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A Review of Attention, Memory, Word Finding, and Executive Function to Support Client Rehabilitation in a Group Therapy Setting

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Abstract

This paper is a review of attention, memory, word finding, and executive function to support individuals with deficits in these areas seen in a rehabilitative speech-language therapy setting. Each chapter contains a definition of the domain and describes the subdomains included. The chapters also include the neurology associated with the domain and common disorders that include deficits in the areas of attention, memory, word finding, and executive functioning. At the end of each chapter, recommended treatment principles are provided to guide therapy with each domain. This paper was created to accompany a therapy manual titled “Providing Connections Through Group Therapy” in order to treat a variety of patients with deficits in attention, memory, word finding, and executive function. The research in this paper assisted in forming accommodations and lesson plans directed toward the adaption of an inclusive therapy program. The research and therapy manual can guide speech-language pathology graduate students and certified clinicians to implement a group therapy program encompassing a variety of different patients.

Keywords: attention, memory, word finding, executive function, TBI, aphasia, dementia

Chapter 1: Attention

One definition of attention is “the complex multisensory ability to select, divide, and sustain information for further processing of thought or action” (Styles, 2006, p. 32). Though many researchers have somewhat agreed on a definition for attention, the attentional processes are divided further into varying subdomains. In this review, a discussion of alertness, selective attention, sustained attention, divided attention, alternating attention, spatial attention, and executive attention provide insight into different attentional processes and demonstrate where breakdowns can occur. This paper examines the different domains of attention, how disorders have negative impacts on a patient’s typical ability, and what individual and group treatments are best suited to treat the attention deficits.

Types of Attention

Consciousness consists of three processes, alertness, attention, and awareness (Blumenfeld, 2010). Alertness is often referred to as arousal and requires a person to be aware and ready to respond to stimuli in the environment around them (Loetscher & Lincoln, 2013). Often alertness is one of the first cognitive aspects assessed when dealing with patients to ensure they have the ability to attend to a task. The characteristics of attention are more complex. Attention is described as the ability to direct focus on a stimulus with concentration and limited distractions (Blumenfeld, 2010). Awareness is the ability to integrate different forms of information from the environment into a mental thought to later be retrieved (Blumenfeld, 2010). Though the levels of consciousness all connect and effect one another, for the purpose of this paper, attention will be the primary focus.

Attention can be broken down into different subtypes, depending on how the brain processes stimuli in the environment. Selective attention is essential for safety and efficiency as individuals complete daily tasks. During selective attention an individual is required to devote full attention to a task, while irrelevant stimuli are ignored (McDowd & Shaw, 2000). The Stroop task is an example of engaging selective attention. The person completing the Stroop task names the color of the ink “blue,” while disregarding that the word reads “red”. The competing word information and ink color stimuli challenge the individual’s processing speed and accuracy. In order to perform well on the task, the individual needs to have a firm grasp on which stimulus to focus on and which to ignore (Glisky, 2007). Another example of selective attention is filtering out background noise while talking to a friend in a coffee shop. In this scenario, the individual must use selective attention to ignore a noise stimulus while focusing on the primary auditory stimulus.

Maintaining deep focus to a specific task overtime is called sustained attention or vigilance (Glisky, 2007). There are multiple levels of difficulty to consider for sustained attention. A simpler task is repetitive and familiar, making sustained attention more effortless. A more complex task could be unfamiliar and in need of active concentration in order to complete (Manasco, 2017). An example of a simple sustained attention task would be doing easy addition problems for a prolonged amount of time. These problems could be completed without giving much thought to the process, but sustaining attention, nonetheless. An example of a more complex, controlled sustained attention task is working on a new type of complicated puzzle. The individual completing the puzzle would be challenged because it is a new activity that requires more concentration. Sustained attention can also be correlated with non-distractibility, because it is determined by how well an individual continuously remains attentive to a task without losing focus (Blumenfeld, 2010). Sustained attention can frequently be paired with selective attention during tasks, because some stimuli need to be ignored, while other stimuli require intense concentration.

A form of higher-level attentional processing that involves responding to multiple tasks or stimuli at once is divided attention. Concurrent costs occur when accuracy decreases when an individual is attempting to focus on two tasks rather than trying to complete the tasks separately (Helm-Estabrooks, Albert, & Nicholas, 2014, p. 138). Some divided attention tasks can be more difficult than others based on the multiple inputs coming in and their associated parameters. Similar to sustained attention, divided attention can vary widely in task difficulty, making it challenging to identify performance consistency (McDowd & Shaw, 2000). An example of divided attention would be making a new dinner recipe while having a conversation with a family member. Both tasks require active participation or multi-tasking, in order for both activities to be successful (Loetscher & Lincoln, 2013).

Alternating attention is described as switching attention, meaning the individual switches focus from one task to another. Alternating attention can also be the switching of focus on different locations or processes (McDowd & Shaw, 2000). Similar to the other types of attention, alternating attention is a process completed daily by most individuals because of the demands of work, school, and daily activities. It is more beneficial to completely shift focus from one task, location, or process to another than try to focus on both with divided attention. Alternating attention allows for an individual’s full focus to be on the stimulus of interest, improving processing of the activity (Glisky, 2007). Switching attention is a higher-level attentional task that requires limited distractions and high levels of processing to complete. As an individual ages, successful performance on higher-level attention tasks decreases due to the flexibility demands on the brain (Glisky, 2007). An example of alternating attention would be reading research articles and writing a paper on them. When an individual is writing a research paper, they tend to switch back and forth between research and writing, demonstrating the ability to alternate tasks efficiently.

Spatial attention has also been called spatial awareness, meaning it falls somewhere between the attentional level of consciousness and the awareness level of consciousness. Many researchers debate if it is necessary to differentiate between awareness and attention because both processes use the same brain mechanisms (Blumenfeld, 2010). Spatial attention is the ability to be aware of the environment and one's self (Loetscher & Lincoln, 2013). An example of spatial attention would be noticing the positioning of people and objects in a room.

Executive attention has been called many names such as, executive control, executive function, or cognitive control, clearly linking it to executive functioning. Executive attention is the process that allows an individual to respond to and complete a task (Vandierendonck, 2014). Executive attention is often activated during other attentional processes because it is hard to isolate each attentional domain into a pure task. Selective attention does not involve executive attention unless the task operates with a means-end system, where a response to a goal-directed activity is determined (Vandierendonck, 2014). Executive attention is involved in working memory, which is when an individual is aware of an idea and processes the thought to carry out a cognitive function (Blumenfeld, 2010). According to Vandierndonck (2014), studies are still determining if other attentional processes are involved in working memory.

Neurology of Attention

Attention involves many brain networks within the structures associated with the system of consciousness (Blumenfeld, 2010). Blumenfeld describes the neurology of attention as follows. Each area of brain activation involved in attentional processes helps with the activation of the many different attention domains. The brain involves widespread projection systems that help with alertness, as well as selective and sustained attention. These widespread projection systems involve the “upper brainstem, thalamus, hypothalamus, and basal forebrain” (Blumenfeld, 2010, p. 921).

All of these structures play a role in arousal and send and receive inputs to other cortical areas of the brain. Blumenfeld (2010) indicated that other areas of the brain associated with attention are the frontal and parietal association cortices. The parietal association cortex plays an important role in the integration of attention and helps activate spatial attention. The prefrontal cortex of the brain also contributes to selective and sustained attention by helping initiate eye movements to objects and tasks, as well as reducing distractibility. In order to pay attention to a stimulus or task, motivation is needed to fulfill the activity (Blumenfeld, 2010). The driving motivation of attention takes place in the anterior cingulate cortex and limbic pathways, by directing the sustained and selective attention to focus on the important stimuli. The tectum, pretectal area, and pulvinar also work to direct visual attention through eye movements to specific stimuli. According to Blumenfeld (2010), the final areas involved in attention are parts of the basal ganglia and cerebellum that are thought to aid in selective attention. Many areas cortically and subcortically are activated for an individual to use each attentional process. The combination of structures allows the brain to quickly process the incoming stimuli, while selecting the important focus of an individual’s attention.

Aging & Disorders Affecting Attention

When determining if an individual has attention deficits, it is important to understand how normal cognitive aging affects attention. Alternating and divided attention are both higher-level attention processes that have age-related decline, especially when the tasks are more complex. Normal aging slows the processing speed of information and resources therefore an adult will take longer than a child to switch between tasks in alternating attention or engage actively in multiple tasks in divided attention (Glisky, 2007). Resources become harder for aging adults to navigate appropriately due to decreased attention to tasks. As individuals age, the speed of selective attention tasks might also slow due to a decline in information processing. Distractibility, however, is nearly equal in both older and younger individuals. Sustained attention and selective attention are two attention domains that are not as affected by aging, though the processing speed of the task may be affected (Glisky, 2007).

Deficits in attention can also cause impairments in executive functioning, language, and memory (Loetscher & Lincoln, 2013). Understanding the aspects of each attentional process helps determine what domains can be affected in cognitive disorders. According to Loetscher and Lincoln (2013), studies have shown that each attentional process may need to be targeted individually during rehabilitation, because there is little generalization from one attention process to the next. Often during rehabilitation, attention is one of the first areas to be addressed for safety purposes and for the significant impact attentional processes play on other cognitive domains (Loetscher & Lincoln, 2013). Improving an individual’s attention skills can facilitate improvement functionally for activities of daily living, because some form of attention is required for every task and thought.

