MULTILINGUAL APHASIA EXAMINATION (MAE)

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November 1, 2025

Introduction and Purpose of the Multilingual Aphasia Examination (MAE)

The **Multilingual Aphasia Examination (MAE)** is recognized globally as a critical, standardized assessment tool primarily rooted in neurological principles, designed specifically to evaluate language function following acquired brain injury. Its fundamental purpose is twofold: first, to definitively determine the presence of **aphasia**, which is the impairment of language affecting the production or comprehension of speech and the ability to read or write; and second, if aphasia is positively identified, to meticulously quantify the specific **level of aphasia** and characterize the underlying pattern of linguistic deficits. Unlike screening tools that offer only generalized impressions, the MAE provides a detailed linguistic profile, allowing clinicians to map functional impairments directly onto models of neuroanatomical organization, thereby serving as an indispensable resource in differential diagnosis and treatment planning. The comprehensiveness of the examination ensures that both subtle and profound impairments across various language modalities are accurately captured, establishing a robust baseline for monitoring recovery.

Historically, the development of comprehensive aphasia batteries was driven by the need to move beyond simple clinical observation toward quantifiable, objective measurement, a necessity highlighted by the complexity of language processing. The MAE addresses this need by incorporating a broad array of tasks that probe the integrity of different processing streams--from basic auditory perception to complex semantic retrieval and motor output--thereby ensuring that the assessment is holistic rather than narrowly focused on fluency or comprehension alone. This methodical approach is crucial because aphasia seldom presents as a unitary deficit; rather, it manifests as a syndrome involving a constellation of impairments that vary widely based on the etiology, size, and location of the cerebral lesion. Therefore, the structure of the MAE is intentionally modular, allowing clinicians to pinpoint the specific breakdown points within the patient's language system, whether they stem from lexical access difficulties, phonological encoding errors, or deficits in syntactic structure processing.

The clinical utility of the MAE extends far beyond initial diagnosis. It is routinely administered to patients suffering from conditions known to frequently result in aphasia, including acute cerebrovascular accidents (stroke), traumatic brain injury (TBI), neurodegenerative disorders such as primary progressive aphasia (PPA), and post-surgical complications. Establishing a reliable baseline score immediately following injury is essential for tracking progress during subsequent rehabilitation phases. Moreover, the standardized nature of the MAE permits meaningful comparison of patient performance against normative data and across different longitudinal assessment points. This rigorous, quantifiable data is vital for making evidence-based decisions regarding therapeutic intensity, setting realistic short-term and long-term recovery goals, and communicating prognosis effectively to the patient, family members, and the interdisciplinary medical team responsible for their care and management.

A defining characteristic inherent in the title of the examination, the concept of "multilingual," speaks to the original intent to provide a testing structure that could be adapted and translated to accommodate speakers of languages other than English. While the specific linguistic structure of the test must always be adjusted to the language being tested, the core cognitive and neurological functions being assessed--such as confrontation naming, repetition, and comprehension--remain universal. This underlying principle allows the MAE framework to be utilized effectively in diverse clinical populations, acknowledging the significant challenge of accurately assessing language deficits in individuals who possess fluency in multiple languages, ensuring that the diagnosis is not confounded by cultural or linguistic biases inherent in monolingual instruments.

Theoretical Foundations and Neurological Basis

The design philosophy underpinning the MAE is deeply rooted in classical and contemporary models of neurocognitive linguistics, particularly those concerned with the localization of language function in the cerebral cortex. The examination's 11 subtests are not randomly selected; rather, they are structured to systematically probe the components of the language system as mapped out by models such as the Wernicke-Geschwind framework and modern dual-stream processing theories. For instance, tasks focused on auditory comprehension (e.g., comprehending words and phrases) primarily engage the posterior superior temporal gyrus (Wernicke's area), whereas tasks requiring motor speech planning and articulation (such as controlled word association or sentence repetition) heavily rely on the integrity of the inferior frontal gyrus (Broca's area) and associated motor pathways. By compartmentalizing language into these distinct, measurable components, the MAE effectively serves as a functional neurological map, allowing the clinician to infer the potential location and extent of the cerebral insult based on the specific pattern of spared and impaired abilities demonstrated by the patient.

