it is important to attempt to discover the meanings and purposes of these utterances. For example, the Echolalic may say loudly to his mother during a difficult moment, "Oh, William, that is enough for today. No recess for you!" The mother may be puzzled by this at first, because her child's name is not William, and there is no recess at home. She may deduce that this is something her child heard at school during a similarly difficult moment, and she may understand that her child is communicating as well as he can, by borrowing an utterance from a similar situation. The authors of our models noted that individuals who are more familiar with the Echolalic are more likely to recognise the sources of delayed echoes and more

able to interpret them (Dyer & Hadden, 1981; Marom et al., 2018; Prizant & Duchan, 1981; Wolff & Chess, 1965).

Teachers and paraprofessionals should collaborate closely with parents and other caregivers and share what they know about the origins of delayed echoes, which can include media such as cartoons, television programmes, movies, and computer applications. If the source of an utterance remains a mystery, Prizant and Rydell (1984) offered two suggestions that may help teachers discern the difference between a delayed echo and a self-generated utterance. First, if the grammatical complexity of an uttered phrase or sentence, for example length, or vocabulary usage, is significantly beyond what the child is known to be able to express on his/her own, the utterance is likely a delayed echo. Second, if the utterance contains a pronoun reversal, the utterance is likely something that has been said either directly to the child, or in their environment. For example, the child may approach a teacher and say, "Would you like to use the toilet?" as a way to request to go to the bathroom.

All mitigated echolalia indicates development

A fourth core observation, summarised in Table 3, is that any, and all, *mitigations of the source utterance are important and are likely to indicate developmental progress*. Mitigations may be observed as linguistic changes such as inserted words, deleted words, substituted words, or changed verb tenses (Fay, 1967; Prizant & Duchan, 1981; Roberts, 1989, 2014). Imagine a student who has been saying at school for weeks, "I'm looking for Spring Street," which is something her mother said to a pedestrian once, through the car window, when she was a bit lost. One day, the student says in class, "I'm looking for Spring Street pencil." The teacher would recognise this as a linguistic mitigation of the earlier echoed utterance, and, perhaps for the first time, realise that the Echolalic is using the phrase as a request. Marge Blanc has written accessibly about the transition from delayed echolalia to self-generated language in children with ASD, and how to assist with this process (Blanc, 2012). The author's developmental model of echolalia highlights mitigated echoes as progression points used as a foundation when moving toward more self-generated language. Similarly, the developmental model by Prizant (1983), suggests that through the mitigation phase, the Echolalic could be coming to learn what might be accomplished when they alter their echoes. For example, when a mitigated echo is heard, as opposed to a pure echo, this might change the response adopted, and subsequent interaction by, the communication partner. Continuing, the longitudinal data by Blanc (2012) is replete with examples from her own speech pathology practice, of delayed echoes being used functionally as wholes, and then being mitigated to create more and more flexible language use. This is consistent with the statement by Prizant and Rydell (1984), who said, "It is likely that

once true symbolic activity is achieved…much of what we call delayed echolalia will be replaced by and/or evolve into a more flexible language system" (1984, p. 191). Further research is warranted to add to the evidence base for this approach.

Mitigations may also be observed in an array of paralinguistic elements including tempo or rhythm, pitch, volume and intonational contour. For example, a child with ASD may change a delayed echo by uttering it in a high, squeaky pitch that was not part of the source utterance. The teacher may come to realise that when the child adds the high pitch, they are indicating excitement. Some researchers have utilised special software to instrumentally measure and verify these mitigations, and it is not likely that most teachers would have the time or resources to engage in such a fine-grained analysis. Still, teachers spend so much time with their students that they may be able to "tune their ears" to detect these types of changes, and doing so may help them notice subtle differences in meaning (Marom et al., 2018; Prizant & Duchan, 1981; Sterponi & Shankey, 2014). In addition, Marom et al. (2018) advance that songs and echoed utterances have much in common, because songs are essentially delayed echoes; that is, lyrics, melody, and other features, are intended to remain the same each time the song is sung. Therefore, teachers may explore ways to incorporate singing into their daily instruction. Singing may be a point of commonality between themselves and their students who use echolalia (Marom et al., 2018). In addition, singing songs that have systematic changes across multiple verses may be particularly helpful in facilitating the student's ability to mitigate their echolalia. It might be especially useful if the song lyrics were also useful phrases that could easily translate to spoken utterances.