Aphasia

Aphasia is one disorder with various etiologies that causes noticeable differences in the areas of executive functioning, memory, and attention. Attentional processes are negatively affected in patients with aphasia, however the degree of the deficit is variable, as well as the specific attention subtypes affected (Murray, 2012). One study found that six participants, all with anomic aphasia, did not fall within the impaired range for attention on the Test of Everyday Attention (TEA; Murray, 2012). These findings determined that attention deficits may be more variable within different aphasia subtypes than originally thought. Further research on comparison between subtypes could discern what subtypes affect each specific attentional process.

Overall, the study done by Murray (2012) found that people with aphasia performed worse than those without aphasia on every attentional measure. Divided attention and alternating attention were two complex attention domains that were largely related to additional deficits in language, auditory comprehension, and communication. Sustained attention, selective attention, and more basic attention skills were found to be negatively impacted in several participants that scored more than two standard deviations below the mean on the Behavioral Inattention Test (BIT). Some of the participants with low selective and visual attention had a co-occurrence of visual neglect, while others did not (Murray, 2012). The attentional deficits accompanying aphasia have been associated with difficulties during activities of daily living and deficits in spoken communication and comprehension.

Patients with aphasia have sought out additional resources, such as augmentative and alternative communication (AAC) devices, to facilitate improvement of functional communication. According to Thiessen, Beukelman, Hux, and Longenecker (2016), people with aphasia used attention to focus on a scene differently than people without aphasia. For example, people with aphasia would focus more on the backgrounds of images, rather than the subject of the picture (Thiessen et al., 2016). The variability in how a person with aphasia focuses on a screen makes it challenging to design an AAC device for the individual. Understanding how clients engage in spatial attention and how they look at scenes can help determine the best AAC methods to use.

Right Hemisphere Disorder

Visual neglect is caused by damage to the right hemisphere that prevents individuals from perceiving objects in their left spatial field. Neglect is often caused by a vascular stroke to the right hemisphere but can also be caused by brain tumors and diseases. The main attentional process associated with damage to the right hemisphere is left visual neglect, affecting visual spatial attention (Bartolomeo, Thiebaut de Schotten, & Chica, 2012). Visual neglect causes many issues with activities of daily living, because perceptions of objects in space are affected by the attentional deficits. Difficulties arise when patients cannot visually attend to all the words on a paper, neglecting the left side, and missing comprehension components to written text. According to Bartolomeo et al. (2012), neglect causes a person to repeatedly focus on right-sided objects, without the intentional activation of perseverating to the right. The continual redirection to the right side may cause additional challenges to patients who have visual neglect; they will have difficulty switching visual attention to the left side of objects and activities. Occasionally deficits to other attentional domains are involved in right hemisphere disorder, such as alertness, selective attention, and sustained attention. Deficits to these attentional domains can cause variability in task performance because the patient will struggle to remain focused, without being distracted, and alert to the task at hand.

Dementia/Mild Cognitive Impairment

Dementia is a term used to describe the loss of memories and other functions for activities of daily living. Dementia has many different forms and subtypes such as Alzheimer’s, Lewy body, or vascular dementia. Mild cognitive impairment (MCI) is diagnosed when an individual has deficits in one or more cognitive areas, can perform activities of daily living, and does not have the diagnosis of dementia (Zancada-Menéndez, Sampedro-Piquero, Begega, López, & Arias, 2013). MCI frequently leads to dementia as it worsens with time, but individuals with MCI do not always have attentional deficits (Manasco, 2017). Individuals with MCI have been found to have similar attention deficits to people with normal cognitive aging. However, some studies have shown that selective and divided attention deficits are common in individuals with MCI and dementia, and sustained attention remains relatively intact (Zancada-Menéndez et al., 2013). According to the study conducted by Zancada-Menéndez et al. (2013), decreased processing speed was found in individuals with MCI and in those with Alzheimer's disorder (AD). These attentional deficits slow the processing speed during activities of daily living by increasing the time it takes to complete tasks. Selective attention deficits in individuals with MCI and AD decrease the ability to eliminate distractions, while divided attention deficits challenge the individual to focus on more than one task at a time.

People with dementia have been known to have decreased divided and alternating attention, causing falls and difficulties with other complex attentional tasks (Chen & Pei, 2018). For example, while walking and holding a conversation appears like a simple task to most individuals, it requires divided attention to focus on both walking and speech. In order to successfully complete a dual task, an individual has to have sharp physical and cognitive abilities, including divided and alternating attention.

Traumatic Brain Injury

Traumatic brain injuries (TBI) lead to many cognitive deficits, including attentional deficits that range in severity (Shah et al., 2017). Executive attention is greatly affected by TBIs causing difficulty tracking conflict and ensuring it is resolved. Deficits in executive attention can cause barriers for completing therapy and finishing everyday tasks, leading to long-term disabilities (Shah et al., 2017). Sustained attention is affected by moderate to severe TBIs, potentially having to do with daytime sleepiness or the sleep-wake cycle (Beaulieu-Bonneau, Fortier-Brochu, Ivers, Morin, & Fortier-Brochu, 2017). For years following the injury, the speed of processing information can remain slow, which may account for difficulty completing tasks more than other attentional domain deficits (Beaulieu-Bonneau et al., 2017). However, sustained attention and divided attention deficits in high-level complex tasks place more focus on the cognitive load placed on the brain (Beaulieu-Bonneau et al., 2017). Activities that require intensely focused attention such as complex activities like cooking and cleaning, can be problematic for individuals with TBI. Overall, TBIs negatively affect the attentional domains significantly, but these deficits can vary depending on severity and location of damage to the brain.

Principles of Attention & Treatment Considerations

It is important to consider best practices when treating attention in group or individual therapy, across all settings. Based on the characteristics of attention and the American Speech-Language-Hearing Association practice position, treatment principles have been suggested to benefit clients with attentional deficits. Attention therapy can consist of both compensatory and restorative treatment measures, though restorative measures are mostly used when treating attention (Manasco, 2017). Restorative therapy focuses on regaining functions that were lost, whereas compensatory therapy focuses on working around skills that will not likely return (ASHA, n.d.a). The types of treatment offered and recommended to each patient will depend upon the severity of the deficit. The basic principles of treatment, however, will stay consistent for all domains of attention.

The first principle of attention therapy to consider is the functionality of the tasks chosen (ASHA, n.d.a). Each aspect of treatment should focus on how the tasks from therapy will carry over into everyday life to give the treatment a strong purpose. Making modifications to the environment is another important factor to contemplate when working with attentional deficits (ASHA, n.d.a). The implementation of environmental manipulations allows the patient to focus their attention, allowing for a strong start to restorative therapy (Mancaso, 2017). Examples of environmental changes could be as simple as reducing noise in the environment or eliminating visual distractions in the therapy room. Another environmental aspect could be the time of day treatment is offered; selecting the time of day that the patient is the most alert (ASHA, n.d.a). Family can help to facilitate improved attention by speaking directly to the patient in short sentences, when they know the patient is attending. Repeating information to the patient as needed, and allowing for breaks are additional environmental modifications that can be used (Mancaso, 2017).

Direct attention tasks should be targeted when treating attention, focusing primarily on one subset of attention at a time. For many attentional deficits, functional drill and practice activities are beneficial. Drill type activities involve having the patient complete a task repeatedly in order to strengthen neural networks (Mancaso, 2017). Another approach to attention treatment is dual task training, where the patient participates in two competing tasks of different or similar stimuli (ASHA, n.d.b.) Dual task training can improve a variety of attentional deficit subtypes and requires the patient to focus and eliminate distractions. Cancellation tasks have also been noted to improve attentional skills by requiring the patient to focus on the stimulus, while ignoring competing stimuli. Similar to other treatment methods, cancellation tasks can increase in difficulty to test different domains of attention (ASHA, n.d.a).

There are various compensatory strategies that help facilitate sustained attention and other attention domains (ASHA, n.d.a). Providing additional strategies during treatment can assist the patient in completing the attention task or make tasks easier to complete on their own later. One compensatory strategy for attention could be highlighting the left side of the page, or the area the individual needs to pay attention to. Other compensatory strategies would be breaking the task into smaller steps and self-monitoring with a timer (ASHA, n.d.a). Also, thinking about the therapy and tasks metacognitively can help the patient improve in therapy over time. Metacognitive strategies, such as writing down potential distractions ahead of time, can help the patient become aware of the treatment goals and the problems that may prevent success (ASHA, n.d.a.). Though all of these principles and strategies would be beneficial to patients with attention deficits, it is essential to remember that the most important principles of attention treatment are individualized assessment and therapy goals.

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Chapter 2: Memory

Memory is a complex and abstract system. There is no denying that it makes each individuals' life unique; a library of moments that shape one's existence. Different theories and constructs surround memory, with no definitive explanation detailing its abilities. Memory is not unitary, but dynamic. The complexity of the concept is reflective in the numerous attempts to define it. Throughout the years, memory has been characterized differently, from a unitary and linear thought process to a more dynamic view of its components and constructs. There has been an evolution in viewing the intricacy of memory (Kimbarow, 2016). Though definitions vary, one way in which memory has been defined is

> "the group of complex processes that depends on several intact functions, including the ability to attend to and register new information; to retain, process, and store that information (learning); and to retrieve stored information from the recent and more distant past" (Helm-Estabrooks, Albert & Nicholas, 2013, p. 138).

This paper will discuss the subtypes of memory, their neurological implications, how memory affects individuals with cognitive communication disorders, and the treatments best suited for memory deficits.

Introduction to memory

Memory is composed of subtypes that describe the different kinds of information held in the brain. To better understand and define memory, it is beneficial to take into account these different subcomponents of memory, which include: Sensory memory, working memory (WM)/short-term memory (STM), long-term memory (LTM) and it's subtypes, as well as retrospective memory (RM) and prospective memory (PM).