A key theoretical principle utilized by the MAE is the concept of language modularity, suggesting that language is composed of distinct, specialized cognitive modules that can be selectively impaired while others remain intact. The battery's structure is optimized to distinguish between deficits at the input level (receptive language), the central processing level (semantic and lexical access), and the output level (phonological encoding and motor execution). For example, a patient might exhibit preserved ability to repeat words (suggesting an intact phonological loop and arcuate fasciculus) but profound inability to name objects visually (suggesting a breakdown in the pathway linking visual association cortices to the semantic system). The MAE is specifically designed to isolate these variables, moving beyond the simple classification of aphasia type to generate a detailed functional profile that highlights the specific stage of processing where the language system fails, providing critical information for targeted therapeutic intervention.

Furthermore, the MAE plays a pivotal role in the crucial process of differential diagnosis, helping clinicians distinguish true **aphasia**--a central language disorder--from related conditions that affect

speech or communication but are peripheral in nature. These conditions include **dysarthria**, which is a motor speech disorder characterized by muscle weakness or incoordination; **apraxia of speech**, which is a planning or programming disorder of the speech musculature; and generalized cognitive decline or confusion that affects communication indirectly. The subtests requiring pure linguistic manipulation (such as spelling or controlled word association) are highly sensitive to central language deficits, whereas the specific articulation rating helps to identify co-occurring motor speech issues. This ability to delineate central linguistic breakdown from peripheral motor execution problems is paramount for accurate diagnosis and for selecting the most appropriate rehabilitation strategy, ensuring that interventions are tailored precisely to the patient's primary impairment locus.

The assessment of **lexical retrieval** is a cornerstone of the MAE's theoretical approach. Lexical retrieval, the process of accessing specific words from the mental lexicon, is tested through tasks like visual naming and controlled oral word association. Failures in these tasks often manifest as **paraphasias** (word substitutions), which can be phonemic (sound-based errors), semantic (meaning-based errors), or neologistic (non-words). The MAE framework requires the examiner to meticulously document the types of errors produced, as the quality of the error often provides richer diagnostic information than the mere quantity of errors. For instance, frequent semantic paraphasias suggest a deficit in the semantic network, often associated with posterior lesions, whereas a high frequency of phonemic paraphasias may point toward a breakdown in the phonological output lexicon or the pathway connecting it to the motor system, aligning with different neuroanatomical loci.

Core Components and Structure of the Examination

The MAE is characterized by its comprehensive battery structure, comprising 11 distinct subtests designed to systematically evaluate the full spectrum of expressive and receptive language functions. This extensive coverage is mandatory because language deficits rarely conform to a single modality; rather, they typically involve disruptions across speaking, understanding, reading, and writing, often to varying degrees. The battery is carefully sequenced, moving from relatively automatic, low-demand tasks to more complex, resource-intensive operations that require higher-level integration of semantic and syntactic knowledge. This graded complexity allows the examiner to establish the ceiling and floor performance of the patient across critical linguistic domains, thereby building a detailed profile of their remaining functional capacity and their specific areas of profound impairment.

The 11 subtests of the MAE are categorized into major domains that reflect both input mechanisms (auditory and visual processing) and output mechanisms (oral and written production). The expressive tasks focus on fluency, lexical access, and motor planning, while the receptive tasks assess the ability to decode both spoken and written language at various levels of complexity.

Crucially, the inclusion of spelling tasks (oral, written, and block) provides unique insight into the integrity of the central graphemic buffer--the cognitive mechanism responsible for storing and manipulating the written form of words--which is often selectively impaired in certain types of aphasia and provides a valuable contrast to purely oral output deficits. The systematic assessment of these varied modalities ensures that the diagnosis is not skewed by impairments that might only affect one specific channel, such as visual acuity or hearing loss.

The following list details the core 11 subtests that constitute the foundation of the Multilingual Aphasia Examination, each designed to isolate and evaluate a specific aspect of the patient's language processing architecture. The comprehensive nature of this battery ensures that a complete diagnostic picture is achieved, facilitating precise localization of the functional impairment:

Visual Naming: Assesses the ability to access the phonological form of a word from its visual representation (confrontation naming).
Sentence Repetition: Evaluates auditory short-term memory and the integrity of the direct pathway between auditory input and motor output (crucial for conduction aphasia).
Controlled Oral Word Association (COWA): Measures fluency and systematic lexical retrieval abilities, often requiring the patient to generate words beginning with a specific letter (phonemic fluency).
Oral Spelling: Tests the patient's ability to vocalize the letters of a word, assessing the central graphemic representation independent of motor writing skills.
Written Spelling: Measures the ability to physically write the letters of a word, assessing both central graphemic access and peripheral motor execution.
Block Spelling: Involves manipulating physical blocks or tiles to spell words, adding a visuospatial and constructional element to the spelling task.
Aural Comprehension of Words: Assesses the ability to understand single spoken words, typically through picture selection.
Aural Comprehension of Phrases: Evaluates comprehension of more complex spoken linguistic structures, including short commands or grammatically challenging sentences.
Reading Comprehension of Words: Assesses the ability to derive meaning from single written words.
Reading Comprehension of Phrases: Evaluates the capacity to understand written sentences and short passages, requiring syntactic processing.
Rating of Articulation: A subjective but standardized assessment of speech clarity and the presence of motor speech errors (dysarthria or apraxia) during the execution of other verbal tasks.

The standardization procedure for the MAE is rigorous, involving extensive field testing across diverse populations to establish reliable normative data against which patient scores are measured. This process ensures the test possesses high psychometric integrity, specifically

regarding **test-retest reliability** and **inter-rater reliability**. The consistency of the results, regardless of when or by whom the test is administered, is paramount, as accurate and stable measurements are fundamental to making critical decisions about diagnosis and long-term prognosis. The detailed scoring manual provides explicit criteria for credit and error classification, minimizing subjective interpretation and ensuring that the final profile accurately reflects the patient's objective linguistic capabilities.

Expressive Language Subtests: Output and Fluency Assessment

The expressive language components of the MAE are crucial for assessing the patient's capacity for verbal output, fluency, and the successful retrieval and execution of spoken words. These tasks are particularly sensitive to damage in the anterior language areas, including Broca's area and the pathways connecting the lexicon to the motor cortex. One of the most revealing expressive tasks is the **Controlled Oral Word Association (COWA)** test, often referred to as phonemic fluency. In this task, patients are typically required to generate as many words as possible starting with a specific letter (e.g., F, A, S) within a fixed time limit. Performance on the COWA task is highly indicative of frontal lobe integrity, reflecting not just the efficiency of lexical retrieval but also executive functions such as initiation, cognitive flexibility, and the ability to systematically search the mental lexicon while adhering to specific constraints. A low COWA score suggests significant limitations in accessing the necessary phonological forms of words, which is a hallmark of many non-fluent aphasias.

Another critical expressive subtest is **Visual Naming**, also known as confrontation naming. This task assesses the integrity of the entire language processing stream, starting from visual perception, proceeding through semantic recognition (understanding what the object is), and culminating in the successful retrieval and articulation of the correct word. Errors in visual naming are extremely common in nearly all forms of aphasia, particularly **anomic aphasia**. The MAE focuses on documenting the nature of naming errors: patients might produce phonemic paraphasias (e.g., saying "fable" for "table"), semantic paraphasias (e.g., saying "chair" for "table"), or simply circumlocute (talking around the word without producing it). The pattern and frequency of these errors provide diagnostic clues regarding the specific location of the breakdown--whether the issue lies in accessing the semantic representation or in translating the semantic concept into its corresponding phonological form.

The **Sentence Repetition** subtest, while seemingly simple, provides invaluable information about the integrity of the phonological loop and the specific neural tracts that connect auditory input to verbal output, most notably the arcuate fasciculus. Patients with **conduction aphasia**, whose primary lesion often involves this pathway, typically exhibit disproportionately poor performance on repetition tasks despite relatively intact comprehension and fluency. The MAE uses sentences of increasing length and complexity to strain the patient's short-term auditory memory and

phonological encoding capacity. The presence of phonemic errors or omissions during repetition, particularly when comprehension is otherwise preserved, serves as a strong indicator of a specific disconnection syndrome rather than a primary fluency or comprehension impairment, thus guiding the precise neurological classification.

Finally, the MAE includes a formal **Rating of Articulation**, which is critical for disentangling central linguistic deficits from peripheral motor speech impairments. While the primary focus of the MAE is language (aphasia), many patients present with co-occurring motor speech disorders, such as dysarthria or apraxia of speech, which compromise the intelligibility of their verbal output. This rating is typically scored impressionistically by the clinician during the administration of all other verbal tasks, assessing factors like precision, rate, and prosody. By distinguishing errors due to phonological encoding failure (aphasic errors) from errors due to muscle weakness or incoordination (dysarthria), the MAE ensures that the diagnosis of aphasia is not contaminated by unrelated motor deficits, thereby improving the accuracy of the final diagnostic profile and ensuring appropriate referral to speech motor therapy when necessary.

