

THE ROLE OF ACCEPTANCE IN REDUCING ANXIETY IN STUTTERING

A THEORETICAL FRAMEWORK

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Abstract

Childhood onset stuttering, while being an established speech impediment, operates on a spectrum of severity. Anxiety's influence on stuttering has yet to be fully explored, however, evidence suggests the two are strongly correlated. With that said, people who stutter (PWS) often find that they lose control of fluency when experiencing strong negative emotions such as fear and anxiety. In the context of the aggravation of a childhood-onset stuttering, behavioral management often focuses on reducing situational anxiety. Anxiety tends to become a habitual response to certain elements in the environment for PWS. This is due to the way in which our brains are wired to obtain information that leads to the triggering of behaviors. The brain consolidates information gathered from the environment which consequently primes the mind for automatic processing. Automatic thought processing leads to the construct of unwanted cognitive belief systems that have the ability to trigger anxiety and unwanted thoughts when experiencing certain events throughout life. A new third wave of Cognitive Behavioral Therapy (CBT), Acceptance and Commitment Therapy (ACT), has only recently begun being utilized as therapy for stuttering. ACT's uniqueness lies in its engagement of acceptance, which allows for processes to occur that are vital for long-term functional change of cognitions that sustain anxiety. This paper presents a theoretical framework of the role acceptance plays in reducing anxiety for PWS along with the neurological and psychological mechanisms at play throughout this process.

Chapter 1

Introduction: The Nature and Nurture of Stuttering

Childhood Onset Stuttering

Sometimes it feels like trying to fit square peg through a round hole. Sometimes it feels like dragging a one hundred-pound weight. Other times, it feels like you've lost control. Childhood-onset stuttering is a speech fluency disorder that begins during early childhood, and in many cases, appears as early as a child's first phrase/sentence. The disorder is characterized by disruptions in the forward flow of speech, which include prolongations, repetitions, or blocks of words and/or sounds (ASHA, 2017). These disfluencies are not necessarily problematic; however, they can impede communication when a person produces too many of them. Stuttering affects roughly three million individuals in America alone, mostly children between the ages two and six. About 75% of children who stutter will recover their fluency after childhood while the other 25% will continue to stutter throughout their life (NIDCD, 2017).

The Cause of Stuttering

There is no known singular cause of stuttering, however it is research suggests that it is a combination of nature and nurture factors; *nature* being the physiological innate neurological and mental structures in our brains that drive disfluency and *nurture* being the constant influence of change on mental structures via awareness and reactivity. For example, wet roads present themselves with potential dangers by nature. However, the person driving upon the road can help determine to what degree

danger is eminent. A more prepared and confident driver will most likely encounter less accidents than a driver who is ill prepared and insecure about their driving abilities. Other elements, like weather conditions, also play a role in determining eminent danger. This same concept applies to childhood onset stuttering; the brain will always pose potential for disfluency by nature however other factors, like emotions and how we process them, determine the aggravation caused by the disfluencies. Stuttering is comprised of both physiological and affective, or emotional, components. The wet road which is driven upon represents the physiological factors that create the driving force of disfluency while the skill of the driver represents the adaptive elements that can determine the severity of the stuttering.

There is much evidence supporting the physiological components of stuttering with the literature focusing on genetics, cortical structure, white matter integrity, and capacity for motor control. These physiological components are what set the 25% apart from the other 75%. These biological factors are the building blocks of stuttering, however the cause of stuttering does not reside exclusively in genetics and cortical tissue. Cognitive schemas and neural networks in the brain create a driving force for stuttering by creating a physiological pathway of thought and neuronal activity which also play a role in the development of stuttering.

Emotion drives the outcome of a stutter in a much different way by aggravating it. Anxiety is the hallmark emotional response that literature seems to be oriented towards because of the social evaluation people who stutter (PWS) commonly experience. For PWS, certain social situations or events often trigger anxiety driven physiological, cognitive, and/or behavioral responses due to past experiences and belief systems about

their environment that they have adopted (Leishout, 2014). Social situations trigger these responses in PWS because of the factor of verbal communication which is likely to induce feelings of threat (Davis, Shisca, Howell, 2007). This heightened level of anxiety in social situations is most commonly known as anticipatory anxiety (Blumgart, Tran, Craig, 2010). Regarding belief systems, many PWS report poor self-evaluation compared to those who do not stutter due to the maintained fear of being perceived as less-intelligent and incompetent. PWS may begin to believe perceived assumptions made by others. Belief in these often-false assumptions results in a lack of confidence that for many, helps decrease stuttering severity in social situations.

The Significance of “Nurture” and the Role of Anxiety

As mentioned earlier, stuttering is a speech fluency disorder that is influenced by both nature and nurture. When considering how acceptance may aid in the reduction of anxiety in stuttering, the nurture component of the disorder is more relevant. The nurture component of stuttering deals with the processing of emotions and automatic thought processes, things that are adaptable. The adaptability of these factors lies in psychological flexibility which is something that can be taught via therapeutic techniques, like ACT, mentioned later on within this thesis.

Anxiety’s role in the nurture component is simple; it’s an emotion that affects the way in which we think, feel, and behave. Anxiety stems from the utilization of belief systems that we subconsciously build throughout our lives via past experiences and their outcomes. The human brain remembers events in our lives that ended with the triggering of an emotion really well, like stuttering in a social situation and feeling embarrassed.

The brain not only remembers these events well, but then uses information gathered from that event to tell us how to respond to similar events later and predict outcomes. One can easily see how this event between the brain and emotions can be vital in determining the role anxiety plays in our lives. This thesis goes into analyzing not only how anxiety, the nurture aspect of stuttering, affects the nature aspect of stuttering, but also how anxiety can be reduced in stuttering via observing various neurological theoretical mechanisms at play during both processes.

Chapter 2: Memory Processing & Emotions

Memory's Role in Stuttering

Memory is relevant in the development of stuttering because it determines how we respond to our environment down the line. Past experiences leave us with memories of outcomes of events. Depending on the nature of the outcome, that experience is then labeled as negative or positive. For example, if an experience results in a negative outcome, then we will probably remember the experience to be negative as well. When we encounter an experience that is alike a previously labeled negative experience, we tend to respond with negative emotions alike as well. Recording memories is very much like how a computer stores information. Once the computer is fed information, it then stores it away for recall later.