Sensory Memory

The earliest stage of information processing, sensory memory, is the initial step to an individual's way of remembering. Defined as the shortest-term element in memory, the role of sensory memory is to sharpen sensations received by the world (Bayles & Tomoeda, 2013). After receiving inputs from sensory receptors, stimuli are either ignored or perceived within a third of a second to two seconds (Bayles & Tomoeda). Bayles and Tomoeda illustrate this idea with an analogy to a playback system, in which incoming sensory information has to be sustained long enough to be reviewed for processing into our memory. When perceived, the stimuli enter our sensory memory. Sensory memory is significant because it is essential for the storage of information to move into STM, and without it, we would not be able to attend to something (Bayles & Tomoeda).

Short-Term Memory/ Working Memory

From sensory memory, information travels to STM. STM and working memory (WM) overlap throughout research. WM is " the structures and processes used for the temporary storage and manipulation of information, of which short-term memory is just one component" ("Short-term," 2018, para. 4). Defined as the short-term storage and manipulation of new and old information, WM is critical to learning (Bayles & Tomoeda, 2013). When activated, WM holds approximately seven items or less (Bayles & Tomoeda). The following example illustrates the function of WM: when an individual is at a restaurant and determining the tip amount, WM allows the person to manipulate information in the moment. Without taking steps to retain the information in working memory, it will be lost. In order for information to be transferred to LTM, an individual must apply repetitions of the stimulus, add meaning or association, or chunk the information into shorter groups (Bayles & Tomoeda).

Long-Term Memory.

Defined by consolidation, LTM is the process in which information is stored for long-term use through rehearsal and meaningful association (Bayles & Tomoeda, 2013). LTM includes both declarative and non-declarative memory. According to Kimbarow (2016), declarative memory, also termed explicit memory, is the information individuals learn and experience consciously. Think of declarative memory as the facts and events individuals know and experience. Semantic, episodic, and lexical memory comprise declarative memory (Bayles & Tomoeda). Semantic memory allows an individual to remember factual knowledge, such as who the first President of the United States was or when Halloween is celebrated. The process of remembering personal details and experiences of an individual's life is episodic memory. This type of memory enables a person to remember birthdays, weddings, and other personal milestones (Bayles & Tomoeda). The capacity to understand words and their form and meaning, lexical memory, provides the rules for composing syntactically correct grammatical sentences, giving the gift of communication (Bayles & Tomoeda). Lexical memory enables individual to say 'I love you' or ask for help.

Nondeclarative memory, also called implicit memory, refers to motor skill memory, cognitive skill memory, priming, and conditioned responses and reflexes (Bayles & Tomoeda, 2013). Also known as procedural memory, motor skill memories are the learned motor skills, as well as the processes that support these skills (Kimbarow, 2016). Riding a bike, walking, and kicking a soccer ball are all examples that embody procedural memory. These types of memories are associated with performance, in contrast to declarative memories that are associated with facts/knowledge (Bayles & Tomoeda). Cognitive skill memory is defined as memories under conscious awareness. According to Tomoeda and Bayles (2013), priming is defined as the "facilitation of performance of previous experience with a stimulus," (p. 13). This type of memory is measured by judgement accuracy and response (Bayles & Tomoeda). There are both conceptual and perceptual definitions of priming. Conceptual priming is reinforced when related concepts or ideas are processed (Bayles & Tomoeda). To illustrate, hearing the word "sun" may trigger words like hot and yellow in an individual's mind. Perceptual priming includes being predisposed to the perceptual features of a current stimulus (Bayles & Tomoeda). To help clarify, knowing the word "might" by having been exposed to similar words like "light," "right," and "fight" is an example of perceptual priming. Finally, habits and conditioned behaviors are the last components of nondeclarative memory.

Behavioral events influence future behaviors, which give importance in an individual's routine (Bayles & Tomoeda, 2013). For instance, if an individual runs a mile each day, that habit may influence future behaviors, such as increasing the distance of their run per day and improving their health. Responses to specific stimuli are explained by conditioned behaviors (Bayles & Tomoeda). This can be thought of as having past behaviors influence your present and future events. If an individual had a bad experience at the dentist, future visits may be accompanied by nerves and fear.

Retrospective Memory and Prospective Memory

Brookshire (2003) states that retrospective memory (RM) occurs when information to be remembered occurred in the past and includes semantic, episodic, and declarative memories. An example of RM is remembering conversations previously had. Brookshire defines prospective memory (PM) as information to be remembered in the future, allowing an individual to remember their yoga class at 4 p.m. next Friday.

Neurological Structures Involved in Memory

Knowledge of the areas associated with memory is critical in diagnosing and treating memory disorders. Though many areas of the brain contribute to memory functioning, for the purpose of this paper, those that impact PM, LTM, and STM/WM will be discussed. These specific subtypes of memory will be analyzed due to their role in the cognitive communication disorders that are later mentioned.

Prospective Memory

Through the use of positron emission tomography (PET) scans during PM tasks, Burgess and Quayle (2001) indicated activation of both Brodmann's areas 10 and the thalamus. Both areas influence the maintenance and realization of an intention (Burgess & Quayle). In addition, results from a study in which participants were instructed to press a button every time they heard three specific words belonging to a category, indicated medial temporal lobe (MTL) involvement. Activation was especially seen in the hippocampus. (Gordon, Shelton, Bugg, McDaniel, & Head, 2011).

Long-Term Memory

The neural substrates influencing the functioning of LTM are the medial temporal lobe (MTL) and the hippocampus. As stated by Squire, Stark, and Clark (2004), "The medial temporal lobe includes a system of anatomically related structures that are essential for declarative memory (conscious memory for facts and events)" (p. 279). This was discovered following a case in which a patient underwent surgery to improve a condition that caused him to have frequent seizures. After surgery was performed, the patient was left with memory deficits due to acquired MTL damage that occurred during the procedure (Squire, 2009). This patient's

STM skills, however, were retained. In contrast, the patient's LTM was impacted, seen mostly when his attention was not required (Squire, 2009).

Short-Term Memory/ Working Memory

The prefrontal cortex (PFC), and its components that analyze incoming stimuli, are critical in STM functioning. When stimuli from sensory memory is consciously realized, it is stored in WM, which consists of three components. These components include: the central executive, the visuospatial sketchpad, and the phonological or articulatory loop (Kimbarow, 2016). The decision-making component of working memory, the central executive "focuses attention, encodes information, retrieves information from long term stores, plans actions, and solves problems" (Bayles & Tomoeda, 2013, p. 4). The visuospatial sketchpad affects visual and spatial information (Bayles & Tomoeda). For instance, it will hold and manipulate images like faces and colors of objects. In contrast, the articulatory loop analyzes speech, storing and processing acoustic information to keep it relevant (Bayles & Tomoeda). Ultimately, the right side of the brain will receive spatial information to process and the left side will receive verbal information to be processed ("Where are," 2018). In order for information to be stored in LTM, the hippocampus will create associations to solidify the information for future use ("Parts of," 2018).

Several regions contribute to intact functioning of WM. Two factors to consider while examining the neural substrates of WM are the details of when the stimulus happened and the material to be remembered. These factors will influence what parts of the brain will be activated (Eriksson, Vogel, Lansner, Bergstom, & Nyberg, 2016) .

The PFC is instrumental in the information maintenance and performance skills that are required by WM, especially those with delayed responses (Eriksson et al., 2016) .The area of activation within the PFC will depend on the type of incoming information. Verbal information is manipulated by the left side, while visual information is manipulated by the right (Eriksson et al.). For instance, if the material to be remembered is someone's facial features, the right hemisphere will activate. The dorsolateral area of the PFC is responsible for maintenance of information during WM tasks (Eriksson et al.).

Additionally, the parietal cortex influences WM (Eriksson et al., 2016). The superior parietal portion of the parietal cortex controls the executive functions to carry out tasks requiring WM (Eriksson et al.). Similar to the PFC, areas in the parietal cortex affect different skills of WM. The left side affects verbal information and the right affects spatial. Specifically, the superior temporal and prefrontal regions with the left inferior parietal region play a role in verbal working memory (Eriksson et al.).

The cerebellum, basal ganglia, and the striatum all play a role in intact WM functioning. The cerebellum contributes to general WM functioning, as well as to the specific ability to verbally rehearse information (Eriksson et al., 2016). The basal ganglia is important in WM capacity as it impacts an individual's attention to a stimulus (Eriksson et al.). Those with high capacity for WM tasks are better able to avoid extraneous information in the environment (Eriksson et al.). In order to maintain or update memories in WM, striatal involvement is necessary. According to Eriksson et al., the striatum "acts as a gating mechanism for representations in the PFC, by controlling when PFC representations should be maintained vs. updated" (p. 6). Overall, the striatum is important in strengthening PFC representations, which make them less vulnerable to distractions (Eriksson et al.).

Finally, the MTL impacts WM, though there is speculation to the exact processes. Across literature, it is noted that MTL activation affects binding and relational processing in some individuals, while it affects WM load in others (Eriksson et al., 2016). For instance, following MTL damage, patients were able to remember objects or locations given a short delay (eight seconds), but had difficulty remembering objects and locations in conjunction (Eriksson et al.) . Additionally, intact MTL has been found to improve functioning when the task has greater information to process than a typical WM task (Eriksson et al.).

Memory in Cognitive Communication Disorders

As a result of its widespread connections in the brain, memory manifests itself in many different cognitive communication disorders. Memory impairments are prevalent in the following disorders: aphasia, right hemisphere disorders, traumatic brain injury (TBI), dementia, mild cognitive impairment (MCI), Alzheimer’s Dementia (AD), amnesia, Korsakoff syndrome, tumor lesions, cerebral hypoxia, herpes encephalitis, paraneoplastic limbic encephalitis and ruptured anterior communicating artery aneurysm. For the purpose of this paper and our research, we will focus on dementia and MCI, TBI, aphasia, and right hemisphere disorder.

