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The apraxia of speech rating scale: A tool for diagnosis and description of apraxia of speech

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ABSTRACT

The purpose of this report is to describe an initial version of the Apraxia of Speech Rating Scale (ASRS), a scale designed to quantify the presence or absence, relative frequency, and severity of characteristics frequently associated with apraxia of speech (AOS). In this paper we report intra-judge and inter-judge reliability, as well as indices of validity, for the ASRS which was completed for 133 adult participants with a neurodegenerative speech or language disorder, 56 of whom had AOS. The overall inter-judge ICC among three clinicians was 0.94 for the total ASRS score and 0.91 for the number of AOS characteristics identified as present. Intra-judge ICC measures were high, ranging from 0.91 to 0.98. Validity was demonstrated on the basis of strong correlations with independent clinical diagnosis, as well as strong correlations of ASRS scores with independent clinical judgments of AOS severity. Results suggest that the ASRS is a potentially useful tool for documenting the presence and severity of characteristics of AOS. At this point in its development it has good potential for broader clinical use and for better subject description in AOS research.

Learning Outcomes: The Apraxia of Speech Rating Scale: A new tool for diagnosis and description of apraxia of speech

1. The reader will be able to explain characteristics of apraxia of speech.
2. The reader will be able to demonstrate use of a rating scale to document the presence and severity of speech characteristics.
3. The reader will be able to explain the reliability and validity of the ASRS.

1. Introduction

1.1. Background

The diagnostic classification of apraxia of speech (AOS) was first used by Darley (1968) in the late 1960s. He had observed that a subset of patients with aphasia following stroke also had difficulty with articulatory movements that could not be explained by phonologic errors or weakness. He suggested the use of this term to discriminate the language impairment associated with aphasia and the movement disorders associated with the dysarthrias from a third disorder which he believed resulted from

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Table 1
Scoring for each of the 16 items on the ASRS.

Score	Description
0	Not present
1	Detectable but infrequent
2	Frequent but not pervasive
3	Nearly always evident – not severe
4	Nearly always evident – severe

impairment in planning and programming movement gestures for speech. Debate raged for the next 20 years (and to a small degree continues) as to whether there is indeed a category of impairment separate from either aphasia or dysarthria. Over the last 40 years, a large body of perceptual, acoustic, and physiologic research has demonstrated that there is support for such a category, and has provided copious descriptions of the characteristics associated with the disorder (see reviews in Duffy, 2013; McNeil, Doyle, & Wambaugh, 2000; McNeil, Robin, & Schmidt, 2009; Wertz, LaPointe, & Rosenbek, 1984).

More recently, AOS has been observed in progressive degenerative neurologic disease. In 2006, Duffy provided evidence that it may be the first or only sign of degenerative neurologic disease, and he posited the term primary progressive apraxia of speech (PPAOS) (Duffy, 2006). Recent research has further documented and described PPAOS as well as progressive nonverbal oral apraxia occurring in the context of progressive aphasia (Josephs et al., 2006; Josephs et al., 2012; Josephs & Duffy, 2008). AOS, however, is less recognized in the neurology community, either as part of the phenotype of some categories of progressive aphasia (i.e. progressive non-fluent aphasia or PNFA), or as the earliest or only manifestation of neurodegenerative disease (PPAOS). This lack of recognition is likely due in part to the lack of biomarkers for apraxia of speech. Therefore, observations of specific speech characteristics remain the primary method for its diagnosis and classification. Although auditory perceptual assessment continues to be the primary method for differentiating among motor speech disorders (Duffy, 2013), we know that perceptual observations are vulnerable to a number of problems (Kent, 1996). One of the ways to reduce errors in perceptual judgments and improve consistency across clinicians, both for description and diagnosis, is to specify and quantify the presence and severity of the specific characteristics that have been accepted as consistent with the diagnostic label (Haley, Jacks, de Riesthal, Abou-Khalil, & Roth, 2012).

In order to more specifically quantify the presence and severity of characteristics of AOS for a large research project designed to study individuals with progressive aphasia and/or apraxia of speech, a clinical rating scale, the Apraxia of Speech Rating Scale (ASRS), was developed. This scale was intended to be descriptive (versus diagnostic), primarily for the purposes of the research study rather than for broader clinical use. It became apparent, however, that with some revision the ASRS may be a useful clinical tool for differential diagnosis and estimates of severity, and a pertinent tool for subject description in research. Information regarding the reliability and validity of the scale in its current form will provide critical data informing future revisions.

The ASRS was initially designed to assist the description and quantification of characteristics that have been commonly accepted and reported as indicative of AOS. The rating scale uses a 5-point scale (Table 1), which describes not only the presence or absence of particular speech characteristics, but also their prominence and severity. The 16 items are organized according to whether they (a) are considered to be discriminative of AOS; (b) can be apparent in patients with AOS but may also be exhibited by patients with aphasia; (c) can be apparent in AOS but may also be seen in patients with dysarthria; or (d) can be apparent in AOS but may also be present in aphasia or dysarthria (see Appendix). The ASRS is scored during and/or after listening to the individual's speech during conversational speech, picture description, word and sentence repetition and speech-like AMR and SMR tasks. Scoring procedures are summarized in the methods section.

The purpose of this report is to describe the 16-item ASRS, a rating scale designed to quantify the presence or absence, relative frequency, and severity of characteristics frequently associated with the diagnosis of AOS. We also report initial intra-judge and inter-judge reliability for the scale. Validity was examined through correlations of total ASRS scores with both the clinical diagnosis and clinical judgments of severity of AOS.

2. Methods

2.1. Participants

The data reported in this paper were collected in the context of a larger project to study individuals with progressive aphasia and/or progressive AOS. As part of this work, a comprehensive speech-language test battery is administered in addition to a neurologic examination, a neuropsychological test battery, and neuroimaging.

The ASRS was completed for 133 participants who met study criteria for progressive aphasia and/or progressive AOS (Table 2). Participants ranged in age from 42 to 84. Methods for initial clinical classification are described first, followed by methods for administration of the ASRS, then methods for examining reliability and validity.

2.2. Apraxia of speech clinical diagnosis

The examining clinician (authors E.A.S. or J.R.D.) made clinical judgments about the presence versus absence of AOS based on the spoken language tasks of the Western Aphasia Battery (WAB) (Kertesz, 2007) (i.e., conversational questions; picture