Encoding & Storage

Encoding is the process of sending sensory information to our brain in order to record a memory. When it comes to encoding information from a social experience, a variety of information is necessary in order to form a well biased and recognizable memory. An experience is strongly recognized by its external contextual factors. Relevant information would consist of location and audience which helps “set the stage” for how this experience is remembered. Internal contextual factors, such as mood, are relevant in regard to how we felt during the experience. These factors are strongly influenced by an individual’s degree of reactivity. The way in which we feel during an event will later determine how we feel when experiencing a similar event. Lastly, our thought process as we are experiencing an event determines our overall perception. Our thought processes

are influenced by how we encode information and how we are perceiving that information as we encounter it. Our environment is an accumulation of a variety of factors that ultimately influence how we encode information from it. Shown below (Figure 1) is a diagram of these factors which consist of a combination of both external contextual factors (ECF) and internal contextual factors (ICF). For example, someone may be feeling anxious (ICF) while in a room full of people (ECF) and their thought processes would be that they are being judged when they in fact are not.

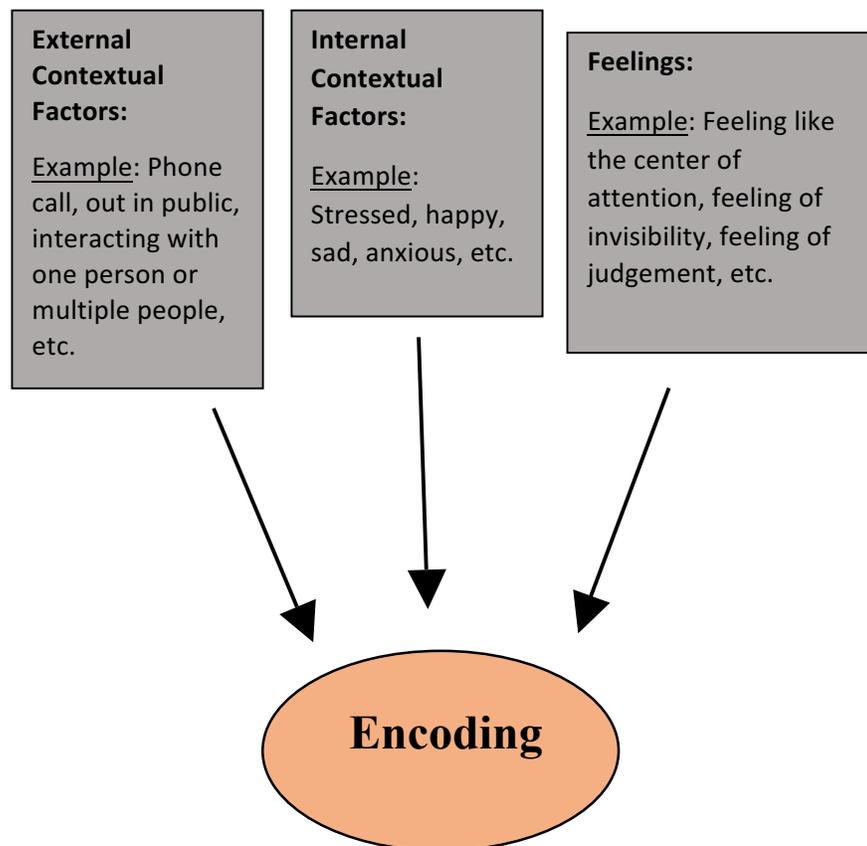


Figure 1: Many factors such as external contexts, internal contexts, and feelings, all play a role in how we perceive and then encode information from the environment around us. (Original image by Emily Arzola)

The Hippocampus is the main platform for memory processing, however, when emotion is involved, the Amygdala activates and makes this process more complex. For example, individuals who are anxious tend to encode information with what is known as a negativity bias (Flores, 2017). This means that negative information encodes more thoroughly compared to neutral information (Beck & Clark, 1997). When negative information is encoded more thoroughly, this just means that the brain stores this information in a way that makes it more accessible for recall later on. When information is easy to recall, we experience it more often and consequently begin putting more weight to its meaning (Figure 2). Existing research and models of cognition suggest that this is caused by expedient effects of emotions on encoding processes, neural processes that create memory schemas for new incoming information (Watts, et al., 2014).

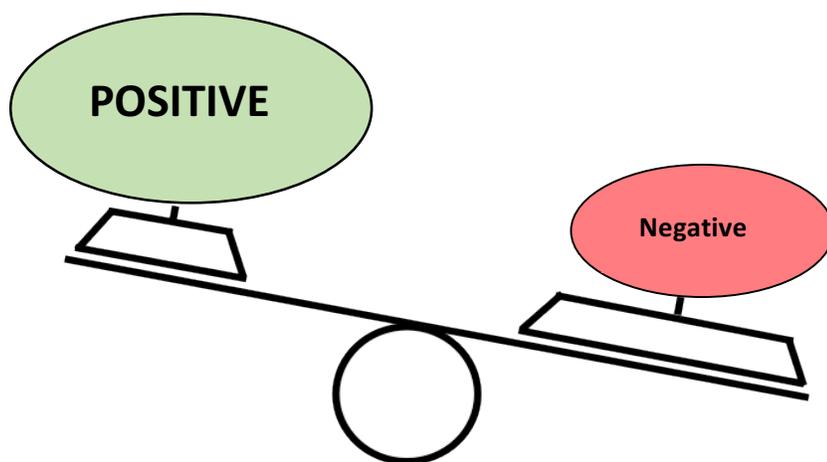


Figure 2: Due to the activation of the limbic system when encoding emotional information, negative experiences or thoughts tend to be encoded better and consequently recalled easier (Original image by Emily Arzola)

Thorough encoding of information results in a different way of storing that information as well. Typically, information will automatically be stored in short-term memory (STM) unless we give it a reason to be stored otherwise. It was mentioned earlier that the activation of the Amygdala makes memory processing more complex, and this is why. Activation of the Amygdala is necessary for not only the formation, but the long-term storage of stressful memories (Gale, et al., 2004).

Reactivity's Influence on Encoding

The factor that sets the human brain apart from a computer is perception. Perception in this context is a way of regarding, understanding, or interpreting something; in other words, a mental impression. Different factors, more importantly emotions, play a role in determining how perceptions are formed. Emotions may tend to spring forth with intensity that feels out of our control at times. These seemingly uncontrollable reactions to stimuli are defined by an individual's level of emotional reactivity, which can differ from person to person.

Personality, emotional stability, and other psychological constructs have been said to affect the development of stuttering for a very long time (Murphy & Fitzsimons, 1960). These constructs collectively define reactivity, a spectrum that defines an individual's temperament towards their environment. Reactive temperaments are defined by the intensity to which someone react to changes in their environment (Schwenk, Conture, & Walden, 2007), impulsivity, and their ability to process negative emotions (Johnson, et al., 2010). Reactive temperaments can be a huge determining factor in how an individual processes information and later approaches situations later in life. Reactive

temperaments are most relevant during the development and persistence of stuttering in early childhood. High-reactive children tend to be timid and shy while being extremely sensitive to changes in their environment typically resulting in the expression of negative emotions. Low-reactive children tend to be social and up-beat, flexible to changes in their environment, and more likely to express positive emotions (Johnson, 2010).