Memory in Normal Aging

When studying memory deficits related to various disorders, it is imperative to understand that memory changes occur throughout the lifespan in the typically aging person. Most of the population experiences normal changes in memory with age. According to Harada, Love, and Triebel (2013), changes in memory occur as a result of “slowed processing speed, and decreased ability to ignore irrelevant information, and decreased use of strategies to improve learning and memory,” (p. 3-4). Decline in both episodic and semantic memory are typical for aging adults, with variations to when these changes happen (Harrada et al., 2013). Though variations occur, episodic memory is thought to show declines throughout life in contrast to semantic memory, which shows declines more specifically in later life (Harrada et al.). In contrast, nondeclarative memory stays intact throughout an individual’s life. For example, while normal aging adults may struggle to remember the details to important events, their ability to brush their teeth might not decrease. Additional areas of deterioration in memory include: spontaneous retrieval of information without cues, knowing the source of learned information, and remembering to perform actions in the future. Areas that remain stable include: recognition memory with cues, temporal order memory, and procedural memory. Rate of acquisition and retrieval decline as well, while retention of information is sustained.

Mild Cognitive Impairment (MCI)

MCI is a psychiatric disease that affects the elderly and is a common precursor to dementia. Individuals with MCI do not fall into either the demented or the normal state of memory functioning (Bayles & Tomoeda, 2013). Therefore, MCI is representative of a cognitive state that isn’t the result of normal cognitive aging and memory skills lie between typical and atypical. There are many causes of MCI, which include Alzheimer’s disease, vascular disease, depression, Lewy body disease, and Parkinson’s disease (Bayles & Tomoeda). MCI comes in two forms- amnestic and nonamnestic. The table below is adapted from Bayles and Tomoeda to help illustrate the types of MCI and the domains within them.

Amnestic MCI Single Domain		Amnestic MCI Multiple Domain		Nonamnestic MCI Single Domain		Nonamnestic MCI Multiple Domain	
Subjective proxy cognitive compliant	X	Subjective proxy cognitive compliant	X	Subjective proxy cognitive compliant	X	Subjective proxy cognitive compliant	X
Objective memory deficit	X	Objective memory deficit	X	Objective memory deficit		Objective memory deficit	
Intact cognitive function and ability	X	Intact cognitive function and ability	X	Intact cognitive function and ability	X	Intact cognitive function and ability	X
Objective memory impairment in one other cognitive domain		Objective memory impairment in one other cognitive domain	X	Objective memory impairment in one other cognitive domain		Objective memory impairment in one other cognitive domain	
Objective memory impairment in one non-memory domain		Objective memory impairment in one non-memory domain		Objective memory impairment in one non-memory domain		Objective memory impairment in one non-memory domain	
Objective memory impairment in two or more non-memory domains		Objective memory impairment in two or more non-memory domains		Objective memory impairment in two or more non-memory domains		Objective memory impairment in two or more non-memory domains	X
Demented		Demented		Demented		Demented	
Non demented	X	Non demented	X	Non demented	X	Non demented	X

Presentation of MCI includes concerns with change in cognitive domains, impairment in one or more cognitive domains, preservation of functional abilities, and no diagnosis of dementia (Bayles & Tomoeda, 2013). An individual diagnosed with MCI will begin to develop difficulties with forgetting important information previously. For example, forgetting appointments, as well as a decrease in the ability to make sound decisions and judgements are noted.

Dementia

A well-known disorder that includes memory loss is dementia. Though many forms of dementia exist, a broad view of the effects on memory will be highlighted. For example, a common sign of dementia is the burden of altered declarative and prospective memories (Brookshire, 2003). In the earlier stages of dementia, a patient may forget to take out the chicken that they had just put in the oven for dinner. Brookshire notes that adults with early dementia may exhibit moments of forgetting, not referencing, or misplacing things. To add, they might forget names, revisit places or topics of conversation twice, or forget experiences completely (Brookshire).

Language involvement in the middle stage of dementia makes an individual become a more passive communication partner, producing no substantive contributions to conversations but only well-known and familiar comments (Brookshire, 2003). Additionally, attention and memory declines will impair the patient's ability to retain spoken or printed materials. Noisy and distracting environments may also cause increased comprehension issues with word-retrieval difficulties (Brookshire). Also in the middle stages of the disorder, the individual's ability to perform activities of daily living is adversely affected. Confusion, wandering, and bowel or bladder incontinence increases while self-care and sleep decrease (Brookshire).

In addition to changes in memory, in the later stages of the dementia process, patients may experience personality and behavior differences (Brookshire, 2003). During this time, patients disregard self-care and become a risk for themselves and their caregivers due to decreased judgement (Brookshire). Adults with dementia may also undergo anxiety, depression, behavior changes, denial, excess disability, sleep disturbances, and health issues (Brookshire). Furthermore, difficulties with insight, judgement, and orientation become more noticeable which increase dependence on the caregiver (Brookshire).

In the latest stages of dementia, patients become less receptive to therapy, and it no longer enhances their quality of life. Instead, focus shifts to the caregiver in helping to manage their loved one's new way of life (Brookshire, 2003). According to Rabins, Mace, and Lucas (1982), after surveying 55 families, it was concluded that the five major problem areas within the family unit were memory disturbance, catastrophic reactions, demanding and critical behavior, night walking, and hiding things. It is significant to note the changes not only in the patients, but their caregivers as well. Increased anxiety, feelings of loss, and hostility are common.

Traumatic Brain Injury

According to Murray, Ramage, and Hopper (2001), individuals with TBI struggle with remembering things from the past as a result of their LTM deficits. These individuals experience both retrograde amnesia and anterograde amnesia (Murray et al.). Retrograde amnesia is the loss of information known before the memory loss (Murray et al.). Therefore, these patients will find it hard to remember events that happened before their accident. Specifically, patients find difficulty in recalling their accident (Murray et al.). Anterograde amnesia becomes prevalent when patients struggle with retaining new information- either semantic or episodic. These deficits will alter their ability to perform daily tasks due to the difficulty with the encoding process (Murray et al.). Working memory within this population is another area of concern, changing their efficient use of communication (Murray et al.). Linguistic cohesion and syntax comprehension increased in difficulty when working memory demands were taxing to the individual (Murray et al.). Though deficits do occur, preservation of specific types of memory occur. STM and nondeclarative memory tend to remain intact in patients with TBI (Murray et al.).

Aphasia

Patients who suffer from left-sided strokes may receive a diagnosis of aphasia- a disorder that affects an individual's' ability to understand or express speech. Individuals diagnosed with aphasia exhibit signs of memory difficulties (Murray et al., 2001). The linguistic demands of memory in assessment are important to note to discern if the problem being addressed is one of memory or language. Though there are assessment challenges, it has been discovered that patients with aphasia have LTM deficits (Risse, Rubens, & Jording, 1984). Risse et al. (1984) conducted a study comparing patients with aphasia and typically aging adults' ability in a word recall task. Their results indicated that patients with anterior lesions had verbal LTM deficits. Cues did not prove beneficial for patients with an anterior lesion. In contrast, patients with posterior damage proved to benefit from cues. Risse et al. indicated that while questions remained regarding whether long term abilities are dependent on the hemisphere that was damaged or not, there was agreement that memory is affected in some way by aphasia. Moreover, verbal and spatial memory deficits in individuals with left-hemisphere strokes were found to occur.

Short-term for auditory and visual-verbal material have been chronicled for people with aphasia throughout research (Murray et al., 2001). Variables that affect the severity and presentation of STM verbal deficits include difficulty of a word's articulation and phonological deficits (Murray et al., 2001). In regard to nonverbal short-term abilities, deficits noted include: sequential memory and poor retention of geometric shapes (Murray et al., 2001). There is discussion on whether these deficits are due to verbal encoding difficulties or aspects of nonverbal memory. Some authors argue sentence/discourse comprehension is mediated by WM, and therefore, result in a reduced working memory in patients with aphasia, causing comprehension difficulties (Murray et al., 2001). Despite the divide in research, WM has been found to affect patients with aphasia, the exact process to which it is affected is still under consideration. According to Christos, Kelly, and Code (2015), deficits of WM and STM have an "impact on the ability to retain and manipulate auditory-verbal information" (p. 721).

Right Hemisphere Disorder

A stroke that occurs in the right hemisphere of the brain can result in a right hemisphere disorder (RHD). RHDs cause deficits in areas that provide us with our thinking skills- memory, reasoning, and problem-solving. Following diagnosis of a right hemisphere disorder, both short-term and LTM for nonverbal material is most impacted, with deficits in verbal material as well (Murray et al., 2001). In individuals with RHD, difficulties in delayed or immediate recall of visual information has been noted (Murray et al.). This can include trouble remembering spatial location and orientation, faces, facial expression, and complex visual figures (Murray et al.). The ability to recall melodies of songs and prosodic patterns is also damaged (Murray et al.). Individuals with RHD show increased difficulties with auditory information shows increased difficulty with such a diagnosis. Difficulties with nonverbal information are a complaint in this population. An example can include problems with remembering facial expression or gestures. An additional challenge when working with this population is that they tend to be unaware of their deficits.

