

Unaided communication behaviours displayed by adults with severe cerebrovascular accidents and little or no functional speech: A scoping review

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ABSTRACT

Background: Unaided communication behaviours may provide communication support for persons with severe cerebrovascular accidents (CVA), as these individuals often experience severe communication difficulties, regardless of the aetiology. Though often subtle, these behaviours are present during all stages of recovery, and therefore communication partners need to know not only which unaided strategies are used as communication attempts, but also what their function is (i.e., what the person aims to achieve with the communication).

Aim: To identify the unaided communication behaviours that adults with severe CVA and little or no functional speech use to communicate, and to determine the communication functions addressed by these behaviours.

Methods & Procedures: The study used a scoping review methodology and included articles on communication partners of persons with CVA published between 1986 and 2020. Initially the searches yielded 732 studies from which 211 duplicates were identified. The remaining studies (n = 531) were then screened on title, abstract and full-text level resulting in a final inclusion of 18 studies. Of the 18 studies, five were qualitative and 13 consisted of quantitative methodologies.

Main contribution: The subtle communication behaviours used by persons with CVA (and resultant severe communication difficulties) are often misinterpreted or overlooked by their partners. If partners are trained to recognise such subtle or unaided communication behaviours, they can provide adequate support to access a range of communication functions. The unaided communication behaviours, which include 13 primary behaviours ranging from non-linguistic to linguistic, were utilised to convey 31 communication functions classified into four main communication categories.

Conclusions & Implications: Although unaided communication behaviours often appear as limiting, they can be utilised to communicate various communication functions. The findings

of this review support the training of partners to identify these behaviours and improve person-partner communication.

KEYWORDS: cerebrovascular accidents, communication functions, unaided communication behaviours

WHAT IS KNOWN?

Unaided communication has been widely researched. However, a summary is needed of the various unaided communication behaviours and of the different communication functions addressed by these behaviours.

What the paper adds...

This paper emphasises that unaided communication behaviours range from non-linguistic to linguistic, and they can support unintentional, pre-intentional and intentional communication functions.

Clinical implications

- Even though aided communication is preferred, unaided communication behaviours are generally used in contexts with limited resources, as well as among culturally and linguistically diverse populations.

This study advocates the identification of unaided communication behaviours by partners as well as the support and provision of access to communication strategies for persons with severe CVA.

- Future research should include more untrained communication partners.

INTRODUCTION

Adults with severe cerebrovascular accidents (CVA) and little or no functional speech experience communication difficulties due to various factors (Beukelman & Light, 2020). These difficulties manifest as challenges in persons exchanging thoughts and expressing needs and wants appropriately and effectively (Teachmen & Gibson, 2014). Communication challenges are attributed to cognitive, emotional, sensory, motor, speech, language and voicing difficulties that may prohibit affected individuals from responding to environmental stimuli (Lancioni et al., 2016). These challenges, which are typically described with clinical diagnoses such as apraxia, aphasia and/or dysarthria, are chronic in nature. According to Beukelman et al. (2015) 40- 60% of persons with CVA experience chronic, severe communication difficulties. This may impact both the individual with the condition and the communication partner, and typically result in participation restrictions in various settings (Simmons-Mackie, 2018). Since the publication of the first case studies pointing to the use of augmentative and alternative communication (AAC) as a potential communication solution for persons with severe CVA who present with little or no functional speech in the late 1980's, there has been significant developments in the field (Dietz et al., 2020; Geise Arroyo et al., 2012). Following extensive research, Simmons-Mackie et al.'s (2017) suggest

the so-called “top 10: best practice recommendations for aphasia” of which the fourth one specifically refers to AAC:

“No one with aphasia should be discharged from services without some means of communicating his or her needs and wishes (e.g. using AAC, supports, trained partners) or a documented plan for how and when this will be achieved (Level: Good Practice Point)”. (p. 139)

Loncke (2014) describes AAC as evidence of the resilience of humans’ communication capabilities and their ability to adapt when typical forms of communication are ineffective. AAC may assist adults with severe CVA and little or no functional speech to become competent communicators again, as it is the most fundamental of human capacities and basic human right (International Communication Project (ICP) n.d.). By providing alternative strategies that result in functional communication and participation, AAC could support and supplement natural speech production (Beukelman & Light, 2020). AAC also provides adults with severe CVA and little or no functional speech a means to perform a vast array of communication functions, such as obtaining information, communicating thoughts and feelings, and re-establishing relationships with partners (Hogrefe et al., 2012).

According to the AAC symbol taxonomy suggested by Lloyd and Fuller (1986), there are different classifications of AAC. The most common classification involves unaided (relying only on the body) and aided (relying on external aids or supports) communication strategies. The current scoping review focused on unaided communication, which can be defined as conveying one's thoughts, feelings and messages through natural nonverbal communication (Beukelman & Light, 2020). Unaided communication can be portrayed on a continuum with non-linguistic and linguistic systems being the two anchors (Beukelman & Light, 2020; Bornman & Tönsing, 2019). Non-linguistic unaided communication includes vocalisations and natural gestures (e.g. pointing, idiosyncratic gestures, eye movement and/or deliberate blinking, lip reading, head nodding and shaking, whistles and facial expressions), while linguistic unaided communication includes natural speech, sign language and alphabet signs such as finger spelling (Bornman & Tönsing, 2019; Loncke, 2014; Radkte et al., 2011; Ten Hoorn et al., 2016). Unaided communication is typically used more frequently than aided forms and can be used to communicate specific communication functions. For instance, agreement (“yes”) can be indicated by head nodding or eye blinking, while disagreement (“no”) can be indicated with head shaking or prolonged eye closure (Fleischer et al., 2009). However, Ten Hoorn et al. (2016) warn that unaided communication can be frustrating for both communication partners, as it does not meet all the communication needs of the individual (e.g. conversational topics regarding spiritual beliefs).