When we encode incoming information from the environment, we tend to label emotional information with cognitive tags that tell us how to respond when we encounter it again. An individual's reactivity has high influence on how they "cognitively tag", or label, their environment. As mentioned earlier, a highly-reactive individual tends to respond intensely and often negatively to disruptions in their environment, therefore it makes sense that high-reactivity often results in negative cognitive labels to the environment. When information is encoded and stored away in this manner, it primes the individual for future negative responses.

Retrieval as an Automatic Process

Information can be retrieved in one of two ways, actively and passively. Active retrieval, for example is utilized when recalling a phone number while passive retrieval is utilized when recognizing a face. Passive retrieval, also known as automatic processing, requires little mental resources and no thought. Automatic processing, also known as preconscious processing, only requires a triggering event to activate retrieval (Dehaene, et al., 2004). A triggering event, or a stressor, consists of stimuli that collectively are alike past events that have previously been labeled as negative. They can be thought of as triggers due to their nature of quickly resulting in a specific response.

The way in which we subconsciously learn to respond to triggers is due to a process called memory consolidation.

Automatic thought processing is significant in stuttering due to its “cognitive high jacking” nature. Suddenly, PWS find themselves experiencing emotions driven by negative thoughts that have the potential of severely exacerbating their stutter. A loss of control is experienced and they become frustrated at the fact that they always seem to “get like this” when in certain situations. Automatic thought processing during retrieval is what “high jacks” cognition and it all comes from the way we remember past experiences.

Chapter 3:
Formation of Automatic Thought Processing

Memory Consolidation

The feeling of loss of control is familiar to many PWS. It becomes frustrating when feelings of anxiety, fear, and stress are constantly occurring, especially when they have such a significant effect on speech fluency. For example, calling a restaurant to make a reservation and telling the hostess your name doesn't seem like a situation to typically be feared. However, for a PWS who has a history of stuttering on their name in the past, this is an anxiety triggering event. We can rationally think that this time is not like the last, but because of our history of experiences with stuttering, any familiar failure tends to trigger anxiety. Triggers aren't always so obvious, however. For example, a PWS may feel anxious when on a phone call with a friend. Even though the person knows that they will not be required to say their name over the phone, it is the context of the phone call that is subconsciously familiar and that can trigger anxiety.

The human brain works in layers of systems, as does memory. Memory consolidation is process that stabilizes a memory trace after its initial acquisition. This process builds the platform for recognition of familiarity. On a small scale, there is synaptic transmission which occurs between neurons that send messages around the brain while on a larger scale, there are cognitive schemas that are at play which tell us where to route our thoughts. Synaptic consolidation occurs within hours after learning while system consolidation occurs in over weeks or years. These layers work in parallel to determine how we respond to our environment. This chapter will discuss how we form

automatic emotional responses to our environment and where the feeling of loss of control may stem from.

Synaptic Consolidation

Synaptic consolidation is the first event to occur when acquiring information and learning from our environment. As mentioned previously, synaptic consolidation occurs almost instantly and can become established only hours after learning. A variety of factors contribute to the strength of consolidation, most relevant being activation of the Amygdala and release of stress hormones like cortisol (McGaugh, 2000). This first step of consolidation activates neurons to form pathways of signaling. Neurons are dynamic cells that respond in every moment of our lives to every moment in our lives. We create patterns of neuron firing by responding to our environment. These patterns are so reliable that if the same stimulus that once formed the original pattern is experienced again, the same pattern of neurons would fire. This idea is termed Long-term potentiation, or LTP. LTP suggests that synaptic transmission between neurons is strengthened over time when alike information is encountered either consistently, or once but very intensely. LTP also makes it difficult to perceive events differently than before. Due to a strong previously established pathway of thought, perception becomes independent of reality (Dinse, et al., 2016).

Neurons communicate using electrochemical signals, which is a combination of electricity and chemicals. When neurons communicate, they don't connect to each other physically. There is a junction in between them called the synapse. There is a pre-synaptic

neuron, which is the neuron leading up to the synapse, and a post-synaptic neuron, the neuron immediately following the synapse (Figure 3).

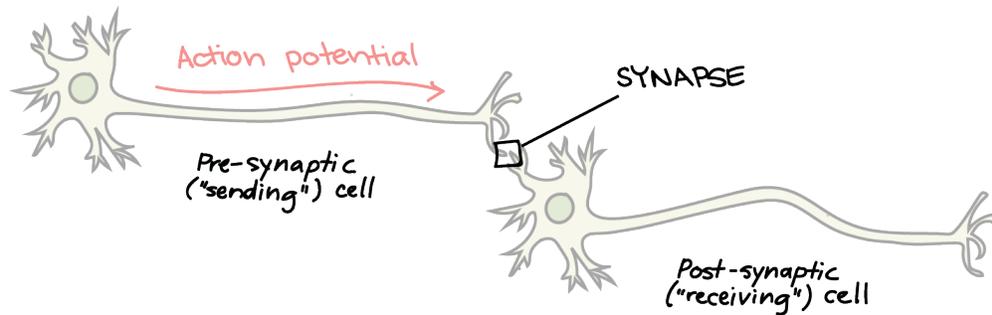


Figure 3: When an electrical signal reaches the pre-synaptic ending, it is translated into a chemical message that then diffuses across the synaptic cleft into a post-synaptic cell. The synapse. (n.d.). Retrieved October 01, 2017, from <https://www.khanacademy.org/science/biology/human-biology/neuron-nervous-system/a/the-synapse>

What's interesting is that with repeated stimulation, the same level of pre-synaptic stimulation converts into greater post-synaptic potential. In other words, after the pre-synaptic neuron gets a lot of practice firing and sending signals to a specific post-synaptic neuron, it gets better at sending those signals and will also get better at opening those channels to allow more ions in. When this happens, the synapse strength is increased. When this increased strength lasts for a long time, meaning anywhere from a few minutes to a few months, it's called LTP.

Synaptic Consolidation & Emotions

While LTP is vital for learning and memory in the Hippocampus, it also plays a role in emotional learning. LTP is thought to be the physiological mechanism by which learning occurs in the Limbic system (Izquierdo, et al., 1993). Much of the literature

supporting this idea comes from studies of LTP in the Amygdala, a brain structure vital in emotional processing, most common being fear conditioning (Figure 4). As synapses are strengthened and as they retain that strength, the brain can more easily recall previous thought processes without us even realizing. An enduring pattern is engraved and neural messages are more likely to flow along such familiar paths of least resistance.