The importance of recording

The fifth core observation, summarised in Table 3, is *the importance of recording and/or writing down snippets of echoed talk.* This is critical data that can be used to track a child's communicative progress over time, and to share or discuss ascribed meanings with parents and other professionals so that more people in the child's orbit will know what the utterances might mean. Teachers are trained to be excellent data collectors, so they are likely to quickly adapt to the collection of echoed utterances as qualitative data. If there is a concern that this task would be too time consuming, it should be asserted that even very small amounts of this data can be quite informative, interesting to analyse, and useful. Teachers can also enlist parents and others to help with this valuable data collection endeavour.

Echolalia should not be extinguished

The sixth and final core observation, summarised in Table 3, is that it is *inappropriate and counterproductive to apply abatement treatments in a wholesale attempt to extinguish echolalia.* This practice has been repeatedly recommended for decades by behaviourally-oriented researchers and clinical practitioners, and continues to this day, with echolalia included in most definitions of "vocal stereotypy" for example, Gibney et al. (2019) and Nikopoulos and Panagiotopoulou (2015) and Valentino et al. (2012). Common rationales given in echolalia abatement studies include assertions that echolalia (a) is disruptive; (b) inhibits learning; (c) interrupts social development and (d) stigmatises the individual. Our six models, which span over fifty years and cut across the disciplines of psychology, speech-language pathology, interactional linguistics, and music therapy, could not be more unambiguous in their refutation of these arguments. In the language of their day, Wolff and Chess (1965) wrote, "…repetition *rather than failure to communicate* [emphasis added] may be the more basic abnormality" (1965, p. 39). Dyer and Hadden (1981) wrote, in reference to treatments that seek to eliminate or 'correct' echolalia, "…it may be said that their usefulness in practice did not live up to their theoretical promise" (1981, p. 331). Prizant and Duchan (1981) called abatement treatments "ill-advised", asserting, "…the results of this study raise many questions concerning the wide variety of behaviour modification programmes that advocate extinction or replacement of immediate echolalia with rotely-trained surface structures (1981, p. 247). Prizant and Rydell (1984) offered that true "functional analyses of communicative behaviour, regardless of its form, provides a better understanding of how a child's communicative system functions for him or her and leads naturally to specific intervention goals and approaches to accomplish those goals" (1984, p. 191). Sterponi and Shankey (2014) characterised their paper as "a perspective on Autism echolalia that requires us to listen attentively to things that are said again and again, rather than to dismiss them as insignificant" (2014, p. 301). Marom et al. (2018) stated that their views and findings were "in contrast to those who emphasise echolalia as strictly intrapersonal" (2018, p. 176).

Conclusions

The aims at the onset of this review were to: (1) to systematically investigate how researchers identify and ascribe communicative function to echoed utterances; (2) to gather and evaluate the evidence that might assist teachers to identify and better understand echolalic utterances as being communicatively purposeful; and (3) to provide teachers with evidence-informed response strategies they can use to assist their students on their journey towards more self-generated speech.

The studies examined in the review identified that there are multiple methodological approaches, such as linguistic mitigations, gaze, behaviour, body orientation, facial position and expression, hand gestures and speech volume,

pitch, and intonation, that can be easily used by teachers in their practice. Second, we explicated the different communicative functions that have been ascribed to echolalia, as seen in Table 1. As noted, there are many communicative functions that echolalia might serve the individual: some of these; requests, comments, turn-taking, and information providing, are strikingly similar, if not exactly the same, as those used by individuals without echolalia. This perhaps suggests that individuals with echolalia are attempting to use language in the same ways as others, with the major difference, being the words spoken (Tager-Flusberg & Caronna, 2007; Tager-Flusberg et al., 2005). In conclusion, when one delves beneath the surface structure, it is clear that there is more to echolalia than meets the ear.

Declaration of conflicting interests

Funding

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