Unaided communication is present during all phases of recovery for individuals with severe CVA and little or no functional speech, with eye movements often being one of the first signs to indicate that a person is aware and alert (Bareham et al., 2018). Nonetheless, these unaided communication behaviours are typically subtle, and therefore communication partners need to know which unaided strategies are used as communication attempts, as well as what their function is (in other words, what the person aims to achieve with the communication) (Fleischer et al., 2009). Unfortunately, in cases where the communication

partners are untrained or not familiar with the affected person, these subtle communication attempts can easily be ignored, misinterpreted or judged as incomprehensible (Ellis & Astell, 2017; Radtke et al., 2011). Moreover, unaided communication attempts may be overlooked by communication partners due to time constraints and limited contact opportunities during activities of daily living (Radtke et al., 2011).

Another component adding to this dilemma may be limited knowledge and negative attitudes of communication partners regarding the identification of subtle intentional unaided communication behaviours, as they may mistakenly perceive verbal communication as the only means to emotionally connect with people (Holt et al., 2012). This may result in reduced motivation, decreased initiation of interaction and limited participation attempts on the side of the individual with severe CVA and little or no functional speech (Finkel et al., 2018).

Training may alter the perspectives of communication partners, as it may encourage them to focus on observable behaviours during interaction and interpret them as communication attempts. Training should also improve the participation of persons with severe CVA and little or no functional speech and reduce their activity limitations (Simmons-Mackie, 2018). Communication partners furthermore require training to observe and interpret different forms of unaided communication behaviour. It may empower them to intervene during the earliest possible stages of the condition, and to assist in assessment, establishment of the prognosis and planning of appropriate treatment (Bareham et al., 2018). Training partners to recognise unaided communication behaviours may also result in improving the emotional state of communication partners and increasing the duration of partner contact (Watson et al., 2012). Finally, communication-partner training can assist with the carry-over of therapeutic skills in real-life contexts (Simmons-Mackie et al., 2010) and often leads to a positive change in the communication skills of the person with a severe CVA and improved person outcomes (Simmons-Mackie et al., 2010; Simmons-Mackie et al., 2016 and 2017).

The aim of the scoping review in hand was to identify the range of different unaided communication behaviours used by adults with severe CVA and little or no functional speech, as well as the function of these behaviours. This knowledge can be used when communication partners are trained to be sensitive and to observe subtle unaided forms of communication used by this often-neglected group of individuals. The specific research question posed was: What unaided communication behaviours do adults with severe CVA and little or no functional speech use during communication, and what functions do they serve?

METHODOLOGY

Since it provides a broader overview of the state of evidence within a field (O'Brien et al., 2016), a scoping review based on an approach suggested by Tricco et al. (2018) was selected to address the aim of the study and guide the research process. This review evaluated studies relevant to the topic (unaided communication behaviours displayed by adults with severe CVA and little or no functional speech) and suggested recommendations related to unaided communication, based on evidence. It also allowed for flexibility regarding the type of literature (both published and grey literature, such as handouts) and the variety of study

designs (both qualitative and quantitative studies) that were included (O'Brien et al., 2016; Tricco et al., 2018). A scoping review was essential in this specific study due to the limited information available on the topic (O'Brien et al., 2016).

To ensure that the review included information relevant to the main aim, the population, exposure and outcome (PEO) approach was utilised. This included a systematic search of literature that focuses on the unaided communication (outcomes) of persons with severe CVA and little or no functional speech (population) and in specific communication settings (exposure) (see Table 1). Due to the pervasive impact of severe CVA on communication, the search was narrowed to focus specifically on unaided communication.

Search strategy and study selection

The three-part search strategy that was applied, started with a limited cross-database search through interfaces to identify relevant keywords from studies relating to the topic (Khalil et al., 2016). Next, relevant interfaces such as Ebscohost, Scopus, Proquest and Cochrane were used, through which databases such as Medline, CINAHL, Pubmed, Psycharticles, Academic Search Complete, Health Source: Nursing/Academic Edition, Taylor & Francis, and Psycinfo were searched individually by using the identified keywords (Khalil et al., 2016). The final component of the search included the screening of reference lists of studies relevant to the topic, as well as the hand-searching of paper-based journals (Khalil et al., 2016; Tricco et al., 2018). The selected keywords included thesaurus and synonym recommendations made by these databases (Table 1). Keywords included general AAC nomenclature obtained from the AAC profile code set (Rowland, 2011) and the AAC symbol taxonomy classification (Lloyd & Fuller, 1986). The keywords included Boolean operators and truncation, and were used in all fields – including title, abstract, subject terms and mesh terms.

The following inclusion criteria were applied in the searches:

- Studies on human participants, specifically adults (18+ years old).
- Material published between 1986 and March 2020 to coincide with the publication of the AAC symbol taxonomy that coined the aided/unaided symbol dichotomy (Lloyd & Fuller, 1986).
- Qualitative and quantitative studies as well as mixed-method research designs.
- Studies published in English.
- Grey literature (Peer-reviewed grey literature such as reports, fact sheets, theses, conference proceedings and chapters of academic textbooks were included, while websites, newspapers and policy documents were excluded as searches yielded limited information relevant to the pre-determined inclusion criteria of the scoping review (Godin et al., 2015)).

Two librarians assisted the first author in refining search terms, identifying studies and eliminating the duplicates. Initially, the searches yielded 732 studies and 10 additional searches as shown in the PRISMA diagram in Figure 1 (Blanco et al., 2019). A total of 211 duplicates were identified and removed (n = 531 remained) and 438 studies were excluded on title level as they did not focus on the topic of the current scoping review. It should be

TABLE 1. Inclusion criteria and keyword selection for partner-assisted communication programmes

