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FRAMES OF ERROR: THREE BEHAVIORAL APPROACHES TO REDUCING STIGMA TOWARDS PEOPLE WITH DISABILITIES

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What makes a person disabled is a much-debated topic with some focusing on the individuals impairments (putting the onus of disability on the individual) while others focus on how the environment (both architectural and social) exacerbates an individual's impairments and creates the conceptualization of disability (putting the onus of disability on society). No matter how a *person with a disability* (PWD) is categorized, they are met with healthcare, education, and work disparities that are perpetuated both unintentionally and intentionally. This paper examines the various ways disability and subsequently stigma arises from a variety of viewpoints both within and outside the tradition of behaviorism. Given an overview of behavioral research, much of which is line with non-behavioral conceptualizations track well on to, the author points to how *Relational Frame Theory* (RFT) and *Contextual Behavioral Science* (CBS) may offer potential applications for the reduction of stigma towards PWDs. Three studies were detailed across relevant relational frames and their potential roles in the formation and defusion of stigma thereby extending the prior behavioral research on utility for potential, computer-based societal interventions.

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CHAPTER 1

DISBABILITY AND ITS CATEGORIZATIONS

The World Health Organization (WHO) estimates that 15% of the world's population (roughly 1 billion people) have some form of a disability diagnosis (WHO, 2018). Of *people with disabilities* (PWDs), 80% live in developing countries (WHO, 2018) and 90% of the children in this population not attending school (UNESCO, n.d.). Disability is not race or culture specific (Kurzban & Leary, 2001) and its concepts leads to barriers in education (DasGupta, 2015; Lalvani, 2015; Bogart, Rottenstein, Lund, & Bouchard, 2017; Hehir, 2002), health care (Magana, Parish, Morales, Li, & Fujiura, 2016; Dodds, Yarbrough, & Quick, 2018; Smart, 2009; Smart 2015), and legal discrimination result in less access to the services that are part of an individual's overall social relationships and well-being (Ziegler, 2020; Smart 2015). Although there have been several barriers identified and inherently linked to viewpoints of where responsibility for disability lay (with PWD or the majority populace), there is not a single, unifying definition of what disability constitutes as. To complicate the manner further there are 6 general categories of disability across hundreds of diagnoses within each (Robichaud, 2011) as well as an infinite combination of comorbidities and intersectionalities (e.g. multiple domains) all playing a role in defining a person's overall "capability" as a human (as defined by the verbal community they live in). In the following sections of this chapter, various definitions of, and ways to categorize, disability will be reviewed followed by how these categorizations both create and reduce barriers for PWDs.

Impairment vs disability

Throughout this manuscript, a variety of terms will be utilized in order to more accurately define the contexts in which disability occurs. No one viewpoint is without its faults as much of

these terminologies used promote various relational frames and ultimately lead to action on the part of individual and society as a whole. One of these important distinctions is the difference between the terms *impairment* and *disability* in the role of the individual in this context.

Impairment. The WHO (2018) depicts impairment being biologically based concerns related to overall functioning. Previous work by Anastasiou & Kauffman (2013)'s approach to impairment as being a physical, mental, or sensory concern that leads to functional limitations within the individual(s) experiencing them. These definitions specifically refer to what degree an individual's body may prevent them from engaging in behavior (daily living skills, problem solving, etc.) and is deliberately devoid of the socio-cultural context in which that individual lives (e.g. only focuses on how the individual cannot do something rather than how the environment may exacerbate their impairment).

Disability. While impairment is grounded in the actual functioning of an individual's body, *disability* is a cultural construct in how a person is limited in their abilities to complete the expectations daily life (Anastasiou & Kauffman, 2013; Mulvany 2000; Putman 2005; Smart 2009; Smart 2015). Given the broad explanation of "expectations" of daily life, whether or not someone is labeled "disabled" is up to the digression of the majority culture and/or the verbal community in which the individual lives in. Although disability is thought to be a relatively new concept beginning in the mid 19th century (Ziegler, 2020; Tilley, Wlamsky, Earle, & Atkinson, 2012), there have been examples of barriers experienced by those with disabilities accessing their military pension during the American Revolutionary War (Daen, 2017) and even further back to Ancient Greece where PWDs were denied entry into military service due to physical difficulties (Penrose, 2015). In each of these cases, the categorization of the disabled person was directly related to their access to the potentially available services that society had to offer. Each of these

cases is reminiscent of Dirth & Branscombe (2018) in that disability lays in the "inappropriate fit" between the PWD and the environment at large. This flexibility is further seen in major organizations and political structures in the present day.

The *Center for Disease Control* (CDC; 2019) in the USA describe disability as an impairment of mental of physical capabilities as well as restrictions in typical activities and socialization opportunities as available to them. The CDC goes on to list areas of disability including *vision, thinking, communication, movement,* and *social relationships.* This ideology around disability is similar to what the WHO (2001) describes listing the same concepts of bodily impairment, limits in activities, and restricted participation in social gatherings being the basis of what defines a disability. Various legislation within the USA including the *Individuals with Disabilities Education Act* (IDEA, 1975), *Americans with Disabilities Act* (ADA, 1990), and the *Social Security Administration* (SSA, n.d.) respectively label a person with a disability who needs special educational services to meet the needs of a classroom setting, limiting major life activities, and not able to engage in substantial gainful activity. In each of these cases, an individual is being defined as being "disabled" in a way that closely tied with impairment – the individual cannot do what society would normally expect of them to do (e.g. learn, work, procreate).

Comparing people to a perceived "norm" leads to a power differential that put those trained to "test" this norm in a position to make decisions for PWDs. The language and labelling used in these instances (based on psychological and other assessments) are inextricably tied to how PWDs self-identify (Grue 2016; Dirth & Branscombe, 2018; Bogart, Rottenstein, Lund, & Bouchard, 2017). In a study by Bogart et al. (2017), the way in which and individual self-identifies has a large effect on how the person reacts to the world around them including how

they advocate for themselves, who they socialize with, and accepting their level of impairment based on the assessments given to them. The authors further identify concerns regarding this self-identification given that 1) these labels are very focused on the level of impairment, and 2) since there is no official identification for the various disability categories. There are large benefits in self-identification in terms of expanding social support, increased quality of life, and overall advocacy repertoires (Bogart et al., 2017; Putnam 2005; Zeigler 2020). Given these challenges of how one approach disability, and having nor consistent labels, especially among those with comorbid diagnoses, self-identification can be extremely difficult in knowing what one can advocate for or what access to resources they may have (Grue, 2016) further leading to barriers that will be identified later in this chapter.

Categorization considerations

As noted, before, the interaction of how impairment and disability is defined can alter the perceptions of the individual and further create complications in overall assessment given its culturally dependent nature. In an effort to be more concise on the use of the term throughout this manuscript, *disability* will be referred to as the bidirectional impact one's diagnosed or self-identified biological impairments (including neurological structuring) have on culturally mediated access to necessary resources including education, health care, employment, and socialization opportunities (Boagart et al., 2017; Dirth & Branscombe, 2018; Grue 2016; Grue 2019; Smart 2009; Smart 2016; Putnam 2005). The mediation of this definition is dependent on the vantage point of the individual or groups in power that make decisions related to access of services for PWDs.

Much of categorization of whether or not someone is disabled is highly dependent upon the particular view of the individual(s) creating these categories. This perception then may

predict the amount of access to resources and supports an individual may receive. In a recent article by Ziegler (2020), the viewpoint in which a lawyer and judge have regarding disability may dictate the results of a trial. The author described that a lawyer taking a *formalism* approach may strictly follow the precedents set by the laws as written while a *realism* approach makes decisions based on economic, social, and ethical implications of each instance. Simply put, the realism standpoint looks at each individual decision and adjusts the outcome based on the given information while a more formalist standpoint would be making decisions as it is written in the law itself. Both approaches have their merit and level of consistency with intention of helping the individuals they are serving. However, this "power of language" (Zeigler, 2020) in the law dictates the way it is carried out as laws exists to maintain order and if that order is riddled with outdated terminology focusing mainly on impairment as the cause of disability rather than the bi-directional interactions between the individual and the environment they live in, the interpretation of these laws can perpetuate harmful ideologies simply by interacting with the language used. This concept or disability terminology leads to discrimination in legal proceedings for individuals with cognitive disabilities (McCausland et al., 2019). Another study by Slayter (2016) discovered that children with intellectual disabilities in the foster care system experience increased adoption disruption and less likely to be reunified with their families. Each of these studies show that the perception of disability as well as the terminology used around PWDs may further perpetuate real-world, negative consequences for those involved. It was only 10 years ago that Barack Obama signed legislation insisting that the outdated terms like retarded, mentally handicapped, and feeble-minded were expected to be changed to or person-centered focus rather than impairment-centered (Zeigler, 2020).

Converse to the limitation regarding categorization, there are some benefits as well. By

having a label of a disability (taking a more formalist view), the individual is more likely to have access to resources they otherwise would not have, more resources may be available when identifying as this label, and third party payers may be more likely to pay for those additional resources and services (Smart 2015). The power differential is still in the hands of the third-party payer on whether or not some of the concerns may be addressed, but the possibility of being addressed is significantly increased. The benefit is more resources given this particular diagnosis but potential downs range form person (e.g. more stigmatized action towards child in the classroom; Offit, 2008) to societal levels (e.g. increase in ASD rates due to overdiagnosis in order to get services; Frances 2013). Thus, the term disability and whether or not someone has this can be a powerful or both freedom (e.g. more funding for services) and control (e.g. who has access to education and workspaces). Papatola and Lustig (2016) detail such discrepancies between what insurance companies are willing to pay for and how behavioral therapists may address these concerns to work within their insurance system. The culturally mediated nature of disability is thus highly dependent on what the gatekeepers of services in a particular culture can and can't provide with a label or categorization of disability. The next section will detail some of the models that are used within these vantage points regarding disability including limitations and benefits of each.

Models of disability

In an effort to categorize the various type of approaches to disability, Smart (2015) details several models with which detail the various approaches one may use to conceptualize disability and, by extension, what the person can and can't do. In the current zeitgeist, the *biomedical* and the *sociopolitical* models create a dichotomy of impairment-based disability perceptions versus culturally constructed concepts of disability. As a result, these models will be

reviewed more in in relation to the current behavioral focus of this manuscript. Additionally, the first model will be reviewed briefly in an effort to better educate the reader on various viewpoints of disability and how these will relate to chapter 2's [of this manuscript] approach to stigma and prejudice experienced by PWDs as divine retribution as the locus of disability.

Religious-Moral Model of Disability. As one of the first views of disability as a category, this model generally takes the view that those with disabilities or their parents have engaged in a sin that resulted in a divine punishment in the form of a physical, cognitive, or developmental disability (Smart 2015). This is not to say that every religion views disability this way, but it has been a cause of marginalization of a population in the past. In the popular America novel *The Scarlet Letter* (Hawthorne 1850), this model of disability can be seen in the character Arthur Dimmesdale who was a priest that engaged in premarital sex with the main character Hester Prynne. This act results in social outcasting, labelling of both individuals with an A for adultery, and ultimately a physical disability for Arthur (along with disfigurement) as a punishment for this crime. The author of this manuscript, due to the treatment for cancer being received during brain development, was diagnosed with learning disabilities and engaged in extra academic supports through high school. His parents were chastised by the church they frequented for having a son diagnosed with cancer, and subsequent learning disabilities, as being divine punishment for living together before being married as well as being bar tenders (which apparently in not reputable whatsoever). Smart (2015) details that while approaching disability in this model, the way to treat and PWDS is prayer and repentance which ultimately led to marginalization and removal form society in the form of institutions.

Biomedical model overview. The focus of disability in this model is that the individual is experiencing a pathological disease or condition that can be quantified, assessed for, and

objectified (Smart 2015). In this concept, disability is purely an impairment pathology that can, and should be treated with its locus of control being in the individual and disregarding the complexities of how these impairments can be exacerbated by society norms and environment. The PWD is a certain deviation away form a standardized norm based on their level of biological impairment.

Both of the terms of impairment and disability under this model specifically are putting PWDs in another group outside of the majority and identifying pieces about their bodies or functional repertoires to change in order to adhere to what is "normal" as deemed by that society. Smart (2015) suggests five general factors of normalcy and how this is perceived/assessed including personal value judgements of the assessors, environment in which the person functions, who is making the determination, the purpose of the assessment being given, diagnostic tools, instruments, and classification. Each of these factors play a role in determining what "normal" may be but is highly dependent on individuals being trained to utilize these assessments of disability. However, Smart (2006, 2009) details how this training leads to a power differential in where PWDs are not in a position of power to define how they are perceived (or how they perceive themselves in many cases).