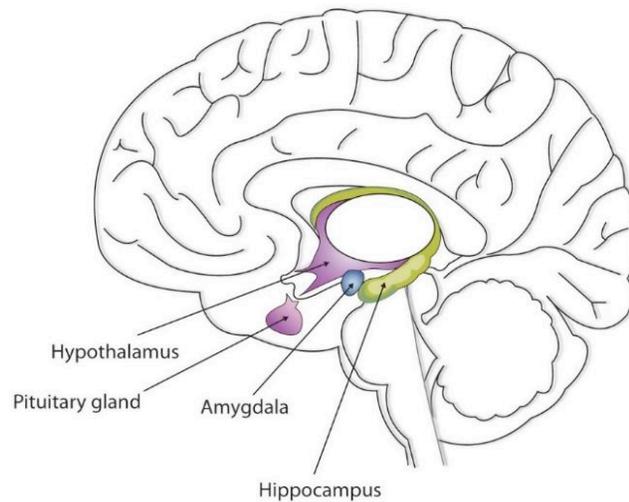


Figure 4: This diagram shows the major parts of the limbic system, as well as the pituitary gland, which is controlled by it. From Flat World Knowledge, *Introduction to Psychology*, v1.0, CC-BY-NC-SA.

System Consolidation

System consolidation is the second part of memory consolidation. The sum of synaptic consolidation results in a larger system of automatic processing called system consolidation. System consolidation takes it a step further and also changes the location of thought processing.

Hippocampus dependent memories become independent of the brain region over time and transfer into the neocortex via LTP (Figure 5) (Preston & Eichenbaum, 2013). By skipping hippocampal processing, a target thought process becomes deeply ingrained and almost automatic (Neiuwenhuis, 2001). Research has made claims that the gradual transfer of memories from the hippocampus to the neocortex is essential for the formation of knowledge structures also known as cognitive schemas (McClelland et al., 1995). Cognitive schemas route incoming information to create an expectation of what we see as reality. They do this by analyzing a stimulus and detecting things that reflect commonalities across multiple experiences. Because of this, schemas have great power in exerting influence over the perception of a stimulus. Cognitive schemas become innate and do not require direct processing to recall information. For example, water is wet. The way we know that water is wet is because we have a cognitive schema that tells us so from experience; we don't have to ask ourselves if it is wet or not.

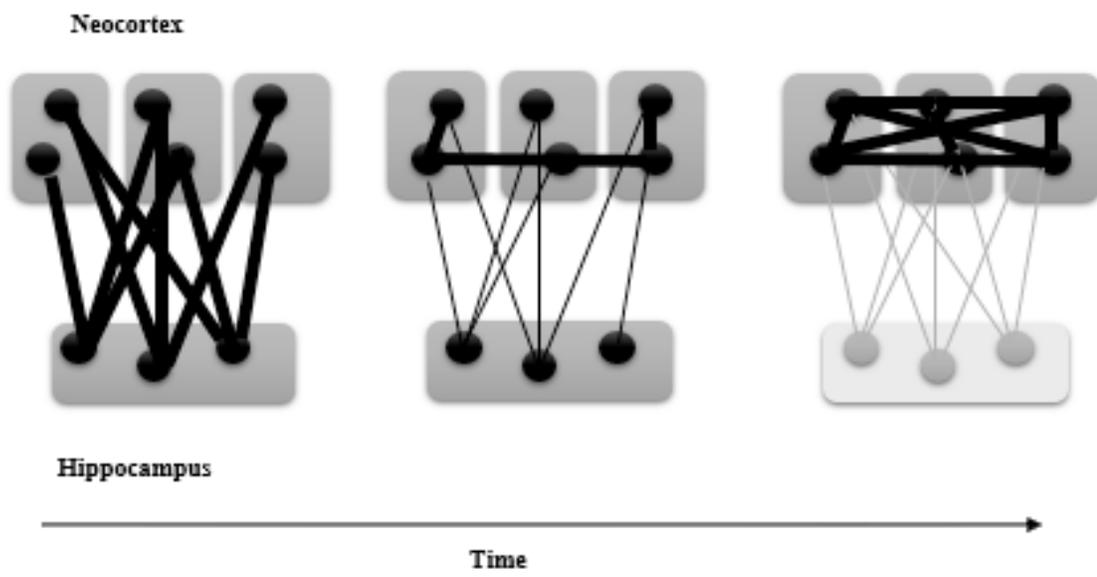


Figure 5: Long term potentiation (LTP) begins to take place resulting in automatic processing of thoughts in the neocortex. (Original image by Emily Arzola)

System Consolidation & Emotions

Cognitive schemas do not become independent of the Amygdala, as this is how they evoke emotions like fear, anxiety, and stress. When a certain stimulus results in the same emotional response enough times, the two will eventually become linked, or consolidated (Drexler & Wolf, 2017). This means that the emotional response will undergo automatic processing and not require conscious thought to be activated, due to its independence of hippocampal processing. If it's an especially negative experience, like pain, fear, or sickness, it might only take one trial to make an emotional response permanent. With many emotional responses that have become permanent, one does not remember the source of response and it tends to last into one's adult life. Once a stimulus is paired with an emotional response, the brain learns it, wires it, and a cognitive schema is made.

Chapter 4

Anxiety & Belief Systems

Anxiety as an Emotional Response

PWS often experience a great deal of anxiety during situations that others typically do not experience. Unfortunately, these emotional responses can sometimes be so compelling that they lead these individuals to be less inclined to speak to authority figures, be assertive, meet new people, or start conversations. Because of this, anxiety is one of the most commonly studied emotions associated with stuttering. Some individuals may experience anxiety to such a severe degree that they develop social phobia, a persistent fear of humiliation, embarrassment, or negative evaluation during social interactions. Anxiety is a complex emotion built by cognitive and behavioral components. Examples of these components include thoughts of expected negative outcomes, also known as anticipatory anxiety, and avoidance of feared situations, also known as avoidance. (Kraaimaat, Vanryckeghem, & Van DamBaggen, 2002).