Content	Keywords	Inclusion	Exclusion	Justification
<p>Population:</p> <p>Adults with CVA (18 years and older)</p>	<p>Cerebrovascular incidents/accidents/stroke-impair*/difficulties/ aphasia/dysarthria, apraxia of speech dis*- neurological</p> <p>Acquire neurological injury/accident/disorder</p>	<p>Only studies that focused on adults with cerebrovascular accidents were included.</p>	<p>Studies focusing on acquired neurological disorders such traumatic brain injury, neurodegenerative diseases (e.g., Dementia/Alzheimer’s disease and Parkinsons disease) will be excluded. Other studies targeting congenital neurological disorders such as cerebral palsy (CP), autism spectrum disorders (ASD), pragmatic disorders, syndromes, developmental delays, learning disorders, congenital hearing, cognitive and visual impairments, paediatric DOC (Disorders of Consciousness) and cancer (except head and neck cancer) were excluded. Studies focusing on children were excluded.</p>	<p>Various individuals with cerebrovascular accidents experience communication difficulties – from initial admission to the critical care unit until they are discharged to go home (Ten Hoorn et al., 2016). Adults were classified as individuals who are 18 years old and older. This population is often affected by acquired neurological disorders (Beukelman & Light, 2020)</p>
<p>Exposure:</p> <p>Communication activities, procedures, contexts or interventions</p>	<p>Support-assist*, aid, support, help, guid* Intervention- therap*, manag*, interven*, rehab*, strategies Programme-program*, train*, caregiver education, patient discharge instruct*, communicat*, part*, train*</p>	<p>Studies focused on the communication activities, procedures, contexts and interventions that include unaided communication.</p>	<p>Studies focusing on general support, emotional burden, physiotherapy, acupuncture, pharmacological and medical interventions such as transcranial direct current stimulation, brain computer interface, fMRI (Functional Magnetic Resonance Imaging), EEG (Electroencephalogram), were excluded.</p>	<p>Identifying these components may provide a form of environmental stimulation that may elicit increased responses from adults with acquired neurological disorders (Lancioni et al., 2016). This may assist in the identification of daily familiar stimuli that promote access to and experience of communication and that motivate participation (Lancioni et al., 2016).</p>
<p>Outcome:</p> <p>Unaided communication</p>	<p>Communicat*- nonverbal, non tech, intentional, volitional, augmentative and alternative, aids, devices, unaided, kinesic, non-speech, functional, expres* strategies, multimodal, motor, pain, gestures, patient-nurse, behaviours, interaction</p>	<p>Studies focused on identifying the unaided communication behaviours used by persons with acquired neurological disorders to support interaction with communication partners.</p>	<p>Studies focusing on low-high technology AAC systems were excluded. Another component that was excluded was nonverbal communication with typical adults (related to psychology), as well as nonverbal movements that were not related to communication.</p>	<p>Identifying unaided communication behaviours may assist partners in identifying the communicative intent of adults with acquired neurological disorders messages and provide the appropriate intervention (Beukelman & Light, 2020).</p>

noted that a small proportion of studies ($n = 20$) in the initial search were also excluded due to access restrictions. The 93 remaining studies were uploaded onto Rayyan, an online platform where researchers can perform collaborative systematic reviews (Ouzzani et al., 2016). Rayyan proved beneficial as it increased the objectivity of study selection and aided in improving the inter-rater agreement (Ouzzani et al., 2016). The first author screened all the abstracts, while the studies were divided equally between the second and third authors. This process ensured that all the abstracts were reviewed by at least two authors (Blanco et al., 2019). The abstracts were divided into three groups: undecided, included and excluded. The initial inter-rater agreement on abstract level was 75%. The remaining 25% (undecided abstracts as well as disagreements) were discussed until 100% consensus was reached (Blanco et al., 2019). Studies were excluded on abstract level due to the wrong population, wrong outcome or wrong focus of the study.

The same process was followed to select the full text selection and the abstract. Initial inter-rater agreement was 75%, which is regarded as acceptable according to Graham et al. (2012). Disagreements were again discussed until 100% consensus was reached. Altogether 17 studies were selected for full-text inclusion, based on the criteria in Table 1. The preferred reporting items for systematic reviews and meta-analysis (PRISMA) diagram are shown in Figure 1.

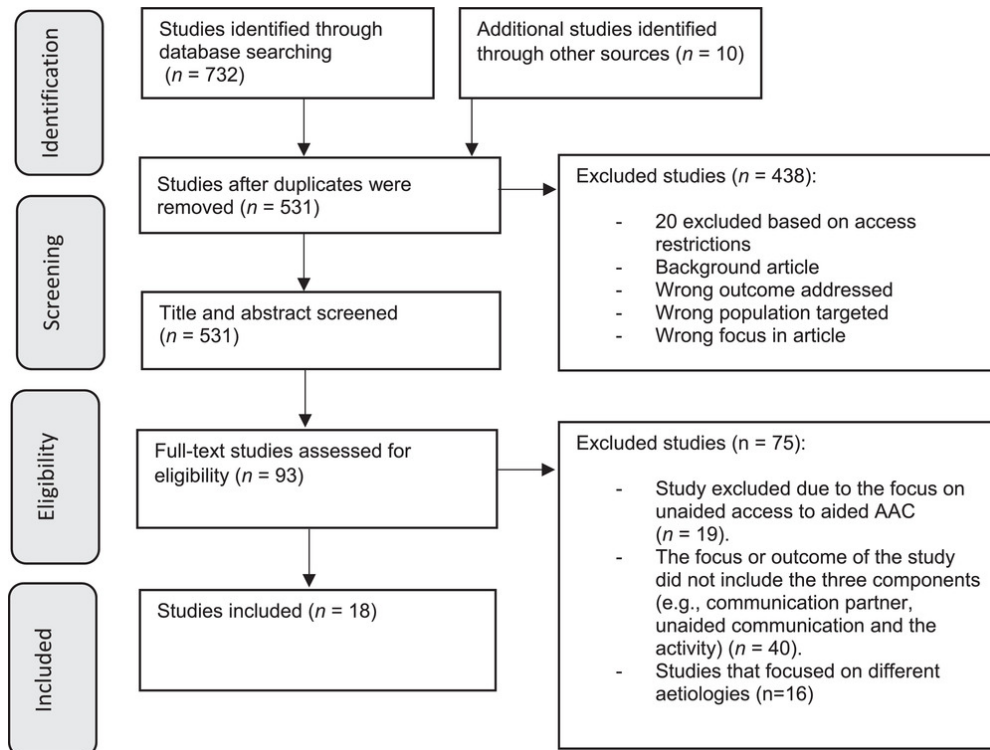


FIGURE 1. Prisma diagram for scoping review process (Blanco et al., 2019)

Data extraction, analysis and reporting

A data extraction tool was developed to assist the authors in compiling consistent and independent data reports. The data extraction instrument included the date, authors, research design, outcomes, outcome measures, unaided communication behaviours, communication content and communication activity/context or intervention. All the data was extracted independently by at least two authors. The first author extracted 100% of the studies while the second and third author each extracted 50% of the studies. Only 10% discrepancies occurred for which a third opinion was sought to act as an arbitrator. Upon full consensus the extracted data was recorded on a data extraction form and transferred to an Excel spreadsheet.