Biomedical model benefits vs limitations. As stated previously, having the label of a disability is beneficial in terms of access to funding for various medical resources. By quantifying and standardizing various diagnoses, it is easier to decide whether or not someone can get access to services (Smart 2006; Zeigler 2020) – either you have this diagnosis, or you don't. Johnston and Dixon (2014) detail that these labels further help to identify and treat health conditions that are part of the disability diagnosis (e.g., heart conditions for those diagnosed with Down Syndrome). These authors go on to create a schematic about how a biomedical model can

identify how the impairment is related to the person's ability to participate in other aspects of society under contextual factors such as person identify and environmental, in terms of how this may exacerbate the biological concerns. However, this model still only focuses on the biological aspect of impairment the individual is experiencing without regard to what resources may be available or how it interacts with the environment (e.g., ramps available, closed captions).

Including the concerns regarding power differentials mentioned in the previous section, there are other key limitations of this model as it relates to the views of PWDs. This promotes an ideology of *ableism* (usually unintentionally) in that and any deviation from the norm is seen as wrong (Wolbring, 2008) and allows for the devaluation of PWDs as being "less than" or that what experts decide for that individual is what is correct (Hehir, 2002) regardless of what the individual may want/need. From the vantage point of ableism, the person is compared against what is "normal" (based on consensus from verbal community – usually the medical community) and, despite what the PWD may want, have suggestions about the next best steps for their lives applied to them without their consent.

Shyman (2016) argues that *applied behavior analysis* (ABA) is one such service that may promote ableism when not applied with a person-centered approach. Much like the medical model, Shyman suggest that ABA practitioners attempt to quality, classify, and organize behavior in order to change various environmental factors so that individual can lead an independent, productive life. The advantages of this is that the intention to assist the individual is clear and prosocial – help the individual independently live life while attaining the resources they want and need (jobs, partners, etc.). However, when not done with the individual as the focus [as well as their wants, needs, and aspirations] or when trying to train/support/collaborate with those around that individual, the therapeutic goals may be shaped based on what experts say rather

than what the individual would like. Shyman (2016)'s article reviews this as when using the medical model of disability, a diagnosis of autism is seen as something that needs to be reduced or eradicated, and thus a behavioral program should be put into place that reduce patterns of behavior, like stereotypy like response interruption redirection (RIRD; Ahearn et al. 2007), while increasing functional language skills.

It has further been expressed (McGuire, 2016; Ruby, 2017; Shyman, 2016) that ABA promotes ableist practices as an effort to "normalize" the individual based on the societal constructs while not considering what the individual would like to do or attain. Although the perception of ABA in this may be overgeneralized in ways that will be expanded upon and defended in later chapters of this manuscript, this concept of choosing what is best of the individual irrespective of what they want is an important consideration for all clinicians responsible for enacting change.

The concept of *medicalization* falls within the purview of ableism. Disability, under this guise, can be the person's lived experience with the disability may have been seen as normal until experts say it is not resulting in the unjustifiable simplification of these experiences merely being medical problems that can, and should, be "fixed" (Smart, 2015). By placing the labelling of disability completely in the hands of trained medical and qualified/trained service professionals (e.g. psychologists), the environments in which the individuals lives is absolved of responsibility for addressing the various potential environment concerns associated with the disability (DasGupta 2015; Smart 2006; Smart 2009; Smart 2015).

Sociopolitical model overview. In direct contrast to the medical model (including medicalization and ableism), the sociopolitical model focuses on the societal and environmental factors around what makes someone "disabled" – referring to this term as a social construct

rather than a biological condition (Smart 2009; Smart 2015). This is an interactional model that more specifically analyzes the relationship between the individual and the environment in which they live in (Putnam 2005). Disability is seen as a socially-mediated construct in where a person is perceived as "normal" until the expectations of society prohibit them from completing typical activities within that community. For example, if an individual diagnosed with Down Syndrome is going about their day and is able to attain the things they want, they are not disabled. Their diagnosis, and relevant impairments, does not disable them. If the individual is not able to get what they want or need because those items/activities are socially controlled (e.g. money for food) yet either the social (financial constraints, lack of resource availability, etc.) or built (buildings without ramps, items out of reach, etc.) environments, it is not that the individual themselves is disabled, it is that their abilities do not fit the environment in which they live (Putnam 2005; Bogart et al., 2017). The focus is that with the proper environmental contingencies and supports in place, and individual's impairments would not disable them (ramps for those in wheelchairs, braille for those who have visual impairments, etc.). However, if these supports are not in place, is that the "fault" of the individual with the impairment or the environment/society not making their environment accessible?

Sociopolitical model benefits limitations. Smart (2015) details that under the sociopolitical model, disability becomes a collective concern of the community the individual lives in – which is contrary to the release of responsibly that the biomedical model may promote. Taking a more environmental approach (social programming, educational supports, accessible buildings, etc.) partially releases the burden of the individual being at fault resulting in greater outcomes for self-advocacy of service, socialization, and overall quality of life (Grue 2016; Drith & Branscombe 2018; Putnam 2005). In an overview of language and disability law, Zeigler

(2020) also pointed out that laws within the realist vantage point adhered to a sociopolitical model and helped to enact change in the language around disability. In 2010, Barack Obama signed legislation that called for the changes in federal laws to replace words like "mentally retarded" with person-center terminology such as "individual diagnosed with a learning disability" and the like.

Although putting the focus of disability on the sociopolitical environment, this may not always be beneficial to individuals who do have medical conditions associated with their diagnoses that need to be addressed (Mulvany 2000; Deacon 2013). With varying interaction between the medical and sociopolitical models (e.g. genetic syndromes with potentially consideration biological concerns and resources access concerns), the self-perception of the individual has is largely overlooked. Anastasiou & Kaufman (2013) point to the important concepts of disability as a neutral social construction that may be part of that person's identity. With no one unifying definition of disability (Grue, 2016), not everyone views their disability as the same or responds to it as such. Dirth & Branscombe (2018) conceptualize the important of disability identity by pointing to the interaction between impairment and social barriers while offering a more unifying perspective for PWDs. This *social identity approach* (SIA) helps to contextualize the lived experiences of those with disabilities by sharing how functional biological limitations can have adverse societal effects if there is not support group of like-minded individuals. Putnam (2005) discussed a similar sentiment 13 years earlier in that in order to be politically active, one much consider their own biology in order to advocate for greater resources in their environment.

Environmental adjustments are mainly made to accommodate impairments and without identifying these within one's self, advocacy is not as effective at addressing the various barrier

PWDs live with every day. Each of these views have the strengths and weaknesses in categorizing individuals as having a disability. On one hand, the biomedical model focuses on how the person is structured and their functional limitations while the sociopolitical model looks at the environmental barriers as creating disability. This may cause confusion as to "which one" to use (or is more ethical) as both of these models may not be mutually exclusive of each other. A dilemma that perhaps behaviorism can clarify is a way to consider both of these models in the analysis of individual and their behaviors.

CHAPTER 2

BEHAVIORISM, EVOLUTION, AND DISABILITY MODELS

With *prediction* and *control* being the primary goals of understanding human behavior (Delprato & Midgley, 1992), B. F. Skinner's behaviorism and focus on operant selection has since had far reaching applications from understanding infant learning repertoires (Gerwitz & Peláez-Nogueras, 1992) to increasing quality of life and social interactions in the elderly (Biglan, 2003) and PWDs (Dixon, Belisle, Rehfeldt, & Root, 2018). The topic of control may be at odds with ethical considerations as to who would have this governance over others (de Malo, de Castro, & de Rose, 2015) and whether something is right or wrong – a topic that Skinner (1948) tried to address in his fictionalized account of the culturally engineered society *Walden 2*. However, even in this utopian society based off of behavioral principles, PWDs were not included in the main society but rather a separate community away from the majority.

Behaviorism is not meant to represent governance *over* others but rather an influence towards a freedom from as much aversive stimuli as possible (Skinner, 1971) through the awareness and subsequent changing of the environmental factors that maintain behavior(s). When applying this concept to disability considerations, the behavior analyst's job is to help reduce environmental (built and culturally mediated) while empowering the individual to be able to successfully engage in daily life. A major area of research currently being studied within behavior analysis is the inclusion of other service providers (Brodhead, 2015) to help limit identified barriers of poor collaboration between service provider. Additionally, behavioral work is being done to help train and support parents on how to interact with their children to teach them communication skills (Suberman & Cividini-Motta, 2019), life skills (Gunning, Holloway, & Grealish, 2020), and creating positive social interactions between parents and children to help

limit overall barriers (Allen & Warzak, 2000; Gould, Tarbox, & Coyne, 2018; Stocco & Thompson, 2015). Each of these skills helps to create more supportive environments for children with disabilities which, assuming a social model of disability, creates those environments of success and reduces the barriers associated with interaction between them and expectations of the environment. Additionally, being able to train others within the environment help to address ways in addressing overall concerns.

This was not necessarily present in methodological behaviorism focusing only on the observable behaviors with its founder John B. Watson famously talking about how he could take babies who are not disabled and can morph them into any job he wanted – lawyer, doctor, thief, etc. (Moore, 2008). This attitude speaks more to a biomedical model in which the individual is fully shaped without consideration of the wants and needs that particular person would enjoy. B. F. Skinner expanded upon his contemporary in his *Radical Behaviorism* was the inclusion of these unobservable *private events* as these were formulated through the various contingencies met outside of the skin and became quiet enough to be stimuli within the skin were the human is both speaker and listener (Skinner, 1953). Since thinking covertly and acting overtly may happen at the same time, both acts are behaviors happening in the same dimension categorizing thinking as *operant behavior* (Delprato & Midgley, 1992) subject to the same consequences that the organism interacts with in the environments which they live. These consequences, and the variables around them, are important variables which must be analyzed in order to predict and control behavior. However, the immediate stimuli present in the environment and subsequent consequences during the time a behavior occurs do not fully account or the learning histories of the organism.

Evolutionary Selection and Behavior

In an effort to create a more inclusive and scientific analysis of behavior and the organism as a whole, Skinner (1981) proposed a *selection by consequences* which included 3 levels; *phylogenic* or *natural selection* (publicly observable gene expressions of an organism), *ontogenic selection* (the behavioral repertoires attained during the lifetime of that organism), and *cultural selection* (socially mediated contingencies affecting the individual). All levels are present in the organism at any given time and are compulsory towards B. F. Skinner's radical behaviorism with the locus of control being the environment(s) of the organism shaping all innate behaviors, lifetime repertoires, and response classes through the consequences in which they come in contact with. Given the reinforcement and operant contingencies mimic that of natural/evolutionary contingencies (Skinner, 1981; Skinner, 1984), the interaction between how an organism is structured, what abilities they have that allow them to access new environments (e.g. a *behavioral cusp*), and what resource they currently have available would further support a social model of disability while addressing some of the functional limitations of this perception in the previous section.

Natural selection. As described previously, the first level Skinner (1981) depicts is that of the Darwinian *natural selection*. This includes the *phylogeny* of an individual organism in terms of structures, abilities, and the subsequent innate behaviors that are genetically coded into the organism's DNA through generations of the environmental passive and actively selection. Skinner (1984) gives the example of Pavlov's dog as an example of a phylogenic reflex. When food is presented, the dog may salivate as an unconditioned response. When the food is paired with a bell enough times, the bell become a conditioned stimulus for food which, in turn, results in the dog salivating (although Skinner suggested that salivating may not be an evolutionarily

important reflex, one can logically infer the value of saliva as a lubricant to be able to properly swallow and digest food resulting in the further survival of the species). The dog did not need to learn how to salivate just in the way a person does not need to learn to pull their hand away after touching a hot stove. These reflexes are directly related to the survival of the organism and may have been genetically coded (i.e. present in previous generations) within the individual. The consequent of reinforcement then mimics the naturally selected (Skinner, 1984; Skinner, 1986; Glenn, Ellis, Greenspoon, 1992) – a topic that will be covered in greater detail in *operant selection*.

Skinner (1981) goes on to describe the deterministic substrate of his behaviorism through structure as a selected response that effect the behavior of an organism. To this end, he suggests that there is no other power that is producing the structural changes seen in organisms as this exists outside of a dimension that is not observable or logically stable and therefore not directly part of his analysis. The evolution of eyes and other sensory organs evolved in response being able to see better which served a survival function (e.g. seeing/finding food). Even verbal behavior in and of itself is not selected by the environment but rather the structures that allow for verbal behavior to occur (vocal cords, diaphragm control, lung capacity, etc.) have been present in those that have survived in previous generations and thus maintain through phylogeny (Skinner, 1953; Skinner, 1981; Skinner, 1984; Skinner 1986a). Sounds may signal others of impending danger, note possible food nearby, or acceptance of sexual advances - all of which have direct survival value for the individual. However, the complexities increase as some of these phylogenic reflexes come under operant control.