Receptive Language and Comprehension Subtests

The receptive language segment of the MAE is specifically designed to assess the patient's ability to decode and derive meaning from auditory and written stimuli. These subtests are highly sensitive to lesions in the posterior language areas, particularly Wernicke's area and the surrounding auditory and visual association cortices. The **Aural Comprehension of Words and Phrases** section is fundamental, starting with simple tasks that test the understanding of single, high-frequency nouns and verbs, usually requiring the patient to point to a corresponding picture. The difficulty systematically increases to include complex phrases and sentences that demand accurate processing of grammatical structure and function words (e.g., prepositions, conjunctions). A patient failing the latter tasks may understand the main content words but miss the critical syntactic cues, indicating a deficit in deep comprehension, which is often characteristic of **Wernicke's aphasia**.

The evaluation of comprehension focuses on differentiating between surface comprehension and deep comprehension. Surface comprehension involves recognizing the semantic content of key nouns, which is often preserved even in moderate aphasia. Deep comprehension, however, requires the understanding of complex linguistic relationships, thematic roles (who did what to whom), and complex syntactic embeddings. For example, understanding a passive sentence ("The man was chased by the dog") requires more sophisticated processing than an active sentence ("The dog chased the man"). The MAE incorporates these subtle linguistic variations to stress the receptive system, thereby revealing subtle but significant deficits that might be missed by simpler comprehension tests. Poor performance on these complex tasks confirms impairment in the central mechanism responsible for interpreting the meaning of perceived language, a critical indicator of

severity.

Similarly, the **Reading Comprehension of Words and Phrases** section evaluates the patient's capacity to process written language. This area is distinct from aural comprehension because it utilizes the visual processing stream and requires intact pathways linking visual input to the central semantic system. Deficits in reading, known as **alexia**, can occur independently or concurrently with aphasia. The MAE assesses reading across a similar gradient of difficulty as aural comprehension, moving from single-word matching to complex written instructions or passages. Analysis of reading errors helps classify acquired reading disorders, such as **surface alexia** (difficulty reading irregular words but intact phonetic reading) or **deep alexia** (semantic errors and difficulty reading function words), providing further specificity regarding the location of the lesion and the nature of the cognitive impairment.

A crucial comparative analysis utilized in the interpretation of the MAE is the comparison of aural versus reading comprehension scores. Significant discrepancies between these two receptive modalities can point toward specific channel deficits. For example, a patient with excellent reading comprehension but poor aural comprehension might have a primary auditory processing disorder or specific damage near the primary auditory cortex, while the visual-to-semantic pathway remains largely functional. Conversely, a primary visual processing deficit, unrelated to aphasia, could disproportionately impair reading. By carefully contrasting the performance across these input channels, the MAE ensures that the diagnosis of aphasia is accurately attributed to a central language processing deficit rather than a primary sensory impairment.

Spelling and Written Output Subtests

The inclusion of dedicated spelling and written output subtests--specifically **Oral Spelling**, **Written Spelling**, and **Block Spelling**--is a hallmark of the MAE's detailed approach, recognizing that writing skills (**agraphia**) often provide a unique window into the integrity of the central language system. Writing, as a linguistic output modality, requires the coordinated effort of accessing the central orthographic representation of a word (the graphemic buffer), translating that representation into a motor plan (for writing) or a sequence of phonemes (for oral spelling), and executing the final output. The spelling subtests are particularly useful because they isolate the process of accessing the written word form, a mechanism that can be selectively impaired even when oral fluency is relatively preserved, or vice versa.

The comparison between **Oral Spelling** and **Written Spelling** is highly diagnostic. Oral spelling requires the patient to vocalize the letters of a target word, relying heavily on the integrity of the graphemic buffer and the ability to convert graphemes into phonemes sequentially. Written spelling, conversely, requires the patient to physically produce the written word, thereby involving the motor planning and execution systems of the hand. If a patient can spell a word correctly aloud

but cannot write it, the deficit is likely attributable to a peripheral motor execution issue (apraxia/dysgraphia). If, however, the patient fails both oral and written spelling, the impairment is localized to the central graphemic buffer, indicating a fundamental difficulty in retrieving or manipulating the abstract written form of the word, a key feature of central agraphia.