Guiding Principles in Group Therapy for Individuals with Memory Deficits

When providing treatment to individuals with memory deficits, it is vital to understand that patients will present differently when providing therapy. Taking a holistic approach and understanding the patient’s pathology and overall functioning is important in addressing the patient's deficits (Golvers, n.d.). Both caregiver and patient involvement to relay meaningful and relevant information is key to that patient’s motivation during the therapy process (Golvers, n.d.). Across literature, two approaches show prominence in therapy for memory deficits, which include restorative and compensatory rehabilitations.

Restorative rehabilitation encompasses strengthening the damaged areas of the brain through repeated exposures and repetition of material to improve memory functioning

(Kimbarow, 2016). Specificity, repetition, intensity, time, salience, and age matters (Dowdy, n.d.). Taking these variables into consideration will enrich the restorative process. For example, introducing material in a meaningful way will likely improve future use of that skill. According to Kimbarow (2016), restorative rehabilitation can “facilitate reorganizations of partially damaged systems, reduce cognitive impairment, and improve cognitive functions” (p .73). Bayles and Tomoeda (2013) extend this idea by detailing neuroplasticity, which is brain reorganization based on experiences. Many principles surround neuroplasticity, but two that are fundamental to rehabilitation are the “use and improve” or “use or lose.” In summary, using information will improve functioning and enhance skills, in contrast to having the knowledge, not using it, and losing abilities (Bayles & Tomoeda).

Compensatory rehabilitation is when cognitive function is unable to be restored and strategies are necessary to compensate for losses (Kimbarow, 2016). Compensatory rehabilitation includes both external and internal memory aids (Eberle, 2015). External aids are physicals tools that are applied to a functional task. Examples include notebooks, planners, cell phones, and beyond. Using a notebook to communicate your background and history is functional and effective to combat memory difficulties (Eberle). If used, access to the type of aid and training for that aid are needed for generalization (Eberle). Internal memory aids are paralleled to the mental processes an individual uses to assist them in improved memory functioning (Eberle). An example of internal memory aids include association, elaboration, and organization (Eberle). Metacognition and metamemory, the ability to understand one’s own thought and memory processes, are significant skills to teach during treatment. Being self aware and providing functional importance of tasks will increase buy-in from the patient (Kimbarow, 2016). If an individual understands their memory deficits and what must be done to compensate, he or she is better able to address his or her problems than someone who is completely unaware of their weaknesses and the skills needed to make up for them.

Restorative and compensatory rehabilitations can be used together in order to meet patients at their level of functioning. Specific treatment styles collected throughout research include, but are not limited to: drill and practice, dual task training, spaced retrieval errorless learning, role playing, and situational coaching (Eberle, 2015). To illustrate, errorless learning reduces the chances for the patient to make mistakes and spaced retrieval is when patients are expected to remember details within a given amount of time, and if wrong, more time is allotted (Eberle). Employing prompts and cues in therapy is also important in therapy as individuals with memory deficits demonstrate difficulty encoding information (Golvers, n.d.). To strengthen this, prompts and cues are used. Examples include exposing material longer, introducing material multimodally (hearing, seeing), creating meaningful connections, etc. (Golvers)

Other factors to consider are load and environmental adaptations (Golvers, n.d.). Minimizing the explicit memory loads will benefit patients as these are the two areas most impaired (Golvers). Taxing these areas may complicate therapy and make it difficult to target goals. Environmental adaptations to take into account include reducing distractions, taking breaks, giving extra time, not speaking too fast or talking too much, and being in a supportive environment (Dowdy, n.d.).

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Chapter 3: Word Finding

Difficulty with word finding can be described as difficulty retrieving desired word(s) or difficulty gaining access to a target word(s). Although word finding difficulties are often associated directly with neurological language disorders, normally aging individuals experience word finding difficulties or “tip of the tongue” moments as well (“Word retrieval,” n.d.). A word finding disorder is typically diagnosed when frequency of word finding is more than normal while having a negative impact on expression of thought, therefore impacting functional communication (“Word retrieval,” n.d.). The Center for Speech and Language Pathology states, “Word finding difficulty is a frustrating ailment. It interrupts the flow of conversations and can discourage the desire to communicate” (“Word retrieval,” n.d.). For the purpose of this paper, word finding , word retrieval, and naming will be used synonymously. This paper examines word finding basics, neuroanatomy of word finding, common disorders affected by word finding difficulties, negative impacts of word finding on various disorders, and treatment principles to consider when providing intervention targeting word finding.

Introduction to word finding

Word finding is a fundamental skill for everyday language usage (Herbet et al., 2016). This language skill can be significantly impaired in individuals with neurological disorders such as a stroke (“Improving word,” 2013). Word finding difficulties can also be associated with normal aging (“Common word,” n.d.). With typical aging, the human brain becomes slower in processing which can lead to increased length of time before retrieving a target word (“Common word,” n.d.). Typical age-related changes in working memory and attention are also factors that support the explanation for increased word finding difficulties with age (Harvey, 2018, slide 7).

As word finding has been studied by experts over the years, there have been a variety of models which contribute to explaining this language skill. Understanding models of word finding can help determine when a breakdown is present. Research findings present various opinions regarding the numerous levels of processing involved in retrieving a word and how representations are both activated and selected (Hillis, 2002). An important idea with little debate among researchers is that there are at least two levels of representation, including a semantic representation and lexical representation that are present during word finding tasks (Hillis, 2002). Semantic representation is recall of words related to the target word meaning and lexical representation is associated with retrieving the name of the target stimuli (Herbet et al., 2016). For example, if an individual is attempting to retrieve the target word “rabbit”, the semantic representations could consist of words like animal, fluffy, and hops which all represent word meaning. The lexical representation in this instance would be retrieval of “rabbit” (Herbet et al., 2016).

Authors Helm-Estabrooks, Albert, and Nicholas (2014) present a specific two-stage model of word retrieval in the Manual of Aphasia and Aphasia Therapy. Helm-Estabrooks et al. (2014) state, “Many of the current models of word retrieval view naming in terms of two-stage processing.” (p. 232). Stage 1 is critical for holding semantic information related to the target concept. Another aspect of this model is known as the lemma. The lemma represents an abstract form of the target stimulus (Helm-Estabrooks et al., 2014). The semantic information from stage 1 feeds into the lemma. Early stages require an individual to retrieve enough semantic information about the target word, so that the lemma will be activated, and the process can continue to stage 2. Stage 2 represents conversion of the lemma into a specific word (Helm-Estabrooks et al., 2014). This specific word is a direct result of phonological information that was retrieved after stage 1. Although this model is big picture and doesn't successfully capture the dynamic process of naming, it provides professionals with a basis and can be used to help locate breakdowns in individuals with word finding and naming deficits (Helm-Estabrooks et al., 2014). Neurological damage often disrupts smooth flow of this complex system, leading to impairments in word finding (LaPointe, 2011).

Neurological aspects of word finding

Prior to neurological discussion, it is important that the reader understands inconsistency among research related to the neurology of word finding as a skill. Inconsistencies in research findings makes it difficult to confirm specific neurological structures necessary for successful word retrieval. The structures presented below have been discussed in literature, but due to the numerous brain connections, fibers, and systems, specific locations remain unclear. Below, general brain structures along with a few specific areas will be discussed in relation to word finding. Continued research is encouraged to determine more consistent data that will allow professionals a better insight into the neurology of word finding. In addition to inconsistent research, neurological disorders present with diverse lesion sites in the brain, making it difficult to appropriately determine a single neuroanatomical location definite to word finding. Literature presents one consistency in relation to neurology and word finding: we can better localize this skill to various language centers of the brain.

Language centers of the brain reside in the left hemisphere (Webb & Adler, 2008). Specifically, the posterior frontal, left temporal, and left parietal lobes play a role in speech and language functions, some being related to retrieval of words. Two areas located in the frontal lobe are the precentral gyrus and inferior frontal gyrus (Hegde, 2006). The precentral gyrus plays a role in controlling movements of the face, mouth, and lips (Hegde, 2006). The inferior frontal gyrus holds a language structure commonly referred to as Broca's area. Broca's area is located specifically in the left, lower, and posterior portion of the frontal lobe. This structure controls motor movements involved in speech production (Hegde, 2006). Language comprehension, another important language function is controlled in the left temporal lobe. The neural structure specific to this function is commonly referred to as Wernicke's area (Webb & Adler, 2008). Although these structures in the frontal and temporal lobe are not specific to retrieval of a target word, they play an important role in neurologic language functioning. The parietal lobe contains two gyri significant for language: the supramarginal gyrus and the angular gyrus. The angular gyrus is more specific to word finding. Damage to the angular gyrus result in difficulties specific to naming (Hegde, 2006).

Additional research by Herbet et al. (2016) discusses the importance of left hemispheric basal temporal structures in word finding and lexical retrieval. This area is also known as the basal temporal language area due to its importance in language processes. Damage to this area of the brain in association with naming difficulties is consistent with previous research on individuals' post-stroke and those with neurodegenerative diseases (Herbet et al., 2016).

The left inferior temporal gyrus (ITG) and left inferior longitudinal fasciculus (ILF) are two target areas in the basal temporal language area found to have significant importance in the lexical retrieval stage of naming (Herbet et al., 2016). When looking at the neurology of word finding, it is essential to understand that other cognitive skills are paramount for successful word finding. These skills will not be discussed in this portion of the paper, but can include higher level skills such as attention and memory. Overall, word finding impairments are commonly observed after left-hemispheric damage and can impact language and communication functions.

Populations affected by word finding difficulties and associated effects

Consistent with previous statements, word finding difficulties are oftentimes most prominent in neurogenic language disorders. For the purposes of this paper, we will discuss word finding difficulties and their effect on individuals with aphasia, traumatic brain injury (TBI), dementia, and mild-cognitive impairment (MCI). Word finding deficits in each population manifest in a unique manner. Deficits related to word finding range from mild to severe, but regardless of where they fall on the spectrum, they negatively affect communication in some form. Information regarding specific effects and severity will be discussed below.