Anticipatory Anxiety & Avoidance

Anticipatory anxiety is the most common form of anxiety that PWS experience. It occurs when an individual becomes anxious when imagining a potential negative outcome. Anticipatory anxiety is characterized as a cognitive component to anxiety because anticipation is a thought that is driven by established cognitive schemas. PWS tend to anticipate a negative outcome because they may have already experienced it from a similar situation once before; they have become primed to expect disfluency. While

anticipating a negative outcome, they may also consciously realize that there is no truth in the anticipation, however the anticipation is often felt out of control. For example, a student walks into a room of strangers on the first day of class. This person knows that they are not required to introduce themselves to another, however the opportunity may present itself and this idea triggers anticipatory anxiety.

Avoidance occurs when an individual attempts to totally prevent the occurrence of stuttering. Avoidance is characterized as a behavior component to anxiety because it is an act driven by anxiety, more specifically, anticipatory anxiety. PWS seem to fear listeners' negative reactions to their disfluency and therefore tend to avoid such opportunities in order to be perceived more positively (Plexico, Manning, & Levitt, 2009). For example, a student who stutters may avoid sitting near people on the first day of class to avoid the potential event of talking to people. Avoidance behaviors are temporarily satisfying while they are instilling the idea of failure just by their nature. Belief in failure sets the stage for anxiety.

Belief System's Effect on Stuttering

Self-perception and social rejection beliefs are two major factors when understanding why PWS feel the way they do. Research has found that adolescents who stutter reported poorer self-perception than those adolescents who do not stutter (Blood, Blood, Tellis, & Gabel, 2001). Further, other studies have found that many PWS fear that they may be perceived as less intelligent, incompetent, or mentally defective (Plexico, et al., 2009). Self-perception theory states that people come to understand themselves via

observations of their own overt behavior and external cues gathered from their environment (Bem, 2008). PWS may begin to believe perceived assumptions made by others. Belief in these often-false assumptions results in a lack of confidence that is necessary to be fluent when in social situations. For example, many PWS hold social rejection beliefs. This means that they often feel socially rejected when they stutter in front of others. It was found that 70% of PWS subscribe to the belief that their stuttering may hinder them from being hired and/or promoted (Klein & Hood, 2004). Consequently, social rejection beliefs are the main motivator to avoidance behavior.

Formation of Belief Systems

How do we come to form such potent and consistent negative belief systems? I theorize that belief systems are generated from how we naturally react to our environment paired with the consistency of these reactions. Highly-reactive individuals tend to perceive situations with more negative weight which over time drives them to establish a belief system. For example, consider a highly-reactive individual who stutters tends to stutter on their name when introducing themselves to a stranger. When they stutter, they recognize that the stranger noticed their stutter in that moment. Even though the individual who stuttered on their name does not know what the stranger was thinking as they stuttered, a high-reactive nature drives the individual to think that they received a negative evaluation from the stranger. These types of experiences over time begin to establish a belief system within the individual that compels them to think that anyone that hears them stutter will judge them negatively.

Consistency installs habit. The human brain is designed to build networks that support persistent and familiar information. When it comes to forming belief systems, this process of creating pathways for perception is key. Belief systems not only tell us what to think but also what to feel. When a system is built that is capable of automatically eliciting a feeling, emotions can begin to feel like they are out of our control and regaining control can seem impossible.

Chapter 5

Memory Reconsolidation: The Mechanism of Functional Change in

Automatic Thought Processing

Relevance of Memory Reconsolidation

PWS struggle with certain triggers or situations that tend to elicit elevated disfluency (Mulcahy, Hennessey, Beilby, & Byrnes, 2008). Talking on the phone, meeting new people, or asking for help at the super market, can all be triggers for anxiety depending on past experiences. As discussed in the previous chapter, these triggers exist due to cognitive schemas that we have unknowingly created throughout our lives. While these schemas are very influential in the way we respond to the world, they are also extremely adaptable, if we allow them to be.

Memory Reconsolidation is a neurological phenomenon where previously consolidated information is recalled and then actively reconsolidated (Tronson & Taylor, 2007). This process can occur on the synaptic level as well as the systematic level (Bramham & Messaoudi, 2005). In order to appreciate how largely useful and powerful this process is, it helps to realize how potent emotional learning can be. One common denominator within all types of emotional learning is memory, more specifically, implicit memory. Implicit memory is a type of long-term memory that does not require conscious thought but instead is an automatic process (Schacter, 1987). Reconsolidation aims to adapt memories, or cognitive schemas, that are already stored in our implicit memory.

Any new learning creates new neural circuits in the brain. In that sense, any new learning literally rewires the brain. With that said, new learning cannot adapt existing

neural networks without first activating them (Rodriguez-Ortiz, Bermúdez-Rattoni, 2007). For PWS, this activation occurs while experiencing an event and the emotions, thoughts, and feelings attached to it. The opportunity to adapt the function of certain thoughts and feelings that occur during certain events in our lives lies within the experience of them. Only then may a functional and transformation change in automatic thoughts and cognition occur (Lane, Ryan, Nadel & Greenberg, 2014).

The Core Process

A Primer on Memory Reconsolidation and its Psychotherapeutic Use as A Core Process of Profound Change, an article written by Ecker (et al., 2012), describes how this process is relevant in the development of new cognitive behavioral therapies, such as ACT. There are three distinct steps involved in memory reconsolidation. Step one involves reactivating a target schema. A target schema is identified by the negative automatic thoughts that occur that influence unwanted responses. Reactivation of target schemas is achieved through a conscious emotional experience, like stuttering in a social situation and consequently experiencing certain emotions. Step two involves allowing a contradictory experience via mindfulness and acceptance techniques taught in ACT, which will be explained in the next chapter. Practicing mindfulness techniques introduces new information that goes against what our automatic thoughts naturally expect. This juxtaposition unlocks, or de-consolidates, the target schema's memory circuits (Tronson, 2007). Lastly, step three involves repeating the contradictory experience. This is where

the commitment aspect of therapy becomes involved. As this experience continues to be in juxtaposition with the target schema, it rewrites the target schema.

Activation of the Target Schema

This first step in the reconsolidation process involves reactivating the target schema underlying the stuttering. Because emotional learning is implicit, one must first figure out exactly *what* the emotional schema underlying a symptom is. This is achieved by cognitive defusion, a skill taught in ACT that will be explained in the next chapter. Venturing into this territory is like entering through a locked door to enter the control room. Like explained in the ACT chapter, during cognitive defusion you should externalize the automatic thought and attempt to ask questions that help you gain a better understanding of the origin of your negative symptoms.

For PWS, common triggers for target cognitive schemas involve social situations. It's difficult to avoid social situations, so as a result, PWS often have their target schema activated daily beginning a long time ago. Because this emotional learning began taking place so long ago without intervention, it has had time to become more and more established in its neural circuitry becoming a dominant neural pathway.