Following data extraction the quality of the included studies was appraised using the mixed methods appraisal tool (MMAT) (Hong et al., 2018). This tool assisted the authors in critically appraising the methodologies of the included studies and the scores are shown in Table 2. However, the focus of this appraisal was on description rather than on exclusion, and therefore no studies were excluded based on their MMAT score (Hong et al., 2018). The first author critiqued 100% of the studies and the other two authors independently appraised 20% of the studies. The MMAT overall quality score used descriptors such as numbers ranging from 1 (indicating 20% quality criteria) to 5 (indicating 100% quality criteria met).

Thematic analysis was used to analyse the data, as this process allows for the systematic and insightful identification and organisation of data into themes in order to address the aim of the research (Nowell et al., 2017). The six-step approach suggested by Braun and Clarke (2012) was followed: 1) The authors familiarised themselves with the data and focused on data reduction through triangulation; 2) the data was then hand coded by the authors; 3) themes were determined by means of inductive coding (i.e. a bottom-up approach that uses the data content to determine codes); 4) the identified themes were reviewed; 5) themes were defined and named; and 6) the thematic analysis process was concluded with the production of a report.

RESULTS

The results of the scoping review are presented as descriptive information related to the 34 included studies (authors, country, research design) and the study population (adults with CVA and little or no functional speech and their communication partners) (see Table 2). This is followed by an analysis of the unaided forms of communication (Table 3 and Figure 2), as well as the various communication functions served by these behaviours (see Table 4).

TABLE 2. Description of included studies (alphabetical according to authors)

Descriptive information: Study						Population: Participants		Population: Partners	
No	Author	Country	Research design	MMAT rating (Score out of 5)	Progressive/Non-progressive	Participants	Aetiology	Context/setting	Communication partner
Person-centred communication									
Quantitative design									
1	Blonder et al. (1993)	USA*	Experimental comparison with control group	5	Non-Progressive	N = 22	7 CVA*** (Right) 7 CVA (Left) 8 Normal	Home	Life partner
2	Blonder et al. (1995)	USA	Experimental comparison with control group	5	Non-Progressive	N = 21	7 CVA (Right) 7 CVA (Left) 7 Normal	Home	Life partner
3	Borod et al. (1989)	USA	Descriptive, correlational	4	Non-Progressive	N = 41	35 CVA (Left)	Therapy	SLT#; Nurse; Researcher
4	Daumüller et al. (2010)	Germany	Experimental comparison with control group	3	Non-Progressive	N = 35	35 CVA (Left)	Hospital	Researcher
5	Dipper et al. (2015)	UK**, Australia	Experimental comparison with control group	5	Non-Progressive	N = 58	29 CVA (Left) 29 Normal	Therapy; support groups; community	Researcher

6	Finkel et al. (2018)	Germany; USA; Austria	Experimental comparison with control group	4	Non-Progressive	N = 117	67 CVA (Left) 50 Normal	Hospital	Researcher
7	Hanlon et al. (1990)	USA	Single subject design	5	Non-Progressive	N = 24	24 CVA (Left)	Support groups; Therapy	Researcher
8	Marangolo et al. (2010)	Italy	Single subject design	4	Non-Progressive	N = 6	5 CVA (Left) 1 TBI****	Therapy	Researcher
9	Preisig et al. (2018)	Netherlands; Switzerland	Single subject design	5	Non-Progressive	N = 36	20 CVA (Left) 16 Normal	Therapy	Researcher
10	Rautakoski (2011)	Finland	Experimental-baseline and intervention	5	Non-Progressive	N = 38	38 CVA (Left)	Therapy	Life partner
11	Sekine and Rose (2013)	UK Australia; Japan	Experimental comparison with control group	5	Non-Progressive	N = 162	98 CVA (Left) 64 Normal	Therapy	SLT
Qualitative design									
12	Cocks et al. (2007)	UK & Australia	Multiple single-case study design	5	Non-Progressive	N = 24	19 Normal 5 CVA (Right)	Community; support groups; hospital	Researcher
13	Garcia et al. (2000)	USA	Opinion piece	0	Both	N = 4	3 CVA (Left) 1 ALS*****	Not specified	Researcher
14	Herrmann et al. (1988)	Germany	Interviews	5	Non-Progressive	N = 7	7 CVA (Left)	Therapy	Relative or close friend
15	Lanyon and Rose (2009)	Australia	Naturalistic observation	5	Non-Progressive	N = 18	18 CVA (Left)	Therapy	Researcher

16	Rhys (2005)	UK	Single case study	5	Non-Progressive	N = 1	1 CVA (Left)	Therapy	Student
17	Uruma et al. (2007)	Japan	Case study	5	Non-Progressive	N = 1	1 CVA (Left)	Hospital	Researcher
Partner-centred communication									
18	Rose et al. (2017)	Australia; UK	Observation	5	Non-Progressive	N = 67 students	11 CVA (Left)	Therapy	Researcher

Note: *USA = United States of America.

**UK = United Kingdom.

***CVA = Cerebrovascular Accident.

****TBI = Traumatic Brain Injury, *****ALS = Amyotrophic Lateral Sclerosis.

#SLT = Speech-Language Therapist.