The **Block Spelling** task introduces an additional layer of complexity, often requiring the patient to physically arrange letter tiles or blocks to form the target word. This task integrates linguistic processing with visuospatial and constructional abilities. While primarily linguistic, failure in block spelling can sometimes reveal co-occurring non-linguistic deficits, such as constructional apraxia or visuospatial neglect, which frequently accompany left hemisphere lesions but are distinct from core aphasia. By including this multi-modal task, the MAE helps the clinician differentiate between purely linguistic agraphia and writing impairments compounded by visuospatial or motor planning deficits, offering a more nuanced diagnostic picture.

Collectively, the output tests--including the expressive speaking tasks and the written/spelling tasks--allow for a comprehensive synthesis of the patient's production profile. The MAE encourages examiners to look for patterns of consistency or dissociation across these modalities. For example, some patients may exhibit preserved ability to spell and write but severe difficulty with oral production (non-fluent aphasia with spared writing), while others may be fluent in speech but profoundly unable to manage any form of written output (agraphia). Analyzing these specific profiles is essential for precisely classifying the aphasia type and severity, and ultimately for designing rehabilitation strategies that capitalize on the patient's spared communication channels while intensively targeting the impaired modalities.

Administration, Interpretation, and Clinical Utility

Effective utilization of the MAE relies heavily on standardized administration procedures and specialized clinical training. The examination must be conducted in a quiet, distraction-free environment to ensure that receptive task performance is not compromised by external auditory or visual interference. The clinician must possess not only a deep understanding of psycholinguistics and neuroanatomy but also meticulous recording skills, as the qualitative documentation of errors--the type of paraphasias, the nature of circumlocution, or the pattern of spelling substitutions--is often as informative as the quantitative score itself. Strict adherence to the MAE manual's instructions regarding stimulus presentation, timing constraints (particularly for fluency tasks like COWA), and prompting rules is mandatory to maintain the validity and reliability of the assessment results, ensuring that the collected data is comparable to the established normative sample.

Scoring the MAE involves converting raw scores for each of the 11 subtests into standardized metrics, typically utilizing z-scores, percentile ranks, or severity ratings. This conversion is crucial because it allows the patient's performance to be objectively compared against a control group,

thereby quantifying the extent of deviation from normal language function. The MAE is specifically designed to define the "level of aphasia," which is often categorized along a continuum from severe/global to mild/anomic. A profile showing uniformly low scores across all modalities strongly suggests **Global Aphasia**, indicative of extensive damage to the perisylvian region. Conversely, a profile characterized by a significant dip only in the naming tasks, with preserved fluency and comprehension, points toward milder forms like **Anomic Aphasia**. The rigorous scoring system provides the empirical evidence necessary for these diagnostic distinctions.

The primary strength of the MAE lies in its ability to generate a detailed scatter pattern--a visual representation of the patient's performance across the 11 subtests. This pattern is the key to clinical interpretation, as specific configurations of performance map directly onto established aphasiological syndromes. For instance, poor fluency and repetition combined with relatively intact comprehension usually indicate **Broca's Aphasia**. Conversely, poor comprehension and repetition coupled with fluent but often empty speech strongly suggest **Wernicke's Aphasia**. The MAE profile, therefore, provides the empirical data required not only to confirm the presence of aphasia but also to precisely classify its type, which is essential for predicting recovery trajectories and selecting appropriate, syndrome-specific rehabilitation strategies.

In conclusion, the MAE stands as a cornerstone instrument in clinical aphasiology due to its comprehensive, neurologically grounded, and highly standardized approach to language assessment. Its clinical utility is maximized in guiding the complex process of rehabilitation, providing objective measures for establishing baselines, setting achievable therapeutic goals, and documenting functional improvement over time. The detailed subtest analysis ensures that interventions are precisely targeted at the patient's specific breakdown points--for instance, focusing on phonological encoding if repetition is severely impaired, or on semantic feature analysis if naming is the primary deficit. By providing a rich, quantifiable profile of both expressive and receptive language functions, the MAE remains an invaluable tool for clinicians aiming to understand the intricate nature of acquired language disorders and optimize recovery outcomes for individuals with aphasia.