Guide a Contradictory Experience

Once the target schema has been defused and you've forced yourself into vulnerable territory to directly experience it, the second step involves the creation of an

experience that sharply contradicts what the reactivated schema expects of the memory circuits. For PWS, this step utilizes a process of becoming mindful of the present moment and the context of the event at hand. In this moment, the goal is to be able to externalize automatic thoughts while being able to describe the event occurring rather than attempting to predict and judge their outcomes.

During this time, reactivation of the target schema is occurring simultaneously with mindfulness techniques. When both the target schema and mindfulness are being experienced, we begin to experience two thought processes that cannot possibly both be true. For example, Sarah may be expecting the receptionist to laugh at her stutter while scheduling an appointment, however, by being present in the moment and mindful of the situation and its outcome, Sarah realizes that her assumption isn't necessarily accurate. This juxtaposition results in a cognitive "mismatch" or "prediction error". This collision of the target schema and mindfulness is the key to transformational change.

When the brain registers this mismatch, or juxtaposition experience, the synapses that encode and maintain the target schema undergo a rapid change. The synapses go from a stable, consolidated state to an unstable, deconsolidated state. During the window of several hours, these synapses are open to being re-encoded by new learning, after which neural circuits reconsolidate back into a stable state in its re-encoded form. It is this second step that opens a window of opportunity in which the target schema is put into an unstable state so that the new learning can lay down neural circuits in its place. This is known as the unlocking and reconsolidating of the emotional brain.

Reconsolidation is only effective when mindfulness coincides with the activation of the old target schema that fuels learned behaviors. When those two things occur at the same time, you then become aware that the negative message you are receiving is not coming from your audience, but rather yourself.

Repeat Contradictory Experience

This last step in the reconsolidation process involves repeatedly focusing on the new cognitive schema slowly being built while also maintaining an acceptance of emotions. Here is where the continued adaptation of the old schema takes place. It's here that we begin to see all the markers of transformational change. Gradual symptom cessation, the disappearing of old and unwanted behaviors, emotions, thoughts and somatics will slowly begin to occur. It's becomes easier to be non-reactive when in certain situations.

Common Misconceptions

The most common misconception of this theory is that reconsolidation is brought on, or triggered, only by the reactivation of a target schema via memory or exposure. What is being forgotten and overlooked by many is pairing this event with a contradictory experience. For reconsolidation to occur, new encoding must occur while the schema is malleable. For new encoding to occur, new juxtaposed information must be presented and processed. This new information not only has to juxtapose the old learned

schema, but it has to go against all prediction creating a huge predication error. The experience of opposing information processing must occur simultaneously with the activation of the old learned, or target, schema. Activation of the old target schema alone without a contradictory experience does not invite reconsolidation, nor is it possible. In fact, without a contradictory experience, the target schema would be strengthened (Pedreira, 2016).

A second misconception to note is that reconsolidation and extinction are not the same thing. The two processes are two different phenomena which individually generate two unique effects. The reason why people may interpret them to be the same is due to the fact that they both eliminate a target schema. What is unique about these processes is the mechanism which drives the changing of the target schema. Extinction utilizes suppression whereas reconsolidation utilizes re encoding. The two processes could not be more exclusive from each other (Merlo et. Al., 2014).

The third misconception that needs recognition is that the process of memory reconsolidation requires a set protocol. The brain is not biased in the methodology in which it induces experiences, what matters is that these three experiences occur in the correct sequence. Many researchers and clinicians have devised unique therapeutic procedures that all successfully achieve reconsolidation. What makes these procedures unique from each other is the way in which experiences, new or old, are induced.

Lastly, the forth misconception about memory reconsolidation addressed the potential of the process not taking effect. An effect won't take place for a few reasons that don't invalidate the theory. The first reason why a target schema may not become

adapted is due to resistance to dissolution. In this case, the experiences and their sequencing have been performed correctly, but there is a blocking occurring which refuses dissolution to occur. This is its own phenomena that does not invalidate the theory of memory reconsolidation. After the first failed attempt at dissolution and reconsolidation, performing the procedure a second time has been known to generate success. The second explanation for a failed attempt is multiple schemas being present. In this case, you may see a target schema becoming adapted but the symptoms still occurring. This indicates the presence of more than one schema eliciting the same symptoms. Symptoms cease to occur when all related underlying target schemas have been erased.

Scientifically, it's becoming more understood how the human brain can re-wire itself according to new information. However, it's what happens right before that is more significant. What is this new information and how are we receiving it? More importantly, how are we allowing our minds to become receptive of this new information so that we can transform these neural networks that drive our thoughts? Functional cognitive transformation requires a level of psychological flexibility. Psychological flexibility can only be achieved by practicing a deeper level of cognitive defusion without attempting to control it. Cognitive defusion paves the way for contradiction to automatic thoughts while attempting to not control these thoughts allows them to be vulnerable to adaptation.

Chapter 6

Acceptance and Commitment Therapy (ACT)

Achieving Psychological Flexibility: ACT

Many PWS have avoided their stutter, both mentally and physically. Avoidance can have strong negative consequences such as anger and sometimes even depression (Seekatz, 2016). Psychology tells us that the more a person avoids a negative thought, the more it tends to come back (Hayes, 2011). Ironically, these negative thoughts encase the most vital information necessary to obliterate them. However, a degree of willingness is required to discover this information. Willingness to do or see things that are negative in order to achieve a greater goal is the beginning of Acceptance. Acceptance means to be able to walk with it, not like it, but to be with it with as little judgement as possible (Hayes, 2011). Being able to listen to the stuttering, see those negative thoughts, and not feel the need to hang on to them, or judge them, is moving towards acceptance.

ACT aims to increasing psychological flexibility which is achieved by the ability to connect with and evaluate the present moment more fully rather than allowing our automatic thought processes hijack our perceptions (Harris, 2009). The first step in ACT is to simply observe oneself having feelings and recognizing and accepting that those feelings are a natural consequence of an event. Next, individuals, or in this context PWS, explore paradoxes of context, such as separating words and actions, and distinguishing clients' sense of self from their thoughts and behavior. ACT in its entirety aims to help individuals, or in this case PWS, consistently choose to act effectively in the presence of difficult or disruptive "private" events. The focus should be shifted from

content of experience to the context of the experience. To teach how to do this, ACT presents six core principles that each teach a valued psychological skill (Figure 7). These principles together are critical in achieving psychological flexibility (Hayes, 2011).