Operant selection. Perhaps the greatest contribution of B. F. Skinner's career (Delprato & Midgley, 1992) was that of the *operant* and its effect on behavior. This level is characterized by

what the individual organism learned through environment contingencies throughout their lifetime (Skinner, 1981). When looking at imitation and modelling, we previously talked of imitation as a phylogenic response – a duckling following the first large moving object (Skinner, 1981) is a reflex that did not have to be learned. The movement was an unconditioned stimulus that elicited the reflex of following that object. However, through interacting with the environment, that following behavior of moving head may be passively selected when reaching water and now they have to swim. The duckling is responding to the environment at hand in which they are learning that certain behaviors are reinforced with survival-relevant stimuli (e.g. food). When these consequences selected, in this case passively, match those of natural contingencies, then operant conditioning is akin to natural selection (Skinner, 1981). When these natural conditioning and operant conditioning match, the selection serves a survival value and result in them working concurrently (Skinner, 1981; Skinner, 1984). The organism's sensitivity to reinforcement and the operant, then, is an evolutionary response that largely replaces natural selection (Skinner, 1984) as the phylogenic structures had to build up over time in order to have this sensitivity.

For infants (Gerwitz & Pelaez-Nogueras, 1992), although crying may start off as a phylogenic response to discomfort, this phylogenic response may quickly come under operant control (e.g. crying to get attention, food) through these learned consequences. Their response of crying more in the future as it provides the necessary survival value while changing the topography of both the infant and the parent who, to reduce the crying, will act under an aversive contingency (negative reinforcement in this case) present in the environment. One possible concern with a traditional three-term contingency when analyzing behavior is taking the operant as is in that particular moment without knowledge of prior learning history. In the case of the

infant crying or cooing, what may be analyzed as environmental contingencies in the moment may not include interactions with the parents in the past, and therefore incorrect or skewed conclusions may be drawn about that instance (Biglan, 2003). It would be easy to say that one should attain a college degree or go to trade school in order to be gainfully employed while saving money over time to attain the "expected" goals of buying a house, have a family, and eventually retire. However, if one does not have the access to the financial means to go to these programs, or if there are not programs readily available in their neighborhoods, this may preclude the individuals from accessing the new environments and opportunities. Much of what contingencies, consequences and even resources available are culturally mediated and as such, should be taken seriously in any analysis of behaviorism.

Cultural selection. Skinner (1981) detailed the third evolutionary consequence controlling behavior is that of *cultural selection*. This includes analysis on how cultural practices/repertoires of a group as a whole are affected by consequences, not just looking at individual organisms. A key difference that Skinner (1981) and Skinner (1984) point out beyond where the analysis of consequences is also that unlike operant selection to a large extent, cultural selection does have "stored" information that the culture can look back on and analyze.

An operant does not have a stored memory, at least as it is understood under the guise of behaviorism, that can be retrieved for future use – the organism is responding to the environment (Skinner, 1953). In cultural selection, there are many permanent products (buildings, data, videos, books, etc.) that a culture can pull on or future use. However, Skinner (1981) cautions against this as it might not be as efficient to the overall understanding of how behavior occurs. Behaviorism is not a prescriptive science (Delprato & Midgley, 1992) in that it tells people how to react or put cultural engineering under protocol. Culture organizes various behaviors as it is

related to group survival of the behavioral repertoires that are found/set to be "important" for the cultural based on the consequences that the group, as a whole, interacts with (Skinner, 1953; Skinner, 1981; Skinner, 1984; Biglan, 2003). Although something may work to further promote the survival of the individual culture, it may not serve to promote the survival of the human species as a whole (Delprato & Midgley, 1992) – something that Skinner (1986b) distinguishes as being pleasant (only serving the individual or culture) versus being reinforcing (serves the human species as a whole). Such examples (Biglan, 2003) may include slavery, cannibalism, and male domination. When relating to disabilities, the use of various terminology helps to perpetuate ideologies of subservience within the disability community. The use of terms such as "mentally retarded" in legislation further pushes an ideology of "othering" in where those with disabilities are not to make their own decisions (Ziegler 2020). This is corroborated by Smart (2006) in the details regarding the biomedical model releasing responsibly of PWDs from society and putting these choice not in their hands, but the highly trained medical professionals, much of time without consideration of what the individual wants.

Level overlap with disability models

An important aspect of these selection by consequences is that these levels are not mutually exclusive to one another as an organism is affected by one or more levels at any given time. Much of the above examples do review specifically reinforcement contingencies but this also work on levels of overall functioning for an individual. Take, for instances, an individual diagnosed with Down Syndrome. If one first looks at biological impairments (e.g. their phylogeny), the individual exhibits low core strength, moderate intellectual disabilities (LD), difficulties with expressive language (e.g. vocalizations), and general noncompliance with undesired tasks (Griffiths et al., 2014). A biomedical model approach may suggest that this

individual is disabled due to these impairments; however, if the individual does not need to communicate with others in order to get what they want (like playing with toys), this individual is not hindered. This individual's operant learning history (e.g. their ontogeny) may dictates (through speech therapy training and goals targeting communicative responses) that in order to gain a preferred item, they must engage in vocal-verbal behavior(s). This is not because of their impairment alone, but because of the environmental factor of withholding that item under the culturally-created rule that in order to gain access to preferred items/activities, once much express verbally (written, vocal, etc.). The barriers then lays within the cultural expectations and not just the impairment along. Further sociopolitical barriers for this individual are expressed during transition planning from primary to secondary school planning (Lightfoot & Bond 2017) where difficulties may arise due to assessed levels of functioning of the individual. If they do not meet certain criteria scores as set up by the district (e.g. the cultural level of selection), then that individual does not move on.

Additional educational supports, which may potentially serve as barriers, may be seen through the use of self-contained classrooms. Holahan and Costenbader (2000) conducted a study comparing students with disabilities (as defined by their diagnoses) who were high or low functioning [as defined by the Brigance Diagnostic Inventory for Early Development-Revised] across self-contained (all students in the classroom have an individualized education plan [IEP]) versus inclusive classrooms (a mix of student with and without IEPs). Their study findings indicated that children who tested as lower-functioning did equally well in both settings while children who tested as higher functioning did better in the inclusive classrooms. This has implications that even based on functioning alone (e.g. a biomedical approach), an inclusive setting was at least as good as a self-contained setting suggesting that this setting would be less

barrier producing to overall academic gains (e.g. a sociopolitical approach). In a more recent study by Blazer (2017) reviewing the literature on classroom settings, inclusive classrooms had an overall better academic results and greater positive parent perceptions for students with (and without) disabilities with the caveat that the classroom needed to be equipped to do inclusive practices (planning, differentiated instruction, support for teachers, etc.). The environments in which individuals operate in need to be set up for success in order for that setting to promote functional repertoires. If a school does not have funding to include these supports, then the environment is not as enriched – resulting in barriers that are more sociopolitical in nature rather than biomedical alone.

When applying these levels and models to prevention science, Biglan (2003) talks about how evolutionism and behaviorism have a place as they help to understand the behaviors that interact with contingencies on broader cultural levels. The shaping of these contingencies, as argued, may have an inherent survival value. When taught how to respond and analyze others' behavior(s), effects of this training have been correlated with reduced delinquency in schools, increased following of rules for clerks selling tobacco, a reduction of drug abuse and alcoholism, and increased quality of life for the elderly (Biglan, 2003). The importance of looking at the interaction between the biology of the individual (think how a drug affects the body), the learning history of the individual (how often have they attained this drug and how), and the cultural aspects of human behavior (noticing increased drug use when culture around the individual is using more or other resources are not available that are more readily available or potent) (Biglan, 2003). As applied to the strengths of the social model of disability, the concepts that Biglan (2003) reviews can be equated to the reduction of how a person is disabled by their environment and those within it rather than only their potential biological impairments "causing"

this disability label. Several studies applying behavior analytic intervention at the group level have shown promising results in adult developmental disability agencies (Luiselli, Amand, MaGee, & Speery, 2008) and school settings for children with developmental disabilities (Falligant & Pence, 2017; Northrup et al. 1994; Putnam et al., 2003). Each of these studies focus on training, not only of the individuals, but the service providers as well in order to create a more accepting and successful environment in order for PWDs to thrive. Targeting the values of individuals in terms of their place in the values dictated by their verbal community is key in understanding how "disability" fits into society and culture – a view that third wave behaviorism may be able to offer solutions in.

Contextualism's extension of radical behaviorism

While taking a sociopolitical model vantage point, many contextual factors play in the exacerbation of individual impairments and further create a perception of disability. When identifying barriers to healthcare services, Drainoni et al. (2006) identified three broad categories which included *structural, financial, and personal/cultural.* Some structural barriers are related to the services that are available. For example, transportation to and from appointments would prohibit and individual from even coming in contact with the necessary essential services. The service professional may not have enough time within the appointment to address the complex needs of the individual. Coupled with poor coordination between service providers, the adverse results may include at best redundant care or at worst, incorrect treatment recommendations or procedures. Additional barriers may include lack of coverage for services that were deemed as "medically necessary" but would be of great value to the patient and lengthy insurance approval processes for necessary rehabilitative services (Carvlho et al. 2017) and overall denial for services and supports (Papatola et al. 2016; Severino, 2017).

Each of the above barriers can lead to further complications of delay in necessary care, putting the individual into financial hardship, and losing trust in the health care system and not advocating for essential services (Drainoni et al., 2018). Much of the overall structural barriers identified above are related to the individual's impairments which focuses on their phylogenic structuring. As further concerns in terms of access to quality and knowledgeable health care providers (Bartlett et al. 2008; Logan et al. 2014; Spencer-Rodgers & McGovern, 2002), two levels of selection are at play within relevant contextual factors. The first is cultural selection in that the health care provider not knowing how to appropriately help their patient or doing so but not collaborating with the patient's other health care providers. This may result in redundancies of care having done tasks with one provider but then done with another in a different way which may 1) promote confusion with the individual being served and/or their parents (Drainoni et al., 2018), 2) impeded the effectiveness of all if the protocols are contradictory to each other and may reduce the effectiveness of all interventions (Miller et al. 2019), and 3) further negative perceptions between therapists (Hincapie et al. 2016). One potential solution would be to include more culturally-relevant practices in the education that is received by the provider (Beaulieu et al. 2019; Okamoto et al. 2018). The individual, in their ontological histories, are learning that service providers they are seeing as being inefficient and unhelpful. In these cases which makes actually going to, and subsequently advocating for, services become punishing at worst or put the effort of going to these services within timely reinforcement (medication, equipment, etc.) on extinction as there as the ratio strain increases.

Applying the concepts of further cultural barriers to care, several researchers have pointed out the various health inequities at the intersectional of disability and minorities as well as disability and gender. Magana et al. (2016) that racial and ethnic healthcare disparities for

PWDs are predicting poor prognoses independent of income and socioeconomic status. Individuals who have a diagnosed disability are at a disadvantage even within their own minority group, which already experiences health disparities. Dodds, Yarbrough, and Quick (2018) suggest that language barriers and lack of social support may be potential causes in how these disparities are formed. If an individual or family is not aware of the materials or services they can ask for, then these services may never be reached by their children. Dodds et al. (2018) further explains how many of the professionals are not trained in working with diverse populations let alone having appropriate interpreters or cultural brokers in order to best support the family.

When applying CBS as an evolutionary science, a move towards the importance of prosociality may be, in and of itself, a culturally selected repertoire as this world's population increases. Biglan (2003) points out that the various contingencies of survival are shaped by the nutritious and reproductive tendencies of humans while also accounting for, and adapting to, discrepancies in care. The primary reinforcers (housing, food, etc.) of these may be socially mediated by the verbal community (cultural selection) and their practices in terms of access (operant selection) to those resources (what insurance coverages, services available, relevant training of the service providers, etc.). An argument can be made, then, that reducing these barriers to PWDs would be advantageous to the overall survival of the human species.

As Biglan (2003) further notes, the pursuit of these resources may be beneficial to one culture but not the human race as a whole (think World War 2 and genocide benefitting Nazi ideology but clearly impacting the survival of others and the world in a negative way) – something Skinner (1986b) deems as the differences between reinforcing (for the survival of the human species) versus pleasant (for the more immediate consequences/comfort of the individual

organism or culture). This dichotomy is extremely important when applying evolutionary concepts to the underpinnings of CBS as, in order to keep consistent with its value of alleviating suffering, one has to look at the organism(s) in context – their context in relation to others, not the therapist/behaviorists inferred context based on their own learning histories. The formation of labels as explained by disability models and behaviorism can lead to both positive and negative effects of categorization of individuals based on ability/disability. Evolution and CBS have both theoretical and clinical relevance in the concepts of stigma formation and the overt behavioral effects of this ideology.