TABLE 3. Types of unaided communication behaviour

Type of unaided communication behaviour	Meaning	Characteristics or examples	Studies
Non-linguistic unaided communication			
<i>Eye movements</i>	Using eye movement to communicate.	Eye blinking; eye gaze; prolonged eye closure; referential gaze to person's face, object or elsewhere; weeping eyes; closing eyes tightly; opening/slight opening of eyes; visual pursuit; gaze withdrawn; gaze returned	4, 10, 14, 16
<i>Facial expressions</i>	Using the face to communicate/ to indicate a thought or an emotion.	<p><u>Positive</u> – smile; blowing a kiss; winking; lip puckering</p> <p><u>Neutral</u> – eyebrow raise, posed or spontaneous; licking lips; scratching chin; scratching nose; relaxed face; open mouth; chewing; finger in mouth; chewing thumb</p> <p><u>Negative</u> – crying; frowning; levator contraction or cheek tightening; poking out tongue; not opening mouth for feeding; biting lower lip; clenching teeth; wincing; grimacing</p>	1, 10, 12, 13, 14, 15, 18
<i>Gestures</i>			2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16, 17, 18
Head and neck movement	Moving the head and neck to communicate.	Nodding head; shaking head; lifting head of bed; slow turn; moving head side to side; rubbing head on bed; turning head to one side (left or right)	
Pantomime gestures (miming)	Actions of a complex concrete, sequential nature that are used to describe a construct and can be interpreted in isolation – substituting verbal utterances. These gestures include body parts that can be used as objects.	<p>Walking that refers to forward movement of hand with alternating extension and flexion of index and middle finger</p> <p>Drawing a vertical rectangle to indicate air or holding an imaginary remote</p>	
Metaphoric gesture	Presenting an image of an abstract concept, such as knowledge or justice.	<p>Two fists bouncing against each other can refer to “clashing arguments” in a heated discussion</p> <p>Tilting the horizontal hand from side to side to indicate equivocation</p>	

Pointing	Deictic	Pointing to self, a location on the body or pointing to a referent in physical environment.	Pointing to referents, to their arm or to something on the table Pointing to distant referents, for instance, to the wall to indicate the neighbours or something outside Pointing to abstract referents, for instance to the sky to refer to "heaven"
Referential gesture	Assigning an entity of referents, such as objects, places or characters in the story.		
Beat gestures	Movements that do not present a discernible meaning are recognised by prototypical repetitive movements and following speech intonation patterns.	Touching nose during conversation	
Emblem gestures	Hand movements that go simultaneously with the rhythm of speech, used for emphasis and to accentuate syllables or words.	Thumbs-up gesture in the Dutch and English culture Thumb and pointer finger making a circle shape for "OK"	
Non-communicative gestures	These gestures do not indicate communication intent but the motor execution of activities.	Fidgeting: repetitive movements involving self-touch but not grooming of body Grooming: grooming the body and changing the body's position	
Reflexive behaviour	These behaviours are automatic and reflexive motor movements of the body.	Muscle tension or compliance; rising temperature; sweating; heartbeat; heart rate; flexing and deflating muscles; absence of movement; restlessness; flexion,, flushing; tactile and olfactory response; opening mouth,, removes feeding tube; squeezing hand; shrugging shoulders; shaking body; leaning forward; claspingshaking hands; leaning on partner; feeling collar; slow cautious movement; repetitive movement; attempting to reach pain site; touching pain site; guarding oneself from the caregiver;	9, 10, 12, 13

		massaging pain site; pulling tube; defensive grabbing; cooperative movement; attempting to return to supine; clenching fist; slapping nurse's hand away; rubbing knees	
<i>Vocalisations</i>	These vocalisations are voiced or voiceless utterances that are not considered as words.	Laughing; yawning; clearing throat; heavy breathing; producing high-pitch sound; growling; clicking tongue; sighing; singing; tutting; moaning; intonation (pitch and prosody); coughing; mouthing (voiceless vocalisation)	9, 12, 13, 18
Linguistic unaided communication			
<i>Gestures</i>			
<i>Iconic gestures (symbolic, meaning-laden, speech focused and codified)</i>	These are hand gestures that have semantic content closely related to speech production. The gestures can be used for word retrieval. They are context specific and support speech production. They are combined with natural speech and cannot be interpreted in isolation.	<p>The iconic gesture of pretending to drink is similar to the real activity of drinking</p> <p>Swinging arms back and forth could indicate running</p> <p>Tracing index finger in the frontal space from left to right to indicate running</p> <p>Imitating the action of throwing a ball</p> <p>Pointing index finger upwards and making a circular movement upwards to indicate going up the stairs</p> <p>Moving lips without producing sound and moving hand back and forth in front of mouth to indicate one cannot speak</p>	In above mentioned studies
Finger spelling	Time	Spatial indication to denote a time, such as past or future.	Indicating the past (back of the body) or the future (front of the body)
Letter	Movements associated with writing letters.	Writing letters in the air or on the desk/thigh with an empty hand or fingers	
Number	Using one's fingers to display numbers.	Displaying numbers by showing the fingers	