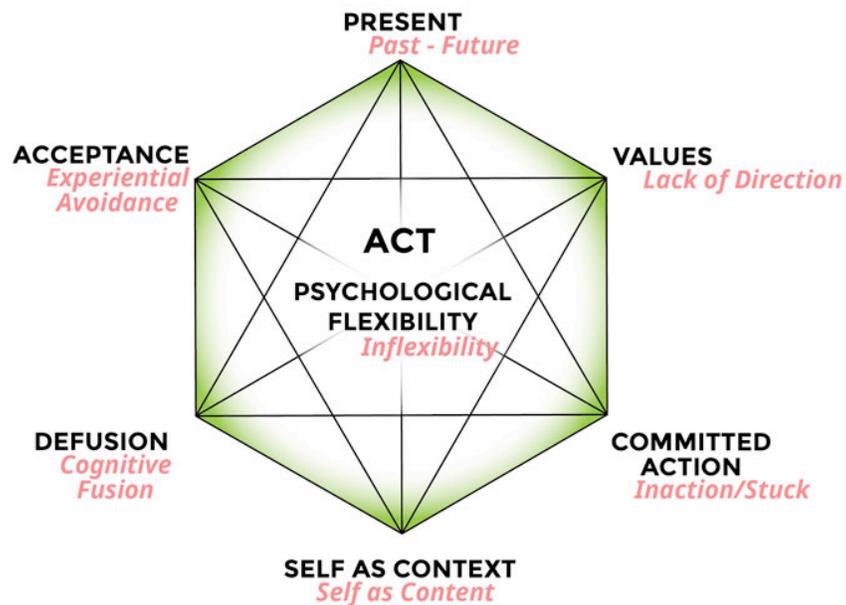


Figure 7: Six core principles that factor into determining psychological flexibility (Angela Anderson, LPC <http://www.angelaandersenlpc.com/>)

The 6 Core Principles of ACT: Applied to Stuttering

Acceptance

Empowerment is permitting ourselves to do what we want to do based on who we are, our actions, values, and who we really want to be. Empowerment gifts a PWS with a value-based life while also developing a flexible mind (Harris 2009). Acceptance is a

major player in ACT, and it's not what people typically think it to be. In the context of ACT, acceptance is the embracing and acknowledging of emotions and automatic thoughts that are targeted to change. By doing so, you stop attempting to control or replace these feelings and thoughts, but rather take them for what they are and attempt to change their role in your life. For PWS, these feelings commonly consist of anxiety, fear, and frustration. These feelings then fuel automatic thoughts that are supported by the belief systems that have been formed over time. By accepting these feelings and thoughts, you not only recognize their existence, but you experience them in their rawest form without allowing them to hijack the way in which you function. ACT teaches mindfulness skills that aid in becoming mindful of the way in which these feelings and thoughts are unrealistic. Acceptance paired with mindfulness is how their function of feelings and thoughts begins to adapt.

Cognitive Defusion

Cognitive defusion aids in the ability to look at thoughts rather than look at the world from pre-programed thoughts. It's difficult to control thoughts due to their automatic nature. While it's difficult to control thoughts, we must remember that thoughts do not have to control us. The first step in cognitive defusion is separating thoughts from the self. The best way to do this is by perceiving thoughts as just words and nothing else. Once we can perceive these words, we gain the ability to look *at* these thoughts rather *from* them (Hayes, 2011).

The goal of cognitive defusion is to teach individuals that just because there's a thought, doesn't mean that thought must have control over you or the situation. PWS

sometimes judge themselves as insignificant or incompetent because of their stutter. Cognitive defusion is a process of first identifying thoughts and then detangling those thoughts from their meaning. Just because someone may feel like they are insignificant or incompetent doesn't mean that they actually are. Resisting thoughts isn't realistic, however disentangling thoughts from behavior is.

Being Present

The only time one can behave in the direction of what they care about is in the present moment. Forty seven percent of our lives we spend thinking about something other than what we are doing (Killingsworth, 2010). About half of the day, peoples' thoughts are about something else than about what they're doing; they're not in the here and now. Mindlessness leads people to depend on automatic thoughts to predict outcomes and act in sub-optimal ways that drive us to become blind to reality. For PWS who deal with triggered anxiety or fear toward certain situations, mindlessness is a toxic crutch. Mindlessness blocks the perception and comprehension of the reality of situations which often contradicts the beliefs that are being used to respond (Harris, 2006). Mindfulness is achieved by first fully experiencing the present moment for what it presents itself to be. Mindfulness is based on the premise that only in the experience of the current event can one accurately perceive what is really happening and behave in a values-based committed manner.

Self as Context

A sense-of-self helps in maintaining a consistent perspective, or point of view, from which to observe and accept all changing experiences and events. The difficult part is that people are typically not as they describe themselves to be. So how are we supposed to gain a sense of self if we are unable to define ourselves accurately? According to Steven Hayes, we should not be attempting to define ourselves but rather understand that we are constantly undergoing a variety of experiences that constantly elicit a variety of responses from us (Hayes, 2011). Feelings, behaviors, and thoughts cannot define a person but instead represent the content of that person's life. We are not the content of our lives, but rather the context (Harris, 2006).

PWS often find themselves defining themselves by the way they are feeling, thinking, or behaving. Because anxiety is a big factor in the way PWS approach the world, they sometimes begin to identify with that feeling and the thoughts that accompany it. Identifying with anxiety can damage confidence and character. Instead of thinking "I am anxious and nervous", approach the situation by thinking "I am experiencing anxiety right now". Self as context helps separate the self and the feelings which allows for further cognitive defusion down the line.

Defining Values

As long as we are alive, we are behaving. As long as we are behaving, we are making choices. When making choices, we should be thinking of what direction we want to go in life to give it meaning. Values are the moral compass that individuals adopt and

later use to guide behavior. Defining values aids in gaining direction in how we should behave. Behavior is commonly understood as actions, but they can also be thoughts and feelings (Harris, 2006).

Anxiety is a less obvious behavior that PWS often deal with. When behaving with anxiety, we are allowing ourselves to act in accordance to the environment and our perception of it rather than our own values. Suddenly our thoughts, or behaviors, are under the control of something that was not purposefully defined by us, therefore they also have no meaning. Defining the values in which we wish to live our lives by helps us regain control of our behaviors and reintroduces meaning.

Committed Action

Promises must be made to the self from the self. Transformational and functional change of behavior requires a level of commitment to independently take steps forward. Stepping forward means willingly and conveniently immersing one's self in situations that tend to trigger unwanted behaviors (Harris, 2006). While stepping forward into situations that we tend to avoid, it's also important to set obtainable goals and incorporate coping mechanisms. For PWS, these obtainable goals may be scheduling an appointment on the phone, introducing yourself to at least 2 people at an event, or raising your hand and asking a question in class. While being challenged, coping strategies, like mindfulness techniques mentioned above, help ground us so that we may avoid letting automatic thoughts hijack cognition.