CHAPTER 3

APROACHES TO DISABILITY STIGMA

The categorization of people with disabilities (PWDs) has been a topic of academic interest since at least Allport (1954)'s book *The Nature of Prejudice.* Analyzing the various theoretical underpinnings of prejudice as it relates to PWDs suggesting that, under specific conditions contact can help to reduce stigma and stereotyping. However, many of theories of stigma have since been applied breaking down dimensions of stigma (Jones et al. 1984), using evolutionary theory to conceptualize why stigma may occur (Kurzban & Leary, 2001), and suggesting the various overt functional effects that stigma has had on PWDs (Bogart, Rosa, & Slepian, 2019). Each of which have had positive effects on understanding how stigma towards disability is formed and offering various solutions, much of which are based on the social model of disability. This section will review the various definitions, process, and functions of stigma from a theoretical standpoint in order to better inform more recent work completed in the contextual behavioral science (CBS) tradition.

Perpetuation of disability

Defining stigma. A common theme across the variety of stigma definitions is categorizing those the target of stigmatization compared to the whatever the majority group in power "norm" is. Goffman (1963) suggests that stigma occurs when there is a divergence between how society views and individual and the what the individual actually possess. A simple example of this could be overgeneralizing one aspect of an individual's functioning and applying across all aspects of their life (e.g. individual in a wheelchair perceived as being cognitively impaired as well). This perceived attribute of an individual as being deviant from the norm can be seen as a mark that the individual may be flawed (Jones et al. 1984). This mark may be a collateral of the

individual's impairment (facial features, stereotypic movements, balance concerns, etc.) that are completely separate from the group forming/categorizing that individual, and other individuals that look/act like them, into a subgroup of society (Kurzban & Leary, 2001). This categorization can then lead to the devaluing of the individual as a functional human being (Crocker, Major, & Steele, 1998) resulting in further stigmatization in the form of stereotyping, exploitation, status loss, prejudice, and discrimination (Bogart et al. 2019; Corrigan, 2004; Hatzenbuehler, Link, & Phelan, 2013; Yang, et al. 2007). As noted in the previous chapter, these concepts can lead to harmful effects and social isolation by creating cultural barriers to healthcare and service access.

Smart (2015) details a variety of behaviors that further exacerbate the perception of stigma and further solidifies an individual's levels of impairment and disability. The first of which is *simulation exercises* which is categorized by having other experience what those with disabilities feel like. This may include putting goggles on to simulate visual impairment or similar equipment that would hinder movement. After reviewing the research associated with these exercises, they may actually help to further promote stigma and overgeneralization of ability/disability as this is only one aspect of that individual's life (Smart, 2015). When looking at a CBS evolutionary approach, one needs to consider all aspects of that individual's life. These simulation activities may address a phylogenic impairment (goggles for vision, sitting in a wheelchair, etc.) yet the operant and cultural considerations are not included. People without disabilities (PWODs) engaging in these activities do not have a learning history of the difficulties this would present in day to day living thereby not also not fully appreciating the social stigma associated with the various impairments they are trying to simulate. In exercises like these, this perpetuates an idea of *othering* and further separates the individual from the majority group as, in this simulation, the majority group can then leave these activities and continue their stigmatized

life (at least as it relates to disability). PWDs, as such, may do a similar repertoire of behaviors called *identity management* (Smart, 2015) or *masking* (Smith & Jones, 2020) not in a way of understanding others, but rather to better blend in with the society in which they live in. This may take the form of hiding disfigurement with clothing or, as a more notable example, the USA's 32nd president Franklin Delano Roosevelt (FDR) purposefully concealing the fact he was in a wheelchair due to complications of polio. Many individuals may have disabilities that are not as easily concealed such as cerebral palsy characterized by hindered bodily control/movements.

"Disabled Heroes" or "Supercrips" are another example of perpetuating stigmatization, stereotyping, and otherness in a way that devalues the lived experience of the individual (Smart 2015; Schalk, 2016). In these cases, media portrayals of individuals with diagnosed disabilities who live what the majority of the society would consider a "normal" life by overcoming or living in spite of their disability. This devalues the disability identity while simultaneously creating a false perception that a person can "just get over it" and move on with their lives. Smart (2015) gives further examples of Christopher Reeve, Stephen Hawking, and Beethoven who all had physical impairments but were able to accomplish many things such as advocacy efforts, theory formation in physics, and music that has spanned the ages, respectively. In each of these cases, the individuals were already well known and had received their relevant training/education before their impairment occurred or progressed.

Forming an identity is healthy towards disability however, pointing to this specifically as a hurdle in one's life devalues the lived experience while bulking up the perception of "wow! You have overcome so much!" A similar sentiment is reviewed by Stella Young in her Ted Talk (Young, 2014) where she details how she is proud of her identity and her going about her daily

life is nothing to aggrandize. She further cites that pointing to the disability as a thing to overcome, 1) says to society that the disability is not typical in a way that it should be removed at all costs, and 2) being used as a reason for PWODs to not complain about life's various struggles. The devaluation comes in the form of putting disability in a negative category – something to avoid at all costs.

The final two concepts that Smart (2016) says promotes disability stigma, and thereby solidifying harmful categorizations of disability, are the instances of *assisted suicide* and *auto abortion* upon being faced with a potential choice between life with impairment(s) (or life with a person with an impairment) and death – the latter being chosen more often. This further supports the separation between what is "normal" and "good" and what is not. Forced sterilization of individuals with intellectual disabilities (DasGupta 2015; Tilley, Walmsky, Earle, & Atkinson, 2012) was also seen in an effort to disable them from procreating. Both of these instances are further exemplified by the horrendous conditions of removing individuals from society with low support and resources as seen in *Willowbrook State School* (Filmrise 2014). In the present day COVID-19 Pandemic, institutions continue to be sources of spread with low resources (Safta-Zecharia, 2020) and emergency services are not delivered equitably for individuals with diagnosed disabilities (Schiariti, 2020).

Institutionalization is a social removal of individuals from the mainstream which promotes the much outdated and harmful religious-moral model of disability discussed in Chapter 1. Individuals being labelled as unfit for society (much like how criminals are) are subsequently removed form that society and put out of the public eye. Even in the utopian society of *Walden 2* (Skinner, 1948) which prides itself on its cultural engineering using behavioral principles, individuals who were not able to contribute to the larger grouping of

people were sent to a sort of institution where they would be taken care of, separate from the majority. As listed previously, a more modern day example of this may be the suggestions of removing individuals with developmental disabilities form the classroom social setting to either 1) be put in a self-contained classroom with other like-developing peers, or 2) removed from the social setting completely to conduct several hours of therapy each week in order to prepare for social situation – without contact with like-aged peers (Blazer, 2017).

Dimensions of Stigma. Jones et al. (1984) offered various *dimensions of stigma* that may help to explain the overall functioning of how stigma forms and what, culturally, creates these agreed upon stigmatizations and stereotypes. The first dimension is *concealability* and is defined as the degree to which their disability is observable suggesting that the more visible the collateral effects (physical, movement, etc.) of an impairment, the greater the level of stigma. This ties very closely with the dimension of *aesthetics qualities* (Ahmedani 2011; Corrigan et al. 2001) in where it is more difficult to hide obvious deformities or biological structures (think facial structure of individuals diagnosed with Down Syndrome or head and hand sizes of those diagnosed with Prader-Willi Syndrome). This concept tracks in cases of employment with those having more visible diagnoses are correlated with great difficulties in finding and maintaining employment (Teindl et al. 2018). Corrigan (2004) maintains that stereotypes, prejudice, and discrimination all first form with the interaction of *cues* and the environment. These may include psychiatric symptoms, social-skill deficits, physical appearance, and labels placed upon the individual.

This dimension is also an important component of *controllability* (Corrigan et al., 2001; Ling et al. 2010) which is characterized by how responsible a person is for their disability. Bogart et al. (2019) discuss this concept in their analysis of stigma towards those with congenital

diagnoses versus and acquired impairments. Take for example, and individual diagnosed with a developmental disability – say an ASD. This individual does not have controllability over their own diagnosis and although experience a certain level of stigma and understanding, it is not the same level as an individual who may have acquired a disability like a traumatic brain injury after a car accident due to drunk driving.

Jones et al. (1984)'s dimension of *peril* which is characterized by the level of which PWODs perceive PWDs as being dangerous, frightening, unpredictable, or strange (Ahmedani 2011). This piece is additionally tied to the dimension of *aesthetic qualities,* as also seen in *concealability,* suggesting that those who are more "unusual" looking may exhibit great instances of aggression or unpredictable behavior (Kurzban & Leary 2001; Ahmedani 2011; Corrigan et al. 2001; Corrigan 2004). An example may be seen in the stereotypic motor movements (hand-flapping, spinning, etc.) or self-injurious behaviors (head-banging, skin picking, etc.) of individuals with an ASD diagnosis. Stereotypic movements or speech may be perceived as being "unusual" by parents and the community and thus become the target of intervention (Specht et al. 2017). In targeting this repertoire, the individual may not want this, especially if it does not impede their daily living, and may cause more harm for the individual (Arnold, 2019).

The dimension of *origin* denotes where an impairment leading to the cultural conception of disability originated (Jones et al. 1984). This concept falls under the genetics or biological factors (e.g. one's phylogeny) that dictate the level of impairment the individual may experience irrespective of cultural dimension that would exacerbate disability (Ahmedani 2011). As reviewed in chapter 1, impairment and conception of that impairment is deeply tied to perceived resources needed to "address" that impairment.

For the final three dimensions, as discussed by Ahmedani (2011), share similar functions in their roles on stigma formation. *Course* and *stability* regard the level to which an individual is likely to benefit from treatment and whether or not they would "recover" (Ahmedani, 2011; Jones et al. 1984; Corrigan et al. 2001; Corrigan, 2004). The perception of whether or not an individual would benefit from treatment harkens back to the biomedical model in an effort to eradicate the disability. This perception continues to create disability and impairment as something that is not socially acceptable. Discomfort and intention to eliminate create a level of *disruptiveness* which is characterized by the level one's disability may change/impact socialization instances or overall success at meeting the expectation/goals of society (Jones et al. 1984). Smart (2015) points to the how PWDs may be view economically in terms of loss of tax dollars due to state funded programs and increased insurance premiums. Each of these dimensions are not mutually exclusive as was described above relating in the exploitation and social norm enforcement of PWDs (Phalen, Link, & Dovido, 2008; Kruzban & Leary, 2001).

Stigma drives and evolution

In an article by Kurzban & Leary (2001), stigma is approached from an evolutionary context positing that stigma may have genetic basis but is not necessarily a genetic given. The manner of social exclusion (e.g. institutionalize or self-contained classrooms) is a function of social hierarchy with the top imposing various restrictions and limitations towards those at the bottom of the hierarchy. The authors conceptualize that stigma may serve functions that are subject to the various selection pressures of species to survive. Three drives were proposed in an effort to expand on the social construction of stigma and, by extension, disability. The drive of *coalitional exploitation* depicts the separation but overall exploitation of the marginalized group (Kurzban & Leary, 2001). This general piece can be seen by wage gaps between PWDs and

PWODs in where PWDs may work a similar number of hours but receive less pay (WHO, 2001; Teindl et al. 2018).

The drive of *parasite avoidance* where individuals are discouraged from engaging in prolonged contact (Kurzban & Leary, 2001). Following the dimension of disruptiveness (Jones et al. 1984), this avoidance may be due in part to the perceptions that PWDs may be unpredictable but also potentially dangerous. If an organism is to avoid stimuli and other organisms that are potentially harmful, they are more likely able to survive. This dangerousness however is a cultural construction that is verbally mediated by the community in which that individual lives in yet the powerful avoidance of danger in an evolutionary sense creates this rule-governed (and not contingency shaped) behavior of social avoidance.

The drive of *dyadic cooperation* is characterized by the avoidance of poor partners that don't provide as much survival value while focusing more on individuals that do (Kurzban & Leary, 2001). This social exclusion in the form of avoidance, the authors argue, is also seen in nonhuman species where the dominant click will impose social restrictions on other behavior conspecifics in that culture to avoid the "weak link" so to speak. This topic relates to the behavioral principle of *Matching Law* (Herrnstein, 1970) where organisms rate of response is equal to that of the rate of reinforcement that organism is experiencing. Simply put, the more reinforcement an individual gain from a particular behavior, the higher the probability that behavior will occur in the future. Given the reinforcement and operant contingencies mimic that of natural/evolutionary contingencies (Skinner, 1981; Skinner, 1984), the interaction between how an organism is structured, what abilities they have that allow them to access new environments (e.g. a *behavioral cusp*), and what resources may be available in the environment based on cultural warrants further discussion among the behaviorist communities. If a culture

creates stigma around an individual, then being with that individual (or socializing) may not provide reinforcement from the community, essentially putting that interaction on extinction. The cues (Corrigan, 2004) of an individual being "disabled" then become a stimulus delta for no reinforcement from the verbal community in the way interaction would be seen with PWODs.