Aphasia

Of all adult neurogenic language disorders, word finding deficits are most prominent in an acquired language disorder commonly known as aphasia (“Improving word,” 2013). Aphasia can be defined as, “a communication disorder that affects a person’s ability to process and use language” (Lingraphica, 2018, para. 1). Aphasia frequently results after an individual sustains brain damage post cerebrovascular accident (CVA), otherwise known as a stroke (Hegde, 2006). Individuals with aphasia present with numerous language difficulties associated with verbal expression or speaking, understanding auditory information, reading, and writing (Lingraphica, 2018). Severity of aphasia falls on a spectrum and differs from type-to-type. Both the type and severity are dependent upon lesion site and extent of damage. Lingraphica (2018) states, “Aphasia can range from mild—where a task like retrieving the names of objects is difficult—to severe—where any type of communication is almost impossible.” (para. 2). Aphasia types can be classified as cortical or subcortical. Cortical aphasias include: Broca’s aphasia, transcortical motor aphasia, mixed transcortical aphasia, global aphasia, Wernicke’s aphasia, transcortical sensory aphasia, conduction aphasia, and anomic aphasia (Helm-Estabrooks et al., 2014; Hegde, 2006). Subcortical aphasias include: anterior capsular-putaminal aphasia, posterior capsular-putaminal aphasia, and thalamic aphasia (Helm-Estabrooks et al., 2014; Hegde, 2006). For the purposes of this paper, we will focus on the various cortical aphasias.

Difficulty with word finding in individuals with aphasia is often referred to as anomia (Hegde, 2006). Anomia manifests differently in each and every individual with aphasia. Although anomia in all cortical subtypes will be reviewed, anomia has the most negative impact on communication in those diagnosed with anomic aphasia (Helm-Estabrooks et al., 2014; Hegde, 2006). Both Wernicke's aphasia and conduction aphasia also have more severe word finding difficulties as compared to the others (Hegde, 2006).

Anomic aphasia presents with predominant naming problems that are persistent (Hegde, 2006). Despite debilitating and pervasive word finding deficits, other language functions are typically intact in individuals with anomic aphasia. Due to the severe nature of word finding in this cortical aphasia subtype, the individual's speech will often be characterized by constant pausing and use of circumlocutions where the individual talks around the target stimulus word (Hegde, 2006). Overall, the individual will have difficulty with everyday conversation and communication, impacting daily life negatively.

Individuals diagnosed with Wernicke's aphasia present with fluent verbal expression, but speech output is characterized by "jargon", meaningless utterances made up of real and non-sense words. These individuals present with severe word finding deficits where they may fail to name an object by making an inaccurate production or produce various substitutions in place of the target word (Hegde, 2006). When a substitution is made, it is often a semantic substitution for the target word. Individuals may also produce an incomprehensible response (Hegde, 2006). Circumlocutions are common as a result of word finding difficulties, where the person with aphasia talks around the target and describes rather than names the target word (Hegde, 2006). Word finding difficulties in instances of Wernicke's aphasia severely affect overall communication and negatively impacts the individual's life.

Conduction aphasia is marked by word retrieval difficulties ranging from mild to severe (Hegde, 2006). These difficulties are found to be more associated with content words compared to function words (Hegde, 2006). In result, this leads to less effective communication as these individuals have empty speech or speech that lacks meaning.

Individuals diagnosed with global aphasia present with severely impaired communication skills which include extremely limited language skills and impaired naming abilities (Hegde, 2006). Verbalizations may be limited to non-sense words and sounds, or a single word or phrase uttered repeatedly without meaning. Lack of communication abilities due to severe language impairments negatively impacts quality of life and relationships, making it difficult to be motivated to communicate at all.

Individuals with transcortical sensory aphasia present naming difficulties that can reach severe levels. These individuals have fluent verbal expression, but it is characterized by empty speech (Hegde, 2006). When individuals who are diagnosed with this type of aphasia are having difficulty with word finding, they often use non-specific words or meaningless words as a substitute (Hegde, 2006). This results in severe communication breakdown, especially during conversational discourse levels. Confrontation naming is also negatively impacted in this cortical subtype, making a simple task such as, answering "What is this?" extremely difficult (Hegde, 2006). Confrontational naming will be discussed in the additional aphasia subtypes below.

Broca's aphasia, transcortical motor aphasia, and mixed transcortical aphasia present with independent hallmark features, but are characterized by similar word finding deficits. Word finding and naming deficits are mainly associated with confrontational naming tasks (Hegde, 2006). Confrontational naming tasks are those that require an individual to name an object, picture, or person after being asked "What is this?" (Hegde, 2006). During conversational speech, significant pauses and filler words are present as the person attempts to search for the word. The severity of word finding in these cortical aphasias has less of an impact on overall communication. Other characteristics of Broca's aphasia, transcortical motor aphasia, and mixed transcortical aphasia will interfere with speech, language, and communication more than word finding.

Traumatic Brain Injury (TBI)

A TBI can be defined as trauma to the head resulting in damage to the brain (LaPointe, Murdoch, & Stierwalt, 2010). Trauma can come in forms such as a blow or jolt (Webb & Adler, 2008). Depending on the location and extent of neurological damage, symptoms post TBI can range on a spectrum from mild to moderate to severe. Severity of TBI is a critical indicator of physical, behavioral, cognitive, speech and language outcomes (LaPointe et al., 2010). Language difficulties associated with TBI are often associated with cognitive and behavioral challenges (Hallowell, 2017). Word finding difficulties are one of many language characteristics associated with TBI (Hallowell, 2017). LaPointe et al. (2010) include both word retrieval and word finding as language problems specific to communication changes post TBI. Individuals who experience a TBI often have areas of greater concern than language, but it is important to note that word finding deficits in this population can negatively impact overall communication.

Dementia & Mild Cognitive Impairment (MCI)

Current literature discusses various types or forms of dementia. More common forms of dementia include: Alzheimer's disease (AD), Dementia with Lewy bodies (DLB), Frontotemporal dementia (FTD), and vascular dementia (Hallowell, 2017). Dementia is a disease which largely affects memory. In addition to memory impairments, individuals with dementia also exhibit impairments in one or more cognitive or linguistic areas. For a dementia diagnosis, impairments must have a noticeable impact on social and occupational interactions, as well as a negative impact on everyday functioning (Hallowell, 2017). Mild cognitive impairment (MCI) is defined by Hallowell (2017) as, "a condition of cognitive decline that is not consistent with normal aging" (p. 194). Similar to dementia, the most common complaint in MCI is memory difficulties (Hallowell, 2017). In contrast to dementia, changes in memory and cognitive domains do not interfere with everyday functioning and performance of activities of daily living in individuals with MCI diagnosis (Alzheimer's Association, 2018).

Both dementia and MCI also have associated language deficits (Hallowell, 2017). Individuals with dementia often demonstrate anomia or difficulty with word finding in the early and middle stages of the disease process. Negative impact on everyday language and communication skills is associated with these deficits (Hegde, 2006). Word finding deficits in individuals with MCI and dementia will negatively impact quality and effectiveness of communication to some extent. Individuals with dementia are often more negatively impacted by other symptoms of the disease process.

Overall impact on communication

Language plays a central role in our daily lives. Neurogenic language disorders interfere with normal language functioning, making everyday communication difficult. The Brain

Tumour Charity (2018) states, “The ability to communicate is something we often take for granted. When communication difficulties occur, they can make us feel frustrated, angry, embarrassed and isolated” (para. 1). These feelings of frustration, anger, embarrassment, and isolation are often emotions felt by individuals with word finding deficits, especially in severe cases. Negative emotions often result from communication breakdowns that make everyday conversation difficult and exhausting. Overall, deficits in this critical language skill can negatively impact everyday communication, which not only impacts the patient’s life, but his or her family and loved ones, as well.

Treatment principles to consider with word finding impairments

When designing intervention programs and treating individuals with word finding difficulties, multiple treatment principles should be considered. As previously discussed, word finding deficits can severely impact one’s ability to communicate functionally. Treatment principles come into play when designing an intervention plan that is both functional and individualized. Building on the individual’s language profile while selecting meaningful, client-specific targets, will create a treatment plan that promotes success for the client. Hegde (2006) states, “Selection of client-specific and personally meaningful target behaviors that, when taught, provide the greatest improvement in functional communication in natural settings and presumably improves the client’s quality of life in a global sense.” (p. 257). Most importantly, the ultimate goal for individuals participating in treatment is for the individual to participate in daily living with the highest level of independence while maximizing quality of life and communication success (ASHA, 2018b).

A critical treatment principle specific to individuals who are experiencing word finding deficits is to determine the type of word finding errors the individual is exhibiting. Most techniques used in therapy for word finding are to retrain naming skills by matching various stimuli or prompting the correct target word with phonologic or semantic cues (Hegde, 2006). Clinicians' aim in intervention is to strengthen the connections between various networks used when an individual is retrieving or attempting to retrieve a target word. After determining the errors that the individual is making, word finding treatment will aim to strengthen semantic and lexical networks or phonological and lexical networks (LaPointe, 2011). In some individuals, treatment will aim at strengthening both of the previously mentioned networks. This is a crucial aspect of successful therapy when word finding is targeted.