Chapter 7

ACT: An Adapted Intervention From CBT

Cognitive Behavioral Therapy

Cognitive Behavioral Therapy (CBT) has been the hallmark therapeutic approach for many years and dates back to the work of B.F. Skinner, the father of modern behavior therapy. Of all psychological therapies, CBT is the most clinically evaluated and has commonly been recognized as the best treatment for anxiety and PTSD (Kar, 2011). CBT is a short-term measurable therapy type that focuses on how we think about events in our life. The main factor that separates CBT from other humanistic therapies is the fact that CBT disregards the “what” and focuses on the “how” (Beck, 2011).

CBT focuses on the “how” is in regard to cognition; how we think about the world determines how we build our beliefs about the world and what we believe about the world determines how we react to it. Focusing on the “how” is coupled with methods of thought tracking that aid in the keeping record of automatic thought processes and assumptions occurring. Keeping track of thought processes helps individuals realize the “how” via downward arrow questioning. Downward arrow questioning guides the individual through a process of “thought dissection” that forces the individual to navigate through cognitive levels where core belief systems reside (Beck, 2011). Beliefs are then brought to awareness to become accessible and adaptable. Another component of CBT is the practice of thought stopping. CBT claims that when negative automatic thoughts begin manifesting, stopping them is crucial in breaking their control over you.

Recognition of Cognition in CBT and ACT

Both CBT and ACT have common goals of recognizing cognition. CBT achieves this with the downward arrow technique which requires the “dissection” of thoughts while ACT achieves this via cognitive defusion which requires the “objectification” of thoughts (Beck, 2011, Hayes, 2011). Both processes aid in better understanding the automatic thought processes occurring at the moment and the core beliefs driving them.

Downward arrow questioning challenges the individual to find meaning in automatic thoughts until they arrive at the core belief. This process consists of a constant challenging of thoughts in attempt to falsify them. For example:

“I’m nervous to meet new people”

People aren’t going to like me on first impression. Why?

“...Because people will judge me.”

What do they have to judge?

“People will think I’m awkward and weird when I introduce myself and I stutter on my name”

Why do I automatically assume I will stutter? Will they even care?

“I stuttered the last time, so I will again this time.”

The past doesn’t predict the future. What happened when I stuttered in front of people last time? Nothing.

“I know they thought my stutter was weird, they just didn’t say it.”

They may have judged my stutter, but not me as a person. They don’t think I’m weird. I’m just assuming this.

ACT utilizes a very similar process called cognitive defusion. Cognitive defusion, like explained in a previous chapter, aims at uncovering the true nature of automatic thoughts and understanding the process of thinking just like in CBT but achieves this in a different way. As mention earlier, cognitive defusion consists of a separating of thoughts from the self. The best way to do this is by perceiving thoughts as just words and nothing else. Once we can perceive these words, we gain the ability to look *at* these thoughts rather *from* them (Hayes, 2011). The mind becomes an external event so that thoughts can be examined and eventually functionally altered. In order to become external, these automatic thoughts should be verbally stated or written down. At this point, this thought becomes collateral and is ready for examination. During examination, the goal is to find what is wrong about the thought and correct it. For example:

“I’m nervous to meet new people.”

I can feel my heart pounding thinking about it. It must be pounding because I’m afraid of something.

“My nervousness is actually fear. Why am I experiencing fear?”

Fear comes from perceiving a threat, however I’m not being threatened right now.

“The fear I am experiencing is due to some perception of threat. What is threatening to me?”

The strangers must be what I am perceiving as threatening, however they are not posing any real threat.

“I am perceiving the strangers as threatening because of what they may think of me when I stutter.”

There’s no guarantee I will stutter. I am predicting an outcome.

“I’m predicting this outcome because it has occurred in the past.”

The past doesn’t predict the future.

“Just because it happened before, doesn’t mean it’ll happen again.”

This belief no longer has meaning.

The feeling becomes a thought and that thought becomes an external factor that can be analyzed. Distance is put between the individual and their feelings while still acknowledging their existence. Once the automatic thought process has been uncovered, core beliefs become contradicted and fundamental change begins to occur within belief systems.

Adaptation Vs Restructuring

The way in which CBT and ACT differ resides in what they do to automatic thoughts once they’ve already been recognized and analyzed. ACT is known to be effective in passively adapting cognitive schemas while on the other hand, CBT does this actively. CBT claims that one must stop or change automatic thoughts when they occur but does not attempt to change their functionality (Beck, 2011). Instead of attempting to restructure automatic thoughts, ACT attempts to change the functionality of automatic thoughts which consequently alters belief systems.

The driving force in changing the functionality of automatic thoughts resides in the ability to accept thoughts as they occur (Schwartz & Begley, 2002). Acceptance is key in changing functionality of thoughts because of its ability to fully activate them.

CBT does not integrate acceptance into its therapy regimen, instead it teaches how to identify thoughts and change them as they occur (Beck, 2011). In context to how systematic networks function, this could explain why many refer to it as a “temporary” therapy. Recognizing a bad thought when it happens and telling ourselves why it’s wrong, like what is done in both CBT and ACT, is a very effective way of rehabilitating belief systems, however the longevity of rehabilitation is of concern. ACT is known to be effective in creating long-lasting changes in belief systems. CBT often leads individuals to suppress and ignore negative automatic thoughts which tend to often re-appear later in life. Acceptance methods directly change automatic thoughts rather than attempting to control them. As mentioned in the Memory Reconsolidation chapter, adapting a schema is more effective than replacing a schema. This theory relates back to the idea that cognitive schemas cannot be erased, but rather adapted, or edited.

Childhood onset stuttering is driven by both nature and nurture components of development. Exacerbation of stuttering is manifested from this sort of cyclical relationship between thoughts, feelings, perception, and past experiences. Thoughts come from feelings, feelings come from perception, and perception comes from past experiences; past experiences are perceived a certain way which makes us feel a certain way which then ultimately influences our thoughts. It’s clear that exacerbation of stuttering originates from cognitive factors, so it makes sense that behavioral management should look at underlying cognition when aiming at regaining fluency. Underlying cognition must not only be identified, but also further analyzed in such a way that passively allows contradiction and/or falsification. ACT practices these cognitive defusion techniques while also valuing the skill of acceptance; the ability to identify and

experience something without struggling with it. Cognitive defusion, acceptance, and other psychological flexibility skills, all coordinate together to comprise an approach that holds the potential to constitute a functional change in the way we allow anxiety to exacerbate stuttering.

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