Kruzban & Leary (2001) make it clear that stigma in the form of discrimination between organisms for survival may be genetically hardwired but this is not a given – it is not inevitable that stigma will occur regardless of intention to help or be kind to others. The language that forms around disability is key in understanding the formation of cultural practices regarding this social exclusion, limited resources available, and legislation creating barriers for PWDs (Zeigler 2020; Grue 2016; Gibson 2019; Bogart et al. 2017). A more comprehensive theory of language may be uniquely suited to understand the overt actions (prejudice, discriminant, etc.), covert derivations (harmful perceptions of PWDs), and the language used around disability and stigma in order to better address ways of reducing these harmful perceptions and concepts of PWDs.

Relational Frame Theory (RFT)

Hayes, Barned-Holmes, and Roche (2001) describe RFT as a psychological account, based in the tradition of behaviorism, of language and its subsequent role in cognition of verbal organisms. As described in great detail in chapter 2 of this manuscript, RFT is an extension of B.F. Skinners *Verbal Behavior* citing the many inconsistencies regarding the contradictory nature of the basic verbal operant definitions and while further expanding on derive relational responding (DRR). This *emergent learning* (e.g. derived) is used in an effort to explain the generativity of language and how language is used to create labels for stimuli (and actions) in the environment (Dixon & Stanley, 2020). In order to further understand the derive relational nature of this theory, it is important to first review stimulus equivalence and how RFT has extended this

literature.

Stimulus Equivalence. Sidman (1971) first described a series of relations associated with creating equivalence between various stimuli. The most basic of these is that of *reflexivity* which simply is characterized as identity matching. For example, you are given a card with a 2D picture of a dinosaur and you place this on top of an identical 2D card of the dinosaur. The relation is A-A in this case as you are relating the first card you are holding the new card you are matching this to. In *symmetry,* you are now relating one stimulus to another stimulus that is not identical in form. For this example, say you have three picture cards out – a dinosaur (the one you had in the previous example), a cat, and a ball. Now the parent may ask the child (let's name him Luca), "Luca, give me the dinosaur" to which the correct response being reinforced is the handing over of the dinosaur picture. Let's say in this case that stimuli A is the picture of the dinosaur and stimulate B is the spoken word "dinosaur". To test for symmetry, the parent may now ask the child while holding up the picture of the dinosaur saying "Luca, what is this?" to which the correct answer would be Lucas saying out loud "dinosaur" if the derived relationship formed. The only relationship that was taught directly was reinforcing Luca for grabbing the dinosaur in the presence of the vocal stimuli dinosaur. These two types of stimuli then form a relationship with each other and are put in a frame of equivalence (Sidman, 1971).

This is then related to the third type of equivalent relation called transitivity which is characterized by a derived relationship that was not directly taught between two different stimuli. Using the same example of the vocal stimuli dinosaur in the picture card dinosaur (i.e. the A to B relationship), another relationship is trained of A (dinosaur picture) to C where C is the written word dinosaur. Let's say that the parent is giving Luca the written word Dinosaur on a card and out in front of him are the 2D pictures of the Dinosaur the ball and the other thing. Now with the

parent is going to do is directly teach Luca to match the written word Dinosaur to the picture of the dinosaur thereby training in A to C relationship. Given that we had symmetrical relationships between B-A, we can now test symmetrical relationships between C-A. With B being the spoken word and C being the written word both of which were trained to be related to the Dinosaur these may form a relationship with each other without ever having to be directly taught. For example, say that there are three written words out in front of Luca - DINOSAUR, BALL, PINEAPPLE. The parent then asked Luca to give me the "dinosaur" using the vocal stimuli (stimuli B) and Luca would be expected to grab stimuli C which was the written word DINOSAUR. If Luca is able to successfully do this without being directly trained he has engaged in *transitivity* with the combination of all these relationships being termed *stimulus equivalence* (Sidman, 1971). An important distinction to make with the stimulant with stimulus equivalence is that we're really only relating items together that are the same. When applying these same concepts to RFT a few notable extensions need to be considered.

RFT Properties. Similar to stimulus equivalence, RFT utilizes the three similar equivalence classes that Sidman (1971) talked about reflexivity, symmetry, and transitivity. The first similar relationship is what is called *mutual entailment* which is similar to the symmetry concept (Hayes et al. 2001; Stewart 2018; Dixon and Stanley, 2020). In this example after training stimuli A to stimuli B as being the same the reverse is also true and derived by the organism. We have already seen this in the case where the picture of the dinosaur was trained to be related to the spoken word "dinosaur" and then Luca was able to derive the relation in the reverse order. One major distinction is that the relations described by Sidman (1971) focus mainly on equating certain stimuli while the concepts of RFT can work within various frames (coordination, comparison opposition, distinction, etc.; Hayes et al. 2001; Stewart 2018; Dixon

and Stanley, 2020). In a section later in this manuscript we will describe a handful of these relational frame families in greater detail.

The next component in RFT is what is called *combinatorial mutual entailment* which is similar to transitivity (Hayes et al., 2001). As such this is the case where Luca was directly was able to derive relationships (e.g. without being trained) between the spoken word “dinosaur” and the written word DINOSAUR. Under the concepts that are explained using RFT, these properties are used to account for the way organisms not only derive relationships between different stimuli, but how those stimuli can acquire multiple functions (Hayes et al., 2001; Stewart, 2018; Dixon and Stanley, 2020). This *transformation of stimulus function* is perhaps one of the hallmarks of RFT in explaining generativity and human suffering (Stewart, 2018; McEntaggert, 2018).

In order to simply illustrate this, let's say now that Luca who has already derived relationships between the picture of a Dinosaur the spoken word Dinosaur and the written word Dinosaur successfully. A day or two after the successful training, Luca is watching a very scary TV show that includes a Dinosaur stomping around and eating people. These actions being paired with extremely loud sounds and bright flashes up on the screen scares Luca resulting collateral biological responses such as cortisol (stress hormone) release, perspiration, and crying for attention in order to escape the aversive stimulus. Given that the spoken word “dinosaur” and written word DINOSAUR are now paired with this picture dinosaur which now has the relationship of fear in the biological sense (sweating, heart palpitations, flinching reflex, etc.), everything within that frame now may evoke the biological response of fear – when someone says the word Dinosaur or Luca is able to read the word Dinosaur on someone's T shirt, the same biological responses may be elicited as if he was watching the scary dinosaur movie. Although

this is a simple example, this depicts the way language can mediate interactions with the environment and apply various functions to stimuli we interact with thereby deriving a variety of emotions, behavioral reactions, and even concepts like stigma (Matsuda et al. 2020) which will be explained later in this chapter.

RFT Frame Families. Hayes et al. (2001) describe several families of relational frames that may be taught or derived through interaction with verbal behavior on the topics of sameness, difference, categories, and the conceptualization of the self. This is one of the major contributing extensions of RFT from stimulus equivalence (Stewart, 2018) in organisms that use language can create countless combinations of the categories as they go about their daily lives (Dixon & Stanley, 2020). These families of frames can either be derived while interacting directly with events in one's life or indirectly (Stewart, 2018). *Rule-governed behavior*, simply put, are contingencies that are socially mediated in such a way that people may react to the formed rules as if they were direct contingencies (Hayes et al. 2001). Examples of this may be seen in formulation of the self as context (i.e. the labels one ascribes to the self; Luciano, Valdivia-Salas, & Ruiz, 2012) or the formulation or who may be terrorist (Dixon, Zlomke, & Rehfeldt, 2006). Due to the scope and focus of this manuscript and subsequent experiments, only a handful of these frames will be described in relation to disability conceptualization and stigma.

The frame of *coordination,* or a frame of sameness, is perhaps the most fundamental type and one of the first frames and organisms learns to do (Hayes et al. 2001; Stewart 2018; Dixon and Stanley, 2020). This is characterized by relating two stimuli together as being the same. This frame can be simply taught (as detailed above) by utilizing *multiple exemplar training* (MET) to create entire classes of stimuli (Hayes et al. 2001) and human organisms as young as 19 months old can be taught to coordinate stimuli together (Luciano et al. 2007). This frame is in contrast to

opposition which is putting two stimuli in a relation where one is the opposite of the others (Barnes-Holmes, Foody, Barnes-Holmes, & McHugh, 2013). Combining these two frames, an ice cube would be taught in a frame of coordination with cold (the same) while in a frame of opposition with hot (opposite). This relation of opposite can be broader and not specifically defined such as in the frame of *distinction* (Hayes, Fox et al., 2001). For example, Dixon & Stanley (2020) detail how one would learn that the vocal utterance "cup" is the same (e.g. coordination) with the written word CUP but then is taught that the spoken word "cup" is different from (e.g. distinction) without ever specifying what that distinction is.

Hierarchical frames are mediated by the relation of "a member of" or "belong to" (Hayes et al. 2001). For example, the classification of "food" *contains* items like meat, bread, and milk – the reverse relationships is that meat, bread, and milk *belong to* the category of food. These three stimuli under "food" can further be expanded (e.g. meat containing prosciutto, mortadella, capicola) and each of those items contain more labels (e.g. prosciutto containing crudo [dried ham] or cotto [cooked ham]) ad nauseum. These items in each category are subsequently categorized and reinforced by the verbal community in which the learning organisms' lives. Slattery and Stewart (2014) were able to demonstrate the categories of RFT (mutual entailment, combinatorial entailment, transformation of stimulus function) within hierarchical frames suggesting their importance in the formation of classes.

Deictic framing involves relating stimuli based on the speaker's perspective rather than the stimuli's formal similarity (Hayes et al. 2001; Lovett & Rehfeldt, 2014; McHugh, Barnes-Holmes, & Barnes-Holmes, 2004). These frames are further parsed out into I-YOU, HERE-THERE, and NOW-THEN relations (McHugh et al. 2004) are identified as important aspects of relating oneself to another person, group of people, stimuli, or event. McHugh et al. (2004)

further describe three levels (in increasing difficulty) – *simple* (I have a Triceratops, YOU have a T-Rex. Which once do I have?), *reversed* (If I were YOU [who has a T-Rex] and YOU were me [who has a Triceratops], what dinosaur do you have?), and *double reversed* (If I were YOU THERE [who has a T-Rex], and you were me HERE [who has a Triceratops], and if here were there and there were here, what dinosaur do you have?). McHugh et al. (2004) utilized a 60-item protocol to testing these relations with individuals diagnosed with developmental disabilities. With results suggesting that deictic framing is an important part of cognitive developmental and socialization.

Each of these frame families help to create not only create a better understanding the basis of human language and cognition, but also insight as to how language is derived beyond what is directly taught. This derivation, socially mediated by the verbal community in which and individual lives, sets the basis for understanding simpler issues such as general language acquisition to more complex verbal behavior around stigma, prejudice, and racism. In the next section, previous literature will be reviewed regarding the verbal formation of stigma and how this can be conceptualized towards the understanding of individuals with various disabilities.

RFT, Stigma, and Disability Extensions. A recent literature review by Matsuda et al. (2020) details the studies within the behavior analytic tradition detailing how racism forms while also detailing various attempts to reduce said harmful frames. The authors first begin with a behavior analytic conceptualization of stigma (and racism by extension) focusing on three aspects of direct contingencies. The first of which being *respondent behavior* which are related to the biologically based behaviors of one's phylogeny (Skinner 1981, Skinner 1953). In this conceptualization, Matsuda et al. (2020) suggest that an individual may be paired with frightening stimuli on the TV. In the presence of this individuals (or individuals that look/act the

same), this may elicit the same fear response – similar to the conceptualization in this paper regarding transformation of stimulus function. While relating disruptiveness or aggression to an individual with a disability (Kurzban & Leary 2001; Ahmedani 2011; Corrigan et al. 2001; Corrigan 2004) a potential example could be a PWD engaging in self-injurious behavior or in property destruction. Without any background knowledge about a diagnosis (e.g. ASD), this can look very scary to an individual resulting in trigger dear (i.e. survival) responses and by extension, future avoidance of individuals with that diagnosis.

When reviewing *operant behavior* – specifically looking at behaviors learned during an organization lifetime (Skinner 1953), Matsuda et al. (2020) depict instances of an individual looking for peer support/affirmation after engaging in a racist comment or joke. Labels and phrases used can result in harmful stigma perpetuation (Zeigler, 2020; Corrigan et al. 2001; Corrigan 2004). Not all comments, however, need to be overtly harmful in order to have the same demeaning effects.

