

Aprosodia post right hemisphere stroke

Prevalence, localisation and patterns

This is a summary of key points related to aprosodia post right hemisphere (RH) stroke for health care professionals.

The document was created in 2024 and will be updated annually to reflect changing clinical evidence.

Communication deficits associated with RH stroke can be evident across linguistic, extralinguistic and paralinguistic areas of communication, and may co-occur with cognitive impairments, hence the use of the diagnostic term of cognitive communication disorder (CCD). Linguistic deficits include challenges in interpreting or selecting appropriate words, syntactic structures, or topics of conversation. At the paralinguistic level, disruptions in the interpretation and/or production of prosodic contours to express meaning and emotion can occur. The ineffective or inappropriate use, or comprehension of body language, facial expression, or eye contact represent extralinguistic deficits.¹⁻³

TERMINOLOGY⁴⁻⁶

- Prosody:** Suprasegmental aspects of speech including intonation (pitch), rate, volume, and rhythm that conveys linguistic meaning (e.g. question versus command), emotional meaning (e.g. joy, fear, disappointment), or intent (e.g. discouragement of further conversation).
- Aprosodia:** Impaired ability to manipulate or understand suprasegmental aspects of speech following neurological injury (e.g. stroke, traumatic brain injury), or as a symptom of conditions such as autism spectrum disorder, dementia, or schizophrenia.
- Affective prosody:** Emotions expressed through the intonation, rate, volume and rhythm of speech. When impaired, a diagnostic term of emotional aprosodia or affective aprosodia is assigned.
- Linguistic prosody:** Changing the meaning of words and sentences by altering suprasegmental aspects of speech (e.g. to differentiate between a noun and a verb, record versus record; speech acts that conveys a greeting, a question or that lets the communication partner know that it is their turn to speak).
- Receptive prosody:** Detecting and understanding the linguistic and/or emotional meaning conveyed by suprasegmental aspects of speech.
- Expressive prosody:** The ability to select and use suprasegmental aspects of speech to influence the linguistic and/or emotional meaning of an utterance.

PREVALENCE⁸⁻¹⁰

Deficits in emotional and linguistic prosody are dissociable. Prevalence following a right hemisphere stroke:

Emotional aprosodia – strong support in current literature to be a consequence of RH stroke.

- Receptive emotional aprosodia
 - 70% of individuals with RH stroke have receptive emotional aprosodia in the acute phase, while
 - 12 – 44% have receptive emotional aprosodia in the subacute and chronic stages of recovery.
- Expressive emotional aprosodia. Similarly, strong support in the literature for it occurring following RH stroke; however, limited prevalence data.

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Linguistic aprosodia – less evidence with some inconsistency across studies.

- Receptive linguistic aprosodia
 - 29% of individuals have receptive linguistic aprosodia in the chronic stage of recovery.
 - Most support for impaired discrimination and identification (receptive aprosodia) of speech acts. Further research is required on the presence and prevalence of noun-verb word-level and phrase-level receptive aprosodia.
- Expressive linguistic aprosodia. Some evidence to support expressive linguistic aprosodia related to speech acts.

LOCALISATION¹⁰⁻¹³

Functional neuroimaging studies of neurologically unimpaired individuals highlight a bilateral activation of brain areas with greater activation in right than left temporoparietal regions during affective prosody tasks. Lesion-symptom mapping post stroke reveal more frequent occurrence of prosody impairments in those with right than left hemisphere stroke. Evidence supports a right hemisphere dual stream organization for emotional prosody implicating right temporoparietal regions for receptive prosody and right hemisphere inferior frontal regions for expressive emotional prosody.

Most evidence is for individuals in the subacute or chronic stage of recovery. In those with right hemisphere stroke in the acute phase of recovery, receptive emotional prosody (and impaired emotional facial expression), are associated with damage to subcortical structures, particularly the caudate, and right posterior superior temporal gyrus. When considering level of prosodic breakdown, frontotemporal lesions are associated primarily with impaired processing of emotional prosody; while domain-general emotion recognition impairment links to overlapping subcortical areas.

ASSESSMENT¹⁴⁻²⁰

The presence of aprosodia has been shown to be a strong predictor of right hemisphere dysfunction, even more so than the presence of neglect, which supports the need for routine assessment of prosody in those with RH stroke. Discourse production and aprosodia were identified as the two most frequent communication impairments from an examination of 112 individuals with RH stroke using a diagnostic assessment developed for CCD.

The following assessment tools and tasks hold value for the identification of aprosodia:

- Ecologically valid tasks that consider use of prosody in spontaneous speech samples, and interpretation of the meaning conveyed when prosody is varied in assessment tasks that represent communication in everyday context, e.g The Awareness of Social Inference Test (full diagnostic and screening versions)(TASIT).

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- Standardised diagnostic assessments, that allow for the evaluation of both receptive and expressive prosody such as The Montreal Protocol for the Evaluation of Communication (MEC) and the Hillis Post-stroke Prosody Battery. Standardisation of screening tools would be supported by the inclusion of pre-recorded audio and/or video components to test the ability to detect and interpret meaning conveyed by altering prosodic patterns of speech, e.g. the RECOGNISE app, and POCKET MEC screening tools (under development).

CO-OCCURRENCE^{14,21}

A systematic review exploring patterns of co-occurrence of deficits post RH stroke revealed that receptive emotional aprosodia may likely co-occur with:

- impaired emotional facial expression recognition
- deficits that affect interpersonal interactions (e.g. impaired ability to detect humor, and difficulty adjusting communication style and/or content based on contextual demands known as pragmatic impairment)
- affective empathy or impaired social cognition (i.e. difficulty with perspective taking or theory of mind)

While the above impairments could serve a predictive purpose in terms of the co-occurrence of aprosodia, current evidence did not find a similar pattern related to unilateral visual neglect. One study documented emotional aprosodia to be present in more than 80% of individuals with RH stroke, while neglect was only present in 18%.

TREATMENT²²⁻²⁶

Providing treatment is important as aprosodia may persist into the chronic phase of stroke recovery and can have many negative consequences. Caregivers rate aprosodia as the most important long-term consequence of right hemisphere stroke and the presence of aprosodia has been associated with reduced relationship satisfaction. The provision of education to family members and friends should be included in rehabilitation management plans. The development and training of strategy use, for example using metacognitive strategy instruction may support the transition from emerging awareness of aprosodia to increased success in modifying prosody during communication interactions.

The following are examples of evidence-based treatments for aprosodia following RH stroke:

- **Receptive aprosodia**
 - Refer to Durfee et al. 2021
- **Expressive aprosodia**
 - Imitative or motoric treatment
 - Cognitive-linguistic treatment

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KEY CLINICAL MESSAGES

Identification. The high prevalence of aprosodia post right hemisphere stroke in the acute phase and ongoing impairment documented in the chronic phase [necessitates the inclusion of aprosodia in acute-phase screening protocols](#).

Profiling impairments. [Comprehensive diagnostic assessment](#) of the communication impairment that occurs post RH stroke should include assessment of both receptive and expressive emotional prosody tasks and explore the possible presence of linguistic aprosodia, particularly related to speech act interpretation and production.

Treatment. [Education](#) to friends and family members is essential given the potential impact of aprosodia on relationships. There is evidence to support [impairment level treatment](#) using either a motoric imitative or a cognitive linguistic approach to the treatment of aprosodia post RH stroke.

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If you are aware of new evidence, practice guidelines, assessment or treatment resources that should be included in this summary contact Ronelle Hewetson: info@righthemispherestroke.org