Determining an appropriate treatment approach is also an important piece of intervention aiming to improve word finding. Treatment approaches include restorative and compensatory (ASHA, 2018b). For some individuals, both compensatory and restorative approaches will be incorporated into intervention. Depending on the etiology of word finding difficulties, the individual may not be able to completely restore impaired word finding function. In this case, a compensatory treatment approach would be implemented. The goal of a compensatory approach is to establish ways the individual can compensate for deficits that cannot successfully to be retrained (ASHA, 2018b). Compensatory strategies are important when targeting word finding and are generally used to some degree, whether paired with restorative or used alone. Compensatory communication strategies can include use of gestures or a communication notebook (Hegde, 2006). Compensatory strategies give individuals a way to communicate in some functional manner regardless of impairment level. In contrast, a restorative treatment approach is used when word finding abilities can be improved or completely restored. (ASHA, 2018b). For example, word retrieval cueing strategies can be used as a restorative approach to improve function or restore function given time (ASHA, 2018b). When using either approach, the ultimate goal is to find strategies or techniques that best fit the individuals needs and abilities.

Treatment for individuals with word finding difficulties should begin at a simple level and progress as the individual is able to complete more complex level tasks (Hegde, 2006). The use of cueing hierarches in treatment is an additional key principle. Cueing hierarchies assist in evoking responses during therapy tasks (Hegde, 2006). Therapy should be structured and implemented with repeated practice. Repeated practice and drill techniques form stronger connections which improve the individuals word retrieval skills (Hedge, 2006).

One final key principle to consider when providing treatment for word finding is the importance of including family and caregivers in the process. The family and caregivers should receive education that gives them a foundation regarding their loved one’s communication deficits (ASHA, 2018a). By keeping the family and caregivers involved, it can assist in building word finding skills outside of therapy settings and in transferring skills into real word settings (ASHA, 2018a). As word finding deficits impact an individual’s ability to communicate functionally, it can negatively impact his or her ability to successfully communicate with family and caregivers. Educating loves ones, involving them in therapy, and providing them with strategies to use outside of structured skilled therapy sessions, promotes more successful communication interactions and fosters a more positive outlook on communication as a whole.

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Chapter 4: Executive Functioning

The ability for people to overcome unexpected, challenging situations as well as reflect and consider all the possible outcomes of actions rather than impulsively acting in situations is managed by our executive functions (EFs; Diamond, 2013; Randolph, 2013). EFs are also relied on while fighting temptations and staying focused on tasks. Therefore, success in educational, vocational, and social activities of daily living (ADLs) are dependent on proper EF functioning (Diamond, 2013; Randolph, 2013).

Researchers and professionals alike all have slightly differing opinions on the definition, foundational cognitive processes, and components of EF (Zelazo, Blair, & Willoughby, 2017). According to Randolph (2013), EFs are "an interrelated set of higher-order cognitive abilities that govern goal-directed behavior, interface with other cognitive skills, and play a role in regulating emotional and social functioning" (p. 77). Oftentimes, attention is considered to be an underpinning of other cognitive domains and therefore, EF skills permit attention-regulation during tasks (Papathanasiou, & Coppens, 2017; Zelazo et al., 2017).

There are three key cognitive processes of EF that are generally considered the foundations necessary to govern proper EF (Diamond, 2013; Zelazo et al., 2017). These include working memory, inhibition, and cognitive flexibility. Individual EF components are comprised of initiation, organization, planning, reasoning, problem solving, self-monitoring, inhibition, metacognition, and cognitive flexibility (Diamond, 2013; Gurd, Kischka, & Marshall, 2010; McDonald, Togher, & Code, 2014; Randolph, 2013).

Key Cognitive Processes of Executive Function

Working memory. Working memory (WM), the process of retaining and modifying stored memories, is categorized as either verbal, nonverbal, or visual WM (Diamond, 2013;

McDonald et al., 2014). Verbal WM involves information that was verbally presented, whereas, nonverbal WM includes visuo-spatial information (Diamond, 2013). Both verbal and visual WM have a maximum capacity of material that can be stored at a time; therefore, problems can arise if they are overloaded (McDonald et al., 2014). Simply stated, WM involves relating previous information to new information through manipulation of the material (Diamond, 2013; Glisky, 2007). WM plays a critical role in our ability to comprehend written and spoken language. Additionally, organizing items in your head, revising previous plans, and reasoning all rely upon WM.

Inhibition. Inhibition is defined as the ability to deter oneself from impulsively responding to environmental stimuli and resist routine actions or thoughts through the management of "attention, behavior, thoughts, and/or emotions" (Diamond, 2013, p. 137). Generally, inhibition and WM have a reciprocal relationship. For example, impulsivity is controlled in part by WM. The ability to manipulate information in working memory increases the likelihood that an inappropriate response will be inhibited. Inhibition aids in WM by preventing distractions from other stimuli while mentally revising or organizing plans or lists (Diamond, 2013). Aspects of inhibition include selective attention, cognitive inhibition, and self-control. Selective attention, the ability to attend to a preferred stimuli and ignore others, is controlled by inhibition. Deliberate neglect of memories or thoughts is defined as cognitive inhibition. Lastly, self-control is referred to as the capability to manage behavior and emotions. The ability to remain focused on a task, fight temptations, prevent impulsivity, and delay gratification are all supported by one's self-control (Diamond, 2013).

Cognitive flexibility. The capability to adjust to a modification in demands or schedule, modify our perspective, and transform our ideas about a specific item or situation is considered cognitive flexibility (Diamond, 2013). Intact cognitive flexibility allows us to successfully multitask and transition between various activities (Dawson & Guare, 2010). WM and inhibition are both prerequisites for cognitive flexibility (Diamond, 2013). For example, when reevaluating a perspective, one must inhibit their initial reaction on the matter. Afterwards, a new perspective is formed and enters WM (Diamond, 2013).

Components of Executive function

Initiation. The capacity to start a task in an appropriate amount of time is defined as initiation (Dawson & Guare, 2010). Initiation can be classified in two different ways. Beginning a task immediately by performing the first step is the first classification of initiation. The second involves planning to initiate a task. This requires one to consider how long it will take to complete a task and when an appropriate time would be to start the task, in order to meet the completion deadline (Dawson & Guare, 2010).

Planning and organization. Planning is a complex skill that requires one to design and outline specific procedures in order to achieve task or goal completion (Dawson & Guare, 2010). Organization requires planning various ways to monitor information or materials (Dawson & Guare, 2010).

Reasoning and problem solving. Solid reasoning skills involve the capability to link unrelated items, concepts, or ideas and pull important information from a larger concept (Diamond, 2013). Problem solving involves being able to use previously learned principles to determine a solution (Gurd et al., 2010). Good problem solving skills require anticipation and analysis of a situation (McDonald et al., 2014). It is generally thought to be composed of four stages (Gurd et al., 2010). The first is defining the problem, followed by generating a list of possible solutions and choosing the best one. Finally, determining and correcting errors in order to achieve good results occurs (Gurd et al, 2010).

Decision-making. The ability to choose a practical approach or action from a range of reasonable possibilities is called decision-making (Gurd et al., 2010). Initiation impairments may co-occur with decision-making deficits because if one cannot select an appropriate action, he/she will not be able to initiate the response; therefore, in order to determine if initiation deficits are accompanying decision-making deficits, it is necessary to determine if someone consistently makes poor decisions or has difficulties making any decision at all (Gurd et al., 2010).

Metacognition, self-regulation, and insight. Metacognition, often referred to as self-reflection, is "the ability to think about cognitive processes" (McDonald et al., 2014, p. 61). It is necessary in creating goals, determining how to achieve them, and following through with them. Self-reflection and insight are also important in the evaluation and adjustment of goals. Insight is the ability to understand oneself or others. Therefore, a lack of insight results in the inability to understand one's own limitations. When insight is intact, people know when certain tasks are too challenging or when assistance is needed (McDonald, 2014; Dawson & Guare, 2010). Self-regulation requires maintaining proper emotions and responses to a stimulus (McDonald et al., 2014). For instance, if a person has poor self-regulation, he/she may laugh at something others perceive to be inappropriate to laugh at (McDonald et al., 2014).

Neurology of Executive Function

The frontal lobes are typically thought of as the control centers for EF including all subcategories previously listed (Gurd et al., 2010; McDonald et al., 2014). It is commonly believed that the frontal lobe governs and connects to other brain regions, which also play a role in EF regulation (Gurd et al., 2010). Therefore, the frontal lobe is not solely responsible for the appropriate functioning of these higher-level cognitive skills.

The prefrontal cortex (PFC) is highly involved in governing EF (Gurd et al., 2010). The PFC is composed of three regions referred to as the medial, orbital, and lateral PFC. As a whole, it contains many neuronal networks with other brain structures including, “the brainstem, the hypothalamus, the limbic system (especially amygdala and hypothalamus), the thalamus, the basal ganglia, and other areas of the neocortex” (Gurd et al., 2010, p. 823). Due to its many connections, it is commonly referred to as “the conductor of an orchestra or an air traffic controller” (Zelazo et al., p 12, 2017) because it coordinates many neuronal networks to complete executive tasks. Motivation and emotions are governed by the orbitomedial and basal portions of the PFC, which contain networks that attach to the limbic system (Gurd et al., 2010; McDonald et al., 2014). The anterior cingulate cortex, also in the medial PFC, can result in attentional insufficiencies if damaged (Gurd et al., 2010). Damage to the orbital region additionally results in attentional deficits related to inhibition and distractibility, but also social and emotional deficits including euphoria and disinhibition. These symptoms occur because of the orbital PFC’s connections with the thalamus, hypothalamus, limbic system, and frontal and posterior association cortex. Lateral prefrontal cortex (LPC) injury commonly results in problems with planning and attention deficits that affect decision-making, organization, and initiation. These functions are referred to as the LPC’s representational role. Its operational role includes the government of temporal integration, or the assimilation of information over periods of time, through controlling attention, memory, prospective set, and response monitoring.