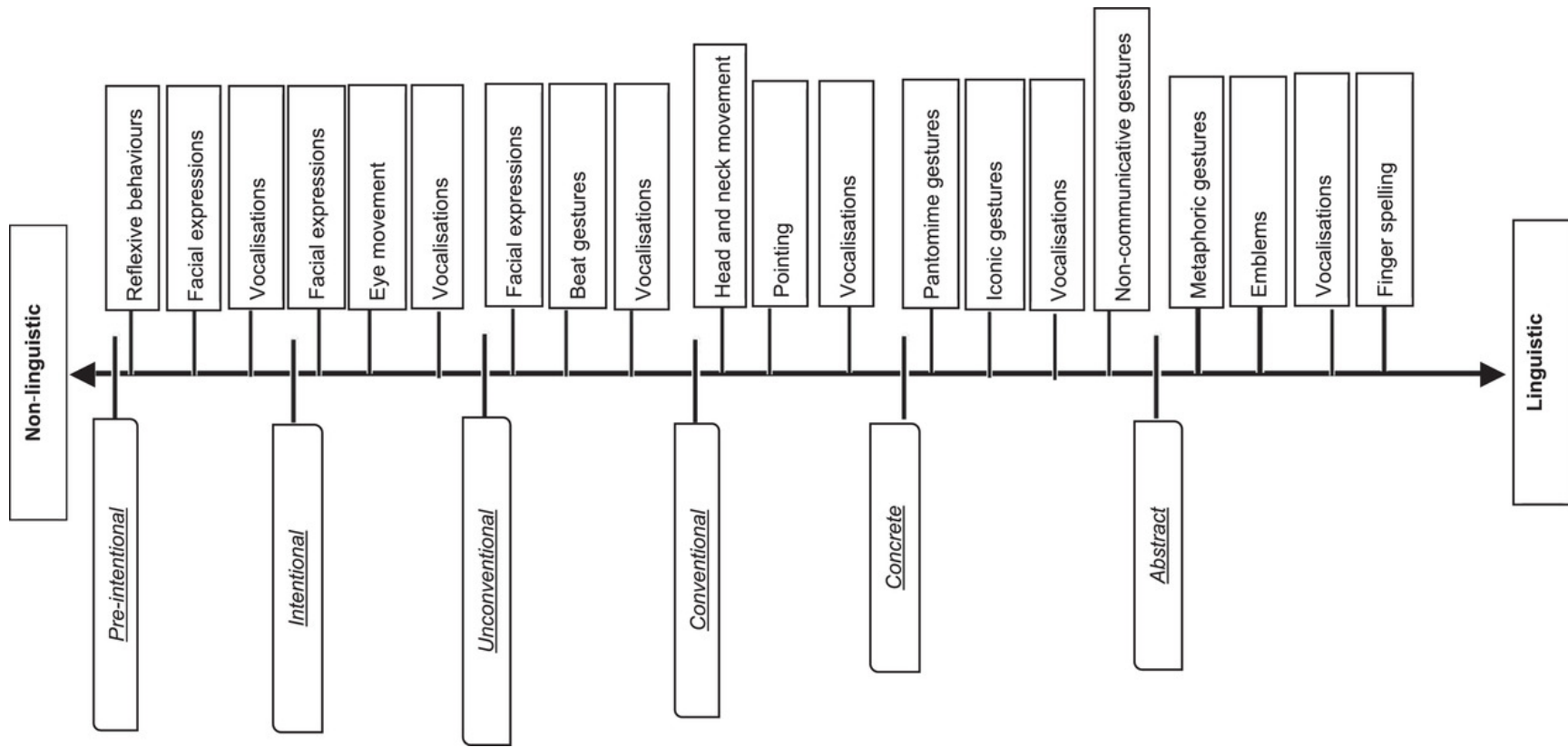


FIGURE 2. Continuum of unaided communication behaviours

TABLE 4. Communication functions

Communication level according to communication matrix	Communication function according to communication matrix	Nr	Label	Definition	Studies
Level 1: <i>Pre-intentional behaviour</i>	<u>Social</u>	1	Searching behaviour	Searching for a person or object in the environment.	15
	<u>Obtain</u>	2	Expressing components related to physical functioning	Communication regarding the physical functioning of the person.	10, 15
Level 2: Intentional behaviour	<u>Refuse</u>	3	Expressing pain/discomfort	Physiological expression of pain.	10, 13, 15
	<u>Social</u>	4	Drawing attention	Focusing the communication partner's attention on a specific object, person or event.	3
	<u>Obtain</u>	5	Expressing affect	This refers to the individual's ability to communicate positive or negative emotions and feelings (e.g., happy, sad, anger, fear)	1, 2, 3, 9, 15, 18
Level 3: Unconventional communication	<u>Obtain</u>	6	Comprehending messages (basic)	Understanding the intent of a message produced by a communication partner.	11, 12, 14
		7	Choice making	Conveying personal preferences to the communication partner.	5, 11
		8	Expressing wants and needs (basic)	Expressing wants and needs.	4, 12, 15
		9	Basic or beginning communication support	Using unaided communication to represent basic messages.	4, 5, 12, 15
Level 4: <i>Conventional communication</i>	<u>Social</u>	10	Greeting	Following social etiquette rules such as saying "hello" or "goodbye".	1, 3, 15
		11	Engagement in interaction	Attending to the communication partner through active listening and body engagement.	1, 5
		12	Turn taking	Reciprocity of turns with communication partners.	1, 10, 16
	<u>Information</u>	13	Functional use of objects	Knowing the function of an object e.g., using a comb.	5, 7, 15
	<u>Obtain</u>	14	Requesting information by asking questions	Requiring the communication partner to provide more information.	1, 4, 15
Level 5: <i>Concrete communication</i>		15	Responding (basic)	This refers to a voluntary response to a communication partner's initiation to communicate.	1, 2, 3, 4, 5, 8, 10, 12, 14, 15
	<u>Social</u>	16	Imitation	Imitating an action, object or person.	5, 11

	<u>Information</u>	17	Naming	Labelling an object, person or event in the person's environment.	7, 16
		18	Commenting	Providing comments during the conversation.	1
		19	Answering questions	Responding to the communication partner's questions (yes/no or general).	1, 2, 3
	<u>Obtain</u>	20	Requesting a turn	When the person with an acquired neurological injury initiates the interaction or requests to take part in the conversation.	16
		21	Requesting participation	When the person with an acquired neurological injury is requesting reciprocal interaction from a communication partner.	3, 15, 16
Level 6:	<u>Information</u>	22	Providing clarification	Elaborating or providing more information based on the communication partner's request.	1, 4
Abstract communication		23	Describing	Describing an object, event or person to the communication partner.	5
	<u>Social</u>	24	Modelling	Demonstrating what is required of the communication partner.	3, 5
Level 7:	<u>Information</u>	25	Narrative	Telling a story.	1, 2, 3, 6, 11, 14, 17
Linguistic	<u>Refuse</u>	26	Arguing	Debating the point of view of the person with an acquired neurological injury.	1
	<u>Social</u>	27	Leading the conversation	Leading the conversation by discussing topics related to the concerns or interests of the person with an acquired neurological injury.	3, 16
		28	Observing social etiquette	Using words that are socially appropriate or inappropriate.	1
		29	Termination	When the person with an acquired neurological injury withdraws from the conversation.	16
		30	Interrupting	The person with an acquired neurological injury interrupts the conversation to provide their point of view.	1
	<u>Obtain</u>	31	Conversational pause	The speaker takes a rest, hesitates, or temporarily stops.	16

Descriptive information on the studies that were included

The methodologies used in the 18 studies included 13 quantitative (72%) and five qualitative (28%) studies. Most of the quantitative designs comprised experimental comparisons with a control group (n = 7), while the qualitative designs were case studies (n = 3). Geographically, 6 of the studies (33%) were conducted solely by or in collaboration with researchers from the USA, 28% (n = 5) were situated in Australia, 17% (n = 3) in Germany, 28% (n = 5) in the UK and 28% (n = 5) were carried out in collaboration with or solely in other countries. The descriptive quality met in the studies ranged from 0 to 5. Most studies (n = 18; 13-quantitative and 5-qualitative) obtained a 5 which indicated 100% descriptive quality, with 3 studies obtaining a score of 80%, 1 study obtaining a score of 60% and 1 study obtained a score of 0 due to the nature of the study (i.e. literature review).