Microaggressions are characterized for labels, jokes, behaviors that are not intentionally harmful on the part of the offender but have negative effects on the target of these terms (Keller & Galgay, 2010). When direct towards PWDs, some examples may include, "you have a girlfriend? That is so cute! I didn't know you could have one!" or, per Stella Young's case "[getting out of bed in the morning in into her wheelchair] You are so inspiring living your life in spite of your disability." Each of these comments are both demeaning to the individual, create a sense of pity (as seen in the religious-moral model of disability), and are reinforced by the society for their gentle nature as not being intentionally harmful. Society may also reinforce portrayal of individuals in the media and simulations of disabilities, as discussed in previous chapters, that are then taught in school or at the very least, not coming in contact with punishing

consequences thereby allowing for future use of those harmful terms/ideas.

A final aspect that is detailed by Matsuda et al. (2020) is that of stimulus generalization in where new relationships are derived around stigma based on contact with one individual. Dixon et al. (2006) and Dixon et al. (2009) detail how stimulus generalization and derived relations between self and others result in viewing all males of Middle Eastern descent as being terrorists following the attacks on September 11th, 2001. In their conceptualization, terrorist attacks are in frames of coordination with feelings of hate and rage while in a frame of opposition with the USA. The USA is in a frame of coordination with pride and safety and thus the terrorists are derived as the opposite of the individual in the USA. Now seeing on the news that the terrorist attacks were done by a group of Middle Eastern Persons; this group enters in a frame or coordination with terrorists and feelings of hate and rage. The article goes on to detail various derived relations beyond this so that all Middle Eastern Persons and Muslims are now related to feelings of hate, rage, and fear.

Dixon et al. (2006) and Dixon et al. (2009) sought to directly reduce these feelings by utilizing a computer program with a RFT-based intervention of putting people of Middle Eastern descent in a frame of coordination with peace, unity, and ultimately reducing the overgeneralizations of all people in this perceived group being terrorists. Both studies had an initial baseline phase where the students were either tested on relationships/perceptions of unity (Dixon et al. 2006) or rating various pictures on the likelihood that those individuals were terrorists (Dixon et al. 2009). Dixon et al. (2006) directly taught frames of coordination between terrorist pictures and American symbols which results in overall class formation of coordination between the stimuli showing a dismantling of stigma (in the form of prejudice) towards all Middle Eastern Persons being terrorists. Dixon et al. (2009) were able to achieve similar results

in their study by using arbitrary symbols as mediators for increasing the positive perceptions of Middle Eastern Persons and effectively breaking down these related frames stereotyping everyone as being a terrorist. These studies show major implications for the dismantling of prejudice and stigma by using basic RFT strategies.

Additional studies using deictic frames have also been shown to be correlated with increased perspective taking and decreased stigma or misperceptions of another's views. Hooper et al. (2015) utilized a simple perspective-taking training (similar to that of McHugh et al., 2004) in an effort to reduce *fundamental attribution bias* (FAE) of political speeches either supporting or not supporting capital punishment. The key in FAE, also known as *correspondence bias,* is that one aspect or perception about a person infers that every aspect about that person is related to that conceptualization (Gilbert & Malone, 1995). For example, this would be like assuming that an individual in a wheel (impaired in one way) is also impaired in their language and cognition (impaired in many ways) when this may not be the case. This study by Hooper et al. (2015) suggests that utilizing a perspective taking task may help to reduce, let's say, the perception that a PWD is not capable of doing "typical" activities within a community (have friends, get gainful employment, etc.).

Another study conducted by Edwards et al. (2017), the authors were able to utilize basic perspective training (McHugh et al. 2004) in typically developing college students to reduce stigma towards elderly capability skills (e.g. functioning). An important limitation was that those in the perspective-taking group without any mindfulness activities beforehand resulted in more fused ideologies of separation between the students and the elderly as well as perceptions of functioning. When using a brief mindfulness tasks, students in that group did not experience the same implicit stigma towards the elderly. These results, couple with that of Hooper et al. (2015),

suggest that perspective taking tasks can alter the perceptions of individuals and notice more regarding their various predicaments with reduced misperceptions and stigma – an idea supported by Corrigan et al. (2002).

Each of the above harmful frames and examples may lead to fused frames of stigma that are difficult to change given the perpetual reinforcement (and lack of punishment) society enacts upon the individual for engaging in prejudice (intentionally or otherwise). However, as noted in the various studies above, RFT may provide solid theoretical and clinical groundwork for reducing stigma towards a variety of individuals by reducing the fusion of stigmatizing thoughts with their current functions of prejudice.

Psychological Flexibility and Stigma. The term *psychological flexibility* was born out of the RFT therapeutic intervention of *Acceptance and Commitment Therapy* (ACT) with both RFT and ACT co-evolving (McEnteggert, 2018). What this topic means is the level to which an individual can more readily shift the stimulus function of various thoughts/private events they may be having. This is done through a service of vocal exercise targeting areas such as *self as context* (dealing with deictic frames and the coordinated labels), *cognitive defusion* (the breaking down of harmful stimulus functions on private events), and ultimately leading to *committed action* which is values-driven, overt behavior(s) related to the new defused frames in order to further created new transformations of stimulus functions on private events and collateral behaviors (McEnteggert 2018). By moving through the activities (many of which deal with metaphors or mediators so that new ideas/perceptions/functions can arise), this therapeutic style targets increasing one's overall psychological flexibility.

In a literature review conducted by Krafft et al. (2018), their results over the analysis of 15 studies utilizing ACT for the specific purpose or stigma reduction suggests that psychological

flexibility plays a major role in fused, stigmatizing thoughts resulting in overt behaviors (like prejudice). Two studies, for example, utilized several metaphors along with mindfulness activities in order to mediate in order to reduce prejudice towards racial minorities (Lillis & Hayes; 2007) and decreased stigma towards individuals with mental health disorders (Masuda et al. 2009). These results suggest that the use of metaphors can be, in the context of RFT, used as a mediating stimulus in order to train new relations related to less stigmatizing thoughts of prejudice.

Disability Frames Conceptualization. Figure 1 depicts a potential conceptualization based on the prior terrorism studies (Dixon et al., 2006; Dixon et al. 2009) and review of stigma utilizing RFT. To briefly review let's look at two separate frames; one for the South and one for an individual with a disability. Starting with the self from an early age the individual's verbal community directly teaches the various goals and expectations as well as values that community holds dear. Here these are directly taught examples such as growing up, getting an education, finding a partner, and procreating so that the cycle can continue. The verbal community, along with its value survives tapping into the three levels of selection proposed by Skinner and the increased importance of survival as detailed by Kruzban & Leary (2001). An additional component is then taught that in order to reach the verbal community-prescribed goals you need to be "capable" (i.e., be able to achieve the goals with a sound mind body and with limited impairments). This relationship then between the self and capability is seemingly derived unless there are direct or rule governed examples that say otherwise.

When looking at an individual with a diagnosed disability per the conceptualization of the community in which they live (e.g. diagnosis leading to the disability perception), let's say that an individual has a certain set of repertoires, this is something that can be directly seen and

may be considered contingency shaped observation. Some examples may include this individual having facial or bodily structures that may look different from the rest of the community, may have patterns of speech that might seem atypical, and exhibit various physical movements such as motor stereoscopy, that is not typical of the individuals that live within that society now let's say that individuals with those types of repertoires are considered impaired. This impairment as we discussed in chapters 1 and 2 is the basis for creating an ideology and conceptualization of disability as well as potential stigma (Yang et al. 2007; Corrigan et al. 2001; Corrigan 2004). When looking at these two frames the derived combinatorial mutual entailment of impaired versus impaired versus the person with disabilities and capable versus the self, these ideologies are then reinforced by the verbal community at large. Now let's add in another frame. The verbal community directly teaches that individuals who are impaired may be sick and that sickness might be related to death those impairments then are also seeing as atypical and thus the derived relation between death and atypical behaviors is formed within the verbally competent individual. The cultural majority teaches a frame of opposition with death as we need to avoid death (as the opposite of life) at all costs. The cultural majority also puts atypical behaviors in the frame of opposition with itself if the self then identifies with the cultural majority – then a whole host of verbal relations are derived such as an individual with disability is opposite of the self or at the very least unspecified difference (i.e. distinction) and that the individual with the developmental disability should be avoided at all costs as they are related to impairment atypical behaviors, and death (Kruzban & Leary, 2001).

While coming in contact with this individual having these cultural labels placed upon them, a generalized response (either private or public) may happen in the presence of people with a disability and create hierarchical classes not just with disability containing other disabilities,

but putting the individual in the "unsafe" category where other groups (e.g. criminals) are already part of per society categorization (Corrigan et al. 2002; Corrigan 2004; Quinn & Chaudoir, 2009). This is just a short example about how disability stigma can arise as it relates to relating the individual towards an individual with a developmental disability, especially one that has been deemed by that community as being different. It is not meant to be an exhaustive methodological explanation nor is its intent to offend.

Beginning with a concept as simple as difference in observation, this model shows that other more complicated verbal relations can be derived between the self and PWDs. This then has major implications for teaching individuals how to be more culturally sensitive and take the perspective of individuals with disabilities as a whole to help break down misconceptualizations around impairments and disability (Corrigan 2004). As a result of potential formations as seen in the model above the general context of this manuscript is to help understand better the relational frame families that are responsible for the formation of stigma, and by extension being able to change those frames and the overall stimulus function regarding the perceptions of individuals with disabilities. These methodological examinations are much needed and are currently lacking in the field of applied behavior analysis – to the author's knowledge – in terms of their relation towards the perceptions of those with disabilities.

CHAPTER 4

PURPOSE OF THE CURRENT STUDIES

Language is a powerful human behavior can create both positive and negative societal effects for *people with disabilities* (PWDs) including policy formation (Zeigler 2020), workplace discrepancies (Teindl et al. 2018), health care disparities (Drainoni et al. 2006), and social exclusion (Kurzban & Leary, 2001). Much of these services focus on a biomedical model of disability (Smart, 2015) in where only the impairment of an individual is the main determining factor of how a person is disabled thereby putting the onus on the PWD for reaching society's expectations (Corrigan, 2004). A more social model of disability (Smart, 2009; Smart, 2015) suggests that disability is a conceptualization of society and thereby the hindrances are not the individual's fault but the society itself. Given that words and the usage of language has substantial power over the labels and ultimately the services available for PWDs (Zeigler, 2020), it is increasingly paramount that the study and alteration of this language be utilized. *Relational Frame Theory* (RFT; Hayes et al. 2001), and by extension *contextual behavioral science* (CBS), hold a useful and unique behavioral technology in order to tackle not only the analysis of, but the reduction of stigma and prejudice (Stewart 2018; Biglan 2003; Matsuda et al. 2020). Many of these studies, however, have not specifically analyzed the various frames that are responsible for this stigma formation especially towards PWDs. In reaction to this gap in the literature (as far as the author is aware), the purpose of the current set of studies is to examine three stigma reducing protocols but increase the perceptions of ability – study 1) frames of coordination, study 2) deictic frame training and psychological flexibility, and study 3) the self in relation to PWDs.

CHAPTER 5

METHODOLOGY

Cross Experiment Questionnaires

In addition to the specific dependent variables in each individual experiment, all of the questionnaires detailed below were completed prior to and immediately after the completion of each experiment (with the exception of the demographics form which will only be done at the beginning). These measures include:

Demographics form – Each participant was given this electronically via the software used in this program. See Appendix A for list of questions which were asked.

Acceptance and Action Questionnaire – 2 (AAQ-II) – Bond, Hayes, Baer, et al. (2011) created this empirically validated extension of the *Acceptance and Action Questionnaire* (AAQ; Hayes, Strohsal, Wilson, et al. 2004) that includes 7 items (compared to the AAQ's 49-item) measure level of psychological flexibility. This is done by rating each of the questions on a 7-point Likert Scale (1 = *never true*; 7 = *always true*). For example, participants would read "worries get in the way of my success" then rate from never true to always true. The greater the score, the greater the psychological inflexibility. This measure has been validated across multiple cultures, had good discriminant validity, and is a reliable predictor of anxiety, depression, and psychological distress (Borgona et al., 2020; Bond et al., 2011). Given the strong metrics of flexibility, experiential avoidance, and that psychological inflexibility is significantly correlated with stigmatizing thoughts towards self and others (Krafft et al., 2018), this was used as the main measure of psychological flexibility.