Aging Effects on Executive Functions

Before determining whether someone has a deficit, one should consider the typical changes that occur in EF across the lifespan (Glisky, 2007). Cognitive changes occur as people age. However, it should be noted that not all older individuals experience the same variations in their cognitive abilities. Research indicates that diminished success with various cognitive tasks that occurs in older individuals is related to EF impairment. Declines in EF skills may occur in part because foundational cognitive abilities, such as attention, diminish (Glisky, 2007). Additionally, the frontal lobe hypothesis of aging suggests that declines in EF emerge as a result the diminished size and function of the PFC (Glisky, 2007). As a result of cognitive changes throughout the lifespan, older individuals often experience challenges with inhibition and reasoning (Craik & Salthouse, 2000).

Disorders Affecting Executive Function

Traumatic Brain Injury

A traumatic brain injury (TBI) is described as a disturbance in brain function after receiving a head trauma, either through a penetration injury or jolt to the head (Papathanasiou, & Coppens, 2017). In the TBI population, EF deficits commonly prevent successful rehabilitation (McDonald et al., 2014). Several factors including injury severity, intellectual ability prior to injury, drive, and the type of task, all affect the clinical presentation of EF deficits in those with TBI. Patients may have difficulties with inhibition, which will likely result in inappropriate responses and impulsivity. Impulsivity can occur both behaviorally and verbally. TBI patients may also be unmotivated, inflexible, and perseverative. For example, difficulties with topic shifting may occur during conversations and they may perseverate on a specific topic of interest. Problem solving, along with the inability to understand abstract ideas may also by clinically present in TBI patients (McDonald et al., 2014). Patients' ability to self-reflect can be impaired and may vary in severity depending on the task. Additionally, patients may have trouble rating their performance on tasks. Challenges with task prioritization, cognitive flexibility, and decision-making are common symptoms in TBI patients as well. Patients may have trouble with effective communication in relation to EF deficits due to an inability to recall main details, provide accurate and appropriate information related to the topic, produce logical ideas, self-monitor, turn-take, and topic switch (McDonald et al., 2014).

Aphasia

Expressive and receptive language impairments during speaking, reading, and writing tasks that occur because of damage to the language dominant hemisphere of the brain are referred to as aphasia (Papathanasiou, & Coppens, 2017). In this population, deficits can be seen in one or multiple EF components and are most prominent during conversation, because of the pragmatic and comprehension difficulties that accompany aphasia. Deficits in cognitive flexibility and problem solving commonly impact patients with an aphasia diagnosis (Helm-Estabrooks, Albert, & Nicholas, 2014). Examples of cognitive flexibility deficits in aphasia patients include perseveration and the inability to switch to other possible modes of communication during a breakdown. During instances of breakdown, the client with aphasia should assess the situation, create an alternative mode of communication, and implement the new strategy (Helm-Estabrooks et al., 2014). Additonally, in some aphasia patients, a lack of awareness of deficits may be present as well as disinhibition (Papathanasiou, & Coppens, 2017).

Right Hemisphere Disorder

A right hemisphere disorder (RHD) is an acquired disorder resulting from an insult to the right hemisphere of the brain that affects language and cognition (Papathanasiou, & Coppens, 2017). One of the most prominent EF deficits in this population is a lack of insight, termed anosognosia. Anosognosia is demonstrated differently across RHD patients and can be a significant obstacle in rehabilitation. However, in less severe cases progresses is made over time. Problem solving, organization, reasoning, and planning difficulties are common in RHD patients.

Problems with inhibition can negatively affect patients' socialization skills and affect family and peer relationships.

Dementia and Mild Cognitive Impairment

Dementia is defined as a deficiency in multiple cognitive areas (i.e., attention, memory, visuospatial skills, language, EF) that affect one's ability to adequately preform ADLs (Papathanasiou, & Coppens, 2017). There are multiple types of dementia that affect different cognitive areas. For the purposes of this paper, only the ones that affect EF the most will be discussed. Patients' EF symptoms may appear secondary to deficits in the other cognitive domains, because these skills are dependent on multiple cognitive areas. Patients diagnosed with dementia often experience difficulties with problem solving and reasoning (Craik & Salthouse, 2000). Using and understanding abstract information also presents as a challenge for dementia patients. Impairments can be noticed in all EF components.

The most common form of dementia, Alzheimer's disease (AD), mostly affects the cognitive domain which results in impaired WM, attention, and EF (Gurd et al., 2010). Patients exhibit challenges managing several tasks at a time during the onset if AD. The noted impairment in managing multiple tasks has been accredited to WM deficits. Another type of dementia that mainly affects EF skills is frontotemporal dementia. Impairments are observed in personality, behavior, and EFs. Skills affected include task switching, planning, inhibition, and organization. Additionally, patients have difficulties with insight, abstract concepts, and perseveration (Gurd et al., 2010).

Mild cognitive impairment (MCI) is diagnosed when cognitive changes occur but do not affect one's ADLs (Gurd et al., 2010). Additionally, these cognitive changes do not result from typical aging or fall into dementia criteria (Johns et al., 2012). While deficits in at least one area of EF are exhibited in patients with MCI, the most commonly affected component of EF in this population is inhibition (Johns et al., 2012).

Executive Function Deficits Across All Areas of Daily Living

Deficits in areas of EF result in challenges with ADLs and socialization, even if the deficits are mild (Gurd et al., 2010). Someone with EF deficits might be misunderstood because their symptoms may appear as an amplified behavior seen in people without deficits. Gurd et al. (2010) relates this to confabulation, which is a common symptom in persons with EF deficits. For example, persons with typical EF do purposefully lie sometimes, whereas persons with EF deficits to not confabulate on purpose, they simply relay incorrect information because memories and thoughts are disarranged. As a result, people may misunderstand and become agitated with the patients ‘dishonesty’. Symptoms can be very challenging for the patient, in addition to his/her loved ones, because, in some cases, the presence of EF symptoms may alter the person’s personality significantly. In addition to social and relationship difficulties, EF deficits may pose problems in their occupations as well. For example, patients may be viewed as disorganized and poor at prioritizing. Unfortunately, many people with typical EF skills have difficulties understanding these patients because symptoms are not predictable or obvious, such as someone with a visual impairment (Gurd et al., 2010).

Executive Function Treatments

Rehabilitation in patients with EF deficits are commonly referred to as one of the most challenging to treat because of their symptoms (Gurd et al., 2010). Treatment can be arduous because of patients’ lack of insight and symptoms that obstruct forming new habits and behaviors. Treatment can also be difficult because EF deficits exhibit themselves differently in every person and there is no agreement on a specific treatment approach. Underlying impairments, such as attention and self-regulatory deficits, impact treatment considerations when working with this population. Therefore, underlying deficits should be targeted as well (Gurd et al., 2010). When determining which intervention plans to use with clients with EF deficits, speech-language pathologists (SLP) should utilize evidence-based practices (Gurd et al., 2010; McDonald et al., 2014). SLPs should educate the patient and family about the deficits present as well as the treatment goals and approaches (Gurd et al., 2010).

Basic Treatment Principles

Prioritize deficits. Prior to implementing an intervention, deficits should be prioritized by the clinician (Gurd et al., 2010). The client and his/her family should play an integral role in creating overall outcome goals for the patient. Additionally, goals should be reviewed with the client, his/her family, and the multidisciplinary team (Gurd et al., 2010).

Compensatory versus restorative treatment. Restorative and compensatory strategies are effective approaches used during cognitive rehabilitation (Gurd et al., 2010). Therapy approaches that are considered to be restorative focus on regaining functions that were lost. Compensatory strategies are intended to adjust an intact ability or develop a new one as an alternative to the lost ability (Gurd et al., 2010).

Teach specific skills. It is imperative that SLPs determine the patient's strengths and weaknesses in order to target the source of the problem (Richard & Fahy, 2005). Once these are determined, therapy tasks can target a specific area of weakness while the SLP supports the patient's ability to complete the task (Richard & Fahy, 2005).

Environmental modifications. Environmental modification includes altering the physical environment or social setting in which a person is completing EF tasks (Gurd et al., 2010). It can also include task modification as well (Goldstein & Naglieri, 2013). Modifications can be made in the person's everyday environment and in the treatment setting (Gurd et al., 2010). An example of a physical environmental modification includes changing the room layout or removing pictures from a wall to reduce distractions. In social settings, modifications can include moving to a quieter area to reduce background noise and distractions (Gurd et al., 2010).

Functional activities and task selection. Tasks selected for intervention should be functional and practical in terms of the patients' goals and ADLs (Gurd et al., 2010). Activities should not require the patient to recite information. Gurd et al. (2010) suggests avoiding tasks that are constrained so that only the SLP is held accountable for correcting clients' performance during task completion. Additionally, therapy should be broken down into stages and slowly be increased in complexity. Most-to-least prompts and spaced retrieval are beneficial aspects to include during intervention. It is important to achieve generalization; therefore, treatment should be delivered in different settings using functional activities (Gurd et al., 2010).

Conclusion

This paper provided background information on areas of deficit and best principles for treatment and serves as an introduction to a therapy manual. The therapy manual provides step-by-step intervention activities and is house in the Illinois State University Speech and Hearing Clinic Materials Room. Each activity includes a multitude of accommodations to consider when providing treatment to individuals who have deficits in memory, executive functioning, attention, and/or word finding. In developing this practical therapy manual, we have taken into account best practices for adult group therapy. Please refer to the manual for a 4-week therapy program used specifically for supporting clients with deficits in memory, executive functioning, attention, and word finding abilities.

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