Population: adults with CVA and little or no functional speech

In total, 18 studies reported on patients diagnosed with CVA and little or no functional speech.

Most participants were recruited from therapeutic and research settings (e.g. community or support groups) (n = 11). The therapy context was followed by studies in a hospital setting (n = 4) and at the participant's home (n = 2), and the remaining studies were not specified (n = 1). All 18 studies targeted communication during activities of daily living such as feeding or natural communication.

Population: communication partners

In 11 (n = 61%) of the person-centred communication studies (i.e. studies that focused on the person with a CVA and little or no functional speech and their communication partner) the researchers acted as communication partners. The researchers were mostly healthcare practitioners from various disciplines (e.g. speech-language therapists (SLTs), nurses, psychologists or medical specialists). In three studies, trained partners (17%) acted as the communication partners (e.g. nurses, SLTs, students and others). Only four studies included untrained partners, and these were life partners/spouses and relatives (22%). Partner-centred communication studies referred to those studies in which the focus was on the partner relaying information regarding the unaided communication of persons with CVA and little or no functional speech (n = 1).

Unaided communication behaviours

Figure 2 illustrates that unaided communication behaviours were plotted onto a continuum with non-linguistic and linguistic systems as the two anchor points (Beukelman & Light, 2020; Bornman & Tönsing, 2019). The different types of unaided communication behaviour were further delineated according to the seven levels of communication described in the communication matrix of Rowland (2011). Table 3 shows that different types of gestures (n = 15) were described most frequently, followed by facial expressions (n = 7), reflexive behaviours (n = 4), eye movements (n = 4) and vocalisations (n = 4). The gestures mostly

involved use of the upper limbs – specifically the hands, arms and shoulders – followed by the head and the lower limbs, specifically the leg and foot.

Communication functions

Communication functions refer to the vocal, verbal and gestural intent or purpose of an individual's message (Austin, 2013; Beukelman & Light, 2020). For the purpose of this paper, communication functions were classified according to the communication function categories in Rowland's (2011) communication matrix. This Matrix indicates how the four basic communication functions, namely refusal (declining the options), obtaining (acquiring what is desired), social engagement (engaging in social interaction) and information (providing and seeking information) are linked to the seven levels of communication functions (Rowland, 2011).

In the 18 studies included, a total of 31 different communication functions were identified that were conveyed using unaided forms of communication. Level 1 (pre-intentional communication) included three communication functions classified according to three communication function categories – specifically social engagement (n = 1), obtain (n = 1) and refuse (n = 1). The second level (intentional behaviour) included two communication function categories, namely social engagement (n = 1) and obtain (n = 1). For instance, the ability to convey affect or emotions was mentioned in seven studies. Communication functions in Level 3 (unconventional communication) focused on expressing wants and needs (n = 3), using unaided communication for basic or beginning communication support (n = 4) and for comprehending messages (n = 3).

Level 4 (conventional communication) included six communication functions categorised according to three communication function categories, namely social engagement (n = 3), obtain (n = 2) and information (n = 1). The conventional communication function mentioned in the majority of the studies was responding (n = 10). Communication function categories included in Level 5 (concrete communication) referred to social engagement (n = 1), information (n = 3) and obtain (n = 2). The second-last level (Level 6 – abstract communication) included the information (n = 2) and social engagement categories (n = 1). Lastly, Level 7 (linguistic communication) was the only level that included all four categories of communication functions – social engagement (n = 4), information (n = 1), refuse (n = 1) and obtain (n = 1). The communication function mentioned most in Level 7 was narratives (n = 7).

DISCUSSION

Research shows that persons with severe CVA often experience communication difficulties during interaction (Beukelman et al., 2015). Typically, a functional means of communication is recovered within the first year after the incident but severe communication difficulties remain longer for some persons with CVA (Godecke et al., 2021). Due to the pervasiveness of a severe communication disorder, a person's autonomy, engagement, satisfaction, safety and overall communicative effectiveness are affected, which in turn results in limited participation in activities of daily living within their communities (Baylor et al., 2019).

These communication challenges can also extend to the communication partner. Communication partners are often aware of the person-partner/ sender-receiver communication challenges and recognise that persons with severe CVA require an effective means of communication (Baylor et al., 2019). Alas, partners often misinterpret the person's communication intent or fail to respond appropriately to communication attempts, due to the subtle nature of these behaviours (Ellis & Astell, 2017). Moreover, for effective communication to transpire, mutual engagement is required. Partners should also identify the intent, motivation and willingness of the person with a severe CVA to participate in communication, in other words to identify the functions of communication.

In the current study, most of the communication functions that were identified focused on the social category of the Communication Matrix (Rowland, 2011). This included components such as producing narratives, leading the conversation and using communication intent. The other communication category that contained numerous communication functions was the obtain category, which included expressing affect or emotions, using unaided communication behaviours to aid the comprehension of messages or instructions, and providing a communication support for verbal interaction. These findings are supported by Beukelman and Light (2020) who suggest that communication has a social purpose and is used to regulate the behaviour of a partner or to obtain something desired from them.

However, regulating the behaviour of a partner may be challenging if they have limited knowledge or skills and struggle to identify subtle communication attempts made by the persons with severe CVA and little or no functional speech (Hogrefe et al., 2012). This shortcoming can be addressed by training communication partners to be sensitive to subtle communication attempts and by allowing them to reinforce such behaviours (Rowland, 2011). If the partners can be trained to identify the means and functions of communication, they can engage with the person with a severe CVA in an attempt to co-construct meaning (Glize et al., 2017; Simmons-Mackie et al., 2010 and 2016).