Acceptance and Action Questionnaire – Stigma (AAQ-S) – Levin, Luoma, Lillis, Hayes, & Vilardaga (2014) created the AAQ-S which is an extension of the *Acceptance and Action*

Questionnaire – II (AAQ-II; Bond, et al. 2011) specifically looking at the relationship between psychological inflexibility as it relates towards stigmatizing thoughts (21-items) and rated on a 7-point Likert scare (1 = *never true*; 7 = *always true*). For example, a participant would read "I feel that I am aware of my own biases" then rate from never true to always true. Similar to the AAQ-II, this scale looks psychological flexibility and inflexibility but in reference to stigmatizing thoughts and is more sensitive than the AAQ-II as identifying items related to stigmatizing thoughts. This was treated as the main measure of the stigma construct pre/post each experiment. However, this measure will not be the sole measure of psychological flexibility as Levin et al. (2014) describe that the AAQ-II had great content validity as it specifically related to flexibility. As a result, both other these measures were used so as to more accurately measures psychological flexibility, inflexibility, and its relations to stigmatizing thoughts.

General Capabilities Scale (GCS) – This scale was formed for the purpose of rating overall perceived capabilities of the people portrayed in the following studies. This was adapted from the *Quality of Life Scale* (QOL; Flanagan, 1978; Burkhardt et al. 1982) as a basis which include the categories of *physical material well-being, relations, social community civic activities, personal development fulfillment,* and *recreation*. Given the quantity of stimuli the participants were expected to respond to – so as to not elicit fatigue – each question on the GCS was derived from the strongest correlated item in each group as identified by Zuccoloto & Zangiacomi Martinez (2019). The scale includes 5 total questions across the 5 QOL categories rated on an adapted 7-point Likert scale (1 = *not likely at all*; 7 = *very likely*) – higher score represent greater perceived capability of the individual. These include the sentence starting with "How likely is this person to…:

- … independently get what they want (food, clothes, etc.)?

- … form close relationships (friendships, partners, etc.)?
- … help others (volunteering, give advice, etc.)?
- … understand their strengths and weaknesses?
- … participate in social activities (sports, concerts, etc.)?

These statements were presented in various stimuli throughout these following studies – see Figure 2 for a visual example of this using the computer program. Each experiment will use a variation of this as described in the following sections.

Experiment 1

Frames of Coordination on Stigma Perceptions

Rationale

Kohlenberg et al. (1991) as well as Schulenberg, Lair, Wilson, & Johnson (2019) suggest that applications of RFT may be used as a basis for changing the frames associated with stigma. Previous studies have suggested that by using a computer-based training procedure rooted in RFT were able to reconstruct views of terrorism and overgeneralizing these concepts to all with Middle-Eastern descent being terrorists (Dixon et al., 2007; Dixon et al., 2009). To the knowledge of the author, there have not been any other studies in dismantling similar overgeneralized frames as it related to stigma towards those with developmental disabilities. If derived relational responding (DRR) were to be used, given prior research, as a way of changing overgeneralized associations between one group of people and harmful perceptions, it stands to reason that a similar procedure can be used to help reduce harmful perceptions of other diverse populations as well. The purpose of *Experiment 1* is to utilize a simple computer-based training procedure rooted in RFT to the construct of stigma (as measured by assessment detailed below) between those with a developmental disability (DD) and poor social outcomes (e.g. inability to

achieve wants/needs/goals).

Research Questions

Research Question 1: Will creating a frame of coordination between stimuli sets result in the participants deriving increased capability scores for PWDs?

Null Hypothesis 1: There will be no change on the GCS Pre/Posttest task suggesting no transfer of stimulus function to novel stimuli.

Alternative Hypothesis 1: There will be no change on the GCS Pre/Posttest task suggesting no transfer of stimulus function to novel stimuli.

Research Question 2: Will creating new frames of coordination between PWDs and capability increase overall psychological flexibility?

Null Hypothesis 2: There will be no change between pre-training and post-training scores on psychological flexibility as measured by the *AAQ-II* and/or *AAQ-S*.

Alternative Hypothesis 2: There will be a change between pre-training and post-training scores on psychological flexibility as measured by the *AAQ-II* and/or *AAQ-S*.

Research Question 3: Will relational training of one set of stimuli result in generalization across novel, formally similar stimuli?

Null Hypothesis 3: There will be no change on the GCS Generalization task suggesting no transfer of stimulus function to novel stimuli.

Alternative Hypothesis 3: There will be change on the GCS Generalization task suggesting transfer of stimulus function to novel stimuli.

Participants and Recruitment

There were 5 total participants in the study which included 4 identifying as female and 1 as male – all participants were working professionals living in and around a major midwestern

urban center and recruited via social media postings. Participants' ages ranges from 23-32 with the most common grouping being between the ages of 28-32 (3 out of 5 total participants). In an effort to get a more representative sample of individuals, there is little explicit inclusion or exclusion criteria as all participants were able to read the directions to complete the study on their person computers. The study format did not need to be modified to adjust for potential visual or auditory impairments per participants report/comfort.

Experiment Setting

All portions of this experiment were completed utilizing the Python-based, open-source psychological research software PsychoPy3 (Pierce, Gray, Simpson, MacAskill, Höchenberger, Sogo, Kastman, & Lindeløv, 2019) on their personal laptop or desktop computer in one sitting with all of their data codified in order to protect participant identity. All responses (including latency to response) were automatically recorded on a CSV files (then converted to a Microsoft Excel workbook) that the software produced after completion of the study. Given the sensitivity of this study topic, all data are encrypted, and password protected on the website in addition to all participants being assigned a code in order to protect the participants personal identity.

Protocol Stimuli

GIFs. All media of people represented in this study were in the form of a *Graphics Interchange Format* (i.e. "GIF"). This was done intentionally as many developmental disabilities (DD) do not have a physical accompaniment which would denotes their diagnosis. For example, those diagnosed with Down Syndrome (DS) generally exhibit noticeable facial features that can be observed in a still photo. However, for an autistic individual or those with intellectual disabilities, unless there are other comorbid diagnoses such as DS, there are no physical traits of individuals with this diagnosis. As a result, a still picture may not be identified as the person

being neuro-atypical (e.g. an individual diagnosed with an autism spectrum disorder may not "look" different but rather their behaviors [e.g. stereotypy] deviate from what the verbal community deems as "normal"). In response to this, gifs were created by finding, and citing, YouTube videos, creating GIFs with Giphy.com, then, so that the GIFs would loop longer than a few seconds, would be copied and strung together into a longer MP4 file using Clideo.com. This way, each GIF more accurately represented the behavior(s) associated with this diagnosis so as to control for not directly naming the picture as one diagnosis or another.

There were three categories of these GIFs so to better include and control for various collateral manifestations (appearances and/or behaviors that are associated with a disability diagnosis). The following categories are not meant to cause undue microaggressions or negative perceptions – they were used as a categorizing tool purely based on biological features or movements of the individuals. Each GIF was also created by searching YouTube for appropriate diagnosed behaviors (DS, ASD, cerebral palsy, etc.) and no other information was known about the individual than what was already publicly available from the YouTube video. The first category was *facial collateral manifestation* (FCM) which will depict an individual with a body shape or facial feature(s) that more clearly deviates from a "typically developing" human. The second category was *stereotypic collateral manifestation* (SCM) which will depict an individual who will engage in a socially inappropriate behavior (motoric stereotypy, self-injurious behavior, etc.). The third category was *movement collateral manifestation* (MCM) which will depict and individual who is able to stand but needs help walking with a walker coupled with an atypical gait (think Cerebral palsy). The fourth category was a *manifestation control* (MC) or the *people without overt manifestations of disability* (PWOMD) category in which the individual depicted were doing something (standing, sitting down, walking) that would not denote any observable

physical or behavioral deviations from what is "expected" from a neurotypical individual and will serve as the potentially non-disabled (although mental health or other developmental concerns are unknown).

Stimuli Groupings. There were three grouping of stimuli across the present study and are detailed below for ease of experimental understanding:

- *Grouping 1: GCS Pre/Post-test* GIFs will include 6 total GIFs (3 from MC/PWOMD and one each of FCM, SCM, MCM) and will serve as the pre-post stimuli used for the GCS to assess overall capability. This was done in an effort to control for physical disabilities, behavioral concerns, and the control group.
- *Grouping 2: Training Stimuli* were the main training stimuli for the study – all of which can be found in Figure 3. Stimuli set A will depict various arrows facing in different directions. Stimuli set B will include 3 MC/PWOMD GIFS (walking, hands down, smiling to mirror the "typical" movements of the other collateral manifestation categories). Stimuli set C were the words CAPABLE, ABLE, ADEPT along with distractor stimuli. Stimuli set D was 1 picture from each FCM, SCM, MCM.
- *Grouping 3: GCS Generalization GIFs* will include 3 novel GIFS in each of the 3 collateral manifestation categories (FCM, SCM, MCM) for a total of 9 novel stimuli. These were considered the generalization probe to test transfer of stimulus function to stimuli that share non-arbitrary similarities – see Figure 4 for complete list.

Experimental Design and Procedure

The overall protocol was an amalgamation of those used in Dixon et al. (2006) and Dixon et al. (2009) with the adaptions of different stimuli, different categories grouping (see above for details), and will include a generalization phase to test transfer of function to other formally

similar, but novel stimuli.

Pre-questionnaires: The participants will first have to complete a simple demographics questionnaire (see Appendix A) followed by the AAQ-II and AAQ-S.

Phase 1: GCS Pre-Assessment - Once they complete the aforementioned assessments, they were brought to a screen with the following message:

> *In this first portion of the study, you will be presented with a GIF at the top followed by a equation and a rating scale. By clicking or touching the rating scale, you will answer each question. There is not "right" answer and you will receive no feedback in this portion so answer each question honestly. Once completed, you will be brought to the next portion of the study.*

This will continue for a total of 6 trials (5 questions per each of the 6 GIFs) and was followed by a blank screen saying, "You are done! Thank you for your responses. Please press the 'next' picture to continue on to the next part of the study."

Phase 2: A-B training – in this portion of the study, students will first receive this message:

> *In this next part of the study, you will be presented with 4 stimuli, an arrow at the top and three GIFs on the bottom. Your job is to pick the item (by clicking or touching) the GIF that is linked with the arrow. If you chose the correct item, you will hear a ringing sound followed by a screen that says "Correct!" – if you chose the incorrect item, you will hear a buzzing sound followed by a screen that says, "Incorrect…". Try to get as many corrects as possible as you will have to get a certain amount to move onto the next part of the study. Do your best and let the researcher know if you have any questions along the way!*

Please click the "next" picture once you are ready and let the researcher know if you have any questions.

Participants will then be presented with the set up shown in Figure 5 on their computer screen. As described above, there was one of the arrows with three GIFs underneath. The participant will have to choose the correct matching picture. The "Correct!" text were large and highly contrasted with the background so that those who have vision impairments may be able to read this more easily (otherwise there is the sound) and those with hearing impairments can read instead of responding to the sounds. Depending on their computer capabilities and assistive technology, individuals who are blind will have the option to do the study with GIFs replaced by a written explanation of the GIF and a arrows descriptor they can chose from (e.g. "sideways arrow"). To advance to the next phase of this protocol, participants will have to gain a 90% accuracy average (11/12) across the most recent 12 trials – for example, if the first 12 trials only results in 80% accuracy, the participant continued to another training trial with the first trial they completed was dropped from the average (since this only took the most recent 12 trials).

Phase 3: A-C training – The procedures were identical to that of *phase 2* with the only change being stimuli set A was presented with 6 words – 3 from stimuli set C of words denoting capability and 3 distractor words denoting inability. These distractor stimuli were simultaneously train frames of coordination with capability and frames of distinction with words denoting inability. Figure 6 depicts what participants would visually see. The criterion will remain the same as *phase 2* in order to advance to the next phase.

Phase 4: Mixed Training of A-B and A-C – A total of 24 possible trial types (12 A-B trials and 12 A-C trials) were presented. There was no feedback given in this phase. Participants needed to reach a criterion over 90% (22 correct out of 24 possible trials) accuracy average of

the 24 most recent trials in order to advance to the next phase.

Phase 5: Symmetry, Transitivity, and Equivalence Post Test 1 – Participants were then presented with the following statement instructions for the next portion the study:

> *In this section, you will be presented with the same stimuli you have already seen. You will presented with one of the stimuli you have already seen above with three comparison stimuli on the bottom. Pick the one that matches. You will not receive any feedback this time so respond to the best of your ability! Upon completion, you will be brought to the next part of the study.*
>
> *Please click the "next" picture once you are ready and let the researcher know if you have any questions.*

There was a total of 48 trials (12 B-A symmetry trials, 12 C-A symmetry trials, and 12 B-C transitivity trials, and 12 C-B equivalence trials). During the post-test phases, no feedback was given (as there is no criterion) and there were no distractor stimuli – only stimuli that were directly trained in previous phrases. Once this is completed, participants move onto the next step – See Figure 7 for a depiction of what this would look like for participants.

Phase 6: GCS Post Test 1 – This step was identical to Phase 1. Upon completion the participants will move onto the next phase.