This training may create opportunities for persons with severe CVA to also be active partners during interaction (Finkel et al., 2018). Thus, it should include not only well-known unaided communication behaviours such as eye movement, facial expressions (Blonder et al., 1993) and gestures (for instance sign language), but also less common unaided communication behaviours identified through this study (such as reflexive behaviour). This scoping review supports the notion that unaided communication behaviours occur on a continuum and the acquisition thereof is a process that occurs at various stages (e.g. waking up from a coma and expressing needs and wants) (Rasmus et al., 2019; Rowland, 2011). This suggests that when a developmental approach is followed, the acquisition of unaided communication behaviours occurs prior to verbal communication. However, the person with a severe CVA and little or no functional speech may still access a range of unaided communication behaviours after some verbal communication has been attained (Rasmus et al., 2019; Rowland, 2011).

Accessing a range of unaided communication behaviours may be utilised to successfully influence the social environment (Rowland, 2011). To achieve this, the individual's communication behaviour may include unintentional, pre-intentional and intentional

communication functions (see Table 4) (Austin, 2013; Rowland, 2011). However, the progression from unintentional to intentional communication functions can only occur during interaction with and reinforcement of behaviour by communication partners (Austin, 2013; Rasmus et al., 2019; Rowland, 2011). Therefore, for persons with severe CVA and little or no functional speech to progress to intentional communication, partners need to understand and identify the various communication functions that can be accessed through unaided communication behaviours. Unaided communication behaviours may appear limiting at first glance (Ten Hoorn et al., 2016), but this review emphasises the fact that they can be used to access a range of communication functions – from indicating responsiveness to playing an active role during communication.

To access various communication functions, partners should be alerted to the fact that unaided behaviour is often ambiguous and complex (Holt et al., 2012; Lin et al., 2010; Rasmus et al., 2019). Due to the mind-body connection, behaviour does not occur randomly but may instead be determined by thoughts, feelings and experiences (Holt et al., 2012). Therefore, the interpretation of these behaviours cannot rely solely on the personal perspective, knowledge and beliefs of communication partners (Lin et al., 2010). Interpreting unaided communication behaviours requires attention, motivation and time if it is to occur effortlessly and accurately (Lin et al., 2010). Partners need to be trained to identify and reinforce the communication behaviours of persons with severe CVA, as these may influence partner expectations and thoughts and may also bring about positive partner behaviour modification (Holt et al., 2012).

Positive behaviour modification of partners can only occur when the partners are willing to accommodate persons with severe CVA and little or no functional speech. If this accommodation occurs, partners will have greater knowledge of communication strategies that may facilitate the building of mutual trust and the creation of reciprocal understanding during person-partner communication (Watson et al., 2012).

The training of partners on unaided communication behaviour holds benefit for the partner as well as for the person with a severe CVA, as both members of the person-partner dyad may experience enhanced perceptions of personhood and quality of life (Watson et al., 2012). Furthermore, persons with severe CVA may experience greater success during interaction with a trained partner, which may lead to increased communication autonomy, engagement and quality of interaction. This may ultimately also have a positive impact on the quality of life of both partners (Hogrefe et al., 2012).

LIMITATIONS OF THE SCOPING REVIEW

This review did not include studies on aided AAC (e.g. speech-generating devices or communication boards) or on unaided access to high-tech AAC (e.g. brain/computer interfaces). It focused solely on the use of unaided communication. Studies on unaided communication used by partners were also excluded, as the main focus was on the person with a severe CVA and little or no functional speech and did not include persons with other aetiologies using unaided forms of communication. The only partner studies that were included focused on partners relaying information regarding the affected person's use of unaided communication behaviours. Moreover, these studies typically included researchers

or healthcare practitioners rather than informal or natural partners in the communication partner role, which may negatively impact clinical practice.

Another limitation may be that the review was confined to studies published in English and also did not include studies conducted prior to 1986. This date was selected because the first taxonomy of unaided and aided AAC had been suggested by Lloyd and Fuller in 1986. Studies that were included focused on the adult population (18 years and older) with specific medical diagnoses related to severe CVA. The review did not include studies on adults with developmental disabilities (e.g. cerebral palsy or autism spectrum disorder). Since its aim was to provide descriptive information on the various unaided communication methods, the review included grey literature, and hence quality appraisal of studies was not performed for inclusion and exclusion purposes but rather to describe the studies. This focus was decided on due to the limited availability of relevant research and the specific communication functions addressed by unaided communication behaviours.

CONCLUSION

The scoping review attempted to summarise the various unaided communication behaviours available in the literature and emphasised the importance of partner awareness of these behaviours. Since unaided communication behaviours could be subtle and easily be overlooked or misinterpreted, partner training was required to improve the quality of person-partner communication. Furthermore, unaided communication strategies were used to target a wide range of communication functions – from indicating an initial awareness and alertness to being an active participant in communication. For both communication partners to act as equal and active participants during interaction, partners should reinforce unaided communication behaviours to access a range of communication functions. This study also emphasises the role of the SLT's as previously limited focus was placed on this population with severe communication difficulties due to their limited lifespan. However, persons affected by severe CVA's have an increased lifespan due to medical advances and therefore their quality of life should be considered. Due to the effect of communication on quality of life the role of the SLT's has expanded to include not only improving their own knowledge of communication in severe CVA but also training communication partners on these strategies. SLT's make a critical difference to this population – without access to key services, persons with severe CVA are at a lifelong disadvantage for meeting their basic communication needs and rights (International Communication Project, n.d.).

RECOMMENDATIONS

Studies identified in this review mostly targeted researchers and healthcare practitioners as communication partners, with the result that the primary partners were often overlooked. Future research should include these partners (both paid and unpaid). Even though various aided methods of communication are available, many countries still have limited access to these communication supports and struggle with additional contextual, linguistic and cultural barriers. Future research should therefore target all of these partner populations (researchers, healthcare practitioners and primary partners) as suitable training could enhance their knowledge of unaided communication. It may also enhance partners' insight into the different communication functions addressed by these behaviours, resulting in the

increased communication competence of persons with severe CVA and little or no functional speech.

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There is no conflict of interest to report.

AVAILABILITY

No data is available.

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