Phase 7: A-D training – This phase was identical to phases 2 and 3 only that Stimuli set A were related to stimuli set D. Criterion remains the same.

Phase 8: Mixed training of A-B, A-C, & A-D – This procedure was identical to *Phase 5* except with the change of adding A-D stimuli sets. There was a total of 36 trial types (12 A-B trials, 12 A-C trials, & 12 A-D trials). To proceed to the next phase, the participants need to reach above 90% accuracy in a single trial block (33 correct trials out of 36 total trials).

Phase 9: Symmetry, Transitivity, and Equivalence Post Test 2 – This is identical to *Phase 5* with the addition of the D stimuli. There was a total of 108 trials (12 B-A symmetry trials, 12 C-A symmetry trials, 12 D-A symmetry trials, 12 B-C transitivity trials, 12 D-B transitivity trials, 12 D-C transitivity trials, 12 C-B equivalence trials, 12 B-D transitivity trials, 12 C-D equivalence trials). Once completed, participants will move onto next phase.

Phase 10: GCS Post Test 2 - This step was identical to Phase 1. Upon completion the participants will move onto the next phase.

Phase 11: GCS Generalization posttest – The format of this section was the same as previous GCS tests with the extension that each of the 3 disability manifestation categories (PCM, SCM, & MCM) will have 3 novel stimuli in each that share formal similarity in a hierarchal frame of the defining feature of that category. In total, there were 45 total questions (9 total novel stimuli at 5 GCS questions each) to assess the generalization of the training to other formally similar stimuli.

Post-questionnaire and debrief: Once all phases were complete, participants completed the AAQ-II and AAQ-S. Participants were debriefed about the study and questions were answered for those who had them. Following the debrief session, participants were free to log off of Zoom.

Results

These results were reviewed as effects across all 5 participants with individual differences noted for each of the measure used in this study. As such, each section will review a separate dependent variable split up into three measurement categories – *psychological flexibility* (AAQ-II & AAQ-S), *derived relations* (symmetrical, transitive, and equivalent relations), and *GCS perceptions* (pre-/posttest GCS and GCS Generalization).

Psychological flexibility measures. All 5 participants exhibited lower scores in the AAQ-II (see figure 8) from the pre-experimental scores (M = 19, SD = 8.72) to their post (M = 16.6, SD = 8.96). In 4 of the 5 participants, there were decreases in overall AAQ-S scores (see figure 9) from pre- (M = 66.4, SD = 11.10) to post-experimental scores (M = 58.8, SD = 14.40). Participant 5 did show a total score increase from 82 in pre to 83 in post. Of note, 4 out 5 participants showed a decrease in flexibility scores (only participant 1 with a score increase of 3).

Derived relations test. The training resulted in symmetrical, transitive, and equivalent relations with an accuracy of at least 83% accuracy (responding compared to the intended derived relation to be taught) across all participants for both A, B, and C relations (see Table 1) and A, B, C, and D relations (see Table 2). These data detail that participants were able to accurately derive new relations having only been directly taught A-B, A-C, and A-D relations using the presented computer program.

GCS perception measures. The GCS total score included 3 stimuli termed as people without overtly manifested disabilities (PWOMD; person walking, person sitting, person smiling) and PWDs which included one of 3 manifestation categories created for this experiment – *facial collateral manifestation* (FCM), *stereotypic collateral manifestation* (SCM), and *movement collateral manifestation* (MCM). In the following analysis, these will be looked at separately and of note, higher scores for the GCS mean greater perceptions of the individuals capability levels in various areas of life (relationships, jobs, etc.). Figure 10 depicts the PWD stimuli within the GCS measure and reveals that all 5 participants showed increases in GCS scoring from their pretest (M = 67.80, SD = 9.07) to their posttest scores (M = 86, SD = 12.02) with an average score increase of 18.2 (SD = 14.01). When looking at PWOMD, all 5 participants also showed increased in GCS score from pretest (M = 77.40, SD = 12.48) to

posttest (M = 89.40, SD = 12.61) with an average score increase of 12 (SD = 2.87). In both PWD and PWOMD sample, participant 5 showed the highest score rating with all responding being a score of 7 for all questions. In order to control for any potential outliers in the data, when removing participant 5's data, the average score difference for PWD stimuli (M = 12.25, SD = 5.06) and PWOMD (M = 3.75, SD = 2.87) had depicted a greater mean score difference in PWD versus PWOMD stimuli for pre- and posttest GCS. Figure 13 corroborates these scores differences across pre and post tests for PWD and PWOMD stimuli with all but participant 5 showing increased scores for pre-/posttest scores seen in PWD versus PWOMD.

When comparing PWOMD and PWD scores, Figure 14 depicts this difference between pre-/posttest PWOMD scores from PWD scores – scores above 0 indicate that the PWOMD still scored a higher perception of capability. As scores approach 0, this suggests little to no difference of perception between PWOMD and PWD stimuli as seen in participants 4 and 5 (with participant 4 showing greater perceptions of capability for PWD stimuli). When considering GCS scores to the percentage of capability (total number rated divided by 105 [the top score] multiplied by 100%), table 3 depicts that there was a score increase for all 5 participants for PWD stimuli, there was a 16.93% percentage of capability increase from pretest (64.57%) to posttest (81.90%).

Figure 11 depicts the total score for GCS generalization with all scores above 204 (out of 315) with an average score of 255.40 (SD = 42.67). Table 3 depicts the comparison of the percentage of capability scores for GCS generalization and pre-/posttest GCS scores. Generalization scores (81.08%) matched the scores for GCS posttest scores (81.90%). When breaking apart the GCS generalizations cores into their three subsections [of FCM, SCM, and MCM], across all 5 participants, MCM stimuli were scored the lowest.

Brief Discussion

To address research question 1, all 5 showed that the training to result in new frames of coordination with capability [as measured by stimulus equivalence scores; see tables 1 and 2] and all 5 showed increases in ability perceptions of individuals with disabilities [as measured by the GCS; see figure 10]. These results suggest that participants formed frames of coordination between PWD stimuli and capability words resulting in responding to the GCS rating scale with increases in capability perception. In support of research question 2's alternative hypothesis, all 5 participants did exhibit decreases in psychology inflexibility [on the AAQ-II; see figure 8] suggesting that all participants experienced an increase psychological flexibility after engaging in the computer training. Additionally, 3 out of 5 participants showed decreases in overall stigma scores [on the AAQ-S: see figure 9]. Research question 3 was addressed through the GCS generalization scores along with similar responding patterns for the generalized stimuli [as measured by the GCS Generalization; see figures 11 and 12]. Procedural limitations and comparisons to the other experiments in this line of research will be reviewed more in depth during the general discussion.

Experiment 2

Deictic Framing and Perspective Taking

Rationale

Hooper, Erdogan, Keen, Lawton, & McHugh (2015) were able to use McHugh, Barnes-Holmes, & Barnes-Holmes (2004)'s perspective-taking protocol in order to reduce the *fundamental attribution error* (FAE) in their participants towards understanding political perceptions. Given that perspective-taking may impact the level of stigma an individual may feel towards another (Corrigan et al., 2003), a logical extension of a lack perspective-taking skills may be linked to

feelings of stigma towards those with disabilities. To the knowledge of the author, this has never been directly tested and thus the purpose of *Experiment 2* is to assess the effects of a perspective-taking training on the construct of stigma towards those with developmental disabilities.

Research Questions

Research Question 1: Will direct training results in correct formation of single, reversed, and double reversed deictic frames?

Null Hypothesis 1: Participants will not be able to reach mastery criterion of the relevant perspective-taking frames.

Alternative Hypothesis 1: Participants will be able to reach mastery criterion of the relevant perspective-taking frames.

Research Question 2: Will training deictic frames, and extensions including PWDs within stimuli, increase overall psychological flexibility?

Null Hypothesis 2: There will be no statistically significant change between pre-training and post-training scores on psychological flexibility as measured by the *AAQ-II* or *AAQ-S*.

Alternative Hypothesis 2: There will be a statistically significant change between pre-training and post-training scores on psychological flexibility as measured by the *AAQ-II* or *AAQ-S*.

Research Question 3: Will deictic frame training result in increased perception of capability towards PWDs?

Null Hypothesis 3: There will be no change on the GCS Pre/Posttest task across 4 timed measures suggesting no transfer of stimulus function to novel stimuli.

Null Hypothesis 3: There will be a statistically significant change on the GCS Pre/Post-

test task across 4 timed measures suggesting no transfer of stimulus function to novel stimuli.

Research Question 4: Will relational training of one set of stimuli result in generalization across novel, formally similar stimuli?

Null Hypothesis 4: There will be no change on the GCS Generalization task suggesting no transfer of stimulus function to novel stimuli.

Alternative Hypothesis 4: There will be change on the GCS Generalization task suggesting transfer of stimulus function to novel stimuli.

Participant and Recruitment

There were 23 total participants who completed the study (4 dropped out during the study) including 19 participants identifying as female and 4 as male – all participants identified as either students (n = 6), working professionals (n = 15), or out of work (n = 1) living in the Midwest U.S.A. and recruited via social media postings or via department emails from a major midwestern university. Participants' ages ranges from 23-67 with the most common grouping being between the ages of 28-32 (14 out of 23 total participants). In an effort to get a more representative sample of individuals, there is little explicit inclusion or exclusion criteria as all participants were able to read the directions to complete the study on their person computers. The study format did not need to be modified to adjust for potential visual or auditory impairments per participants report/comfort.

Experimental Setting

Setting details are identical to experiment 1.

Protocol Stimuli

Basic Training. All stimuli were presented on the PsychoPy3 software program created

by the author. At the top of the screen, there were a phrase depicts one of the three deictic frames (I-YOU, HERE-THERE, NOW-THEN) across three categories (simple, reversed, double-reversed). Just below this phrase showed a question to which the participants will have to choose the correct option from two choice presented. Each of these statements had two questions, presented at random, which are described in the protocols below. The initial training phrases were referenced directly from McHugh et al. (2004) perspective taking protocol until each of the training phases in the current study have 5 statements (4 direct examples plus 1 foil) in each. I-YOU and HERE-THERE simple statements will have two additional examples that are not listed in McHugh et al. (2004) as there were originally only two statements. Reversed and double-reversed training phases across all three deictic frames were pulled directly from Almada (2015)'s 10-item *RFT-PT Brief* assessment which include 4 examples identified in McHugh et al. (2004) plus one foil so as to ensure attending to the task. An example of how this were structured on the screen using the PsychoPy3 software can be seen in Figure 15.

Mixed Training. Per protocol suggestion of Almada (2015), during mixed training trials the phrases were written in more common, "every-day" terms as it relates to an individua. For example, the McHugh et al. (2004) statement of "I have a red brick and you have a green brick. What brick do YOU have?" would be written as "Luciano is holding their iPad and Luca is holding a cell phone. What is Luca holding on to?" For all reversed and double reversed statements during he mixed training phases, the 25-item *Deictic Relational Task* (DRT) *Brief* (Almada, 2015) used in their study were implemented in the current study. For all simple relations, new phrases were utilized in a similar format.

Deictic Post-Test. In this section, 15 novel statements written in "every-day" terms were accompanied by a GIF of an individual with a disability (either PCM, SCM, & MCM) – See

Figure 16 for an example. There was no feedback during these trials as this will only be use for testing purposes.

GCS Pre/Post Test – The participants will see a GIF on the top of their screen with one of 5 questions related to quality of life and capability level directly under the picture. Participants were expected to rate the stimuli on a 7-point Likert scale (1 = *not likely at all*; 7 = *very likely*). This will continue for a total of 15 trials (5 questions per each of the 3 GIFs across the PCM, SCM, & MCM categories described in experiment 1) and were followed by a blank screen saying, "You are done! Thank you for your responses. Please press the 'next' picture to continue on to the next part of the study."

GCS Generalization posttest – This test is identical to the one used in Phase 11 of experiment 1 and was completed by the participant in the final phase of the protocol to test for overall generalization with stimuli sharing formal similarity within each category (PCM, SCM, & MCM).

Experimental Design and Procedure

Pre-Assessment questionnaires **–** The consent form, demographics form, AAQ-II, and AAQ-S were first completed by the participants. Once these were finished, the participant moved to the next portion of the study.

Phase 1: GCS Pre/Posttest 1 – The participant will see a screen identical to the one detail in phase 1 of experiment 1. Upon completion, they will click or touch the "next" picture to move onto the next portion of the study.

Phases 2, 3, & 4: Simple I-YOU, HERE-THERE, NOW-THEN basic training – Participants will first see a screen that says:

In the next section, please read each question carefully and chose the right answer. If you

get something correct you will see a correct! Screen paired with a bell sound – incorrect will result in an incorrect! Screen paired with a buzzer sound. Please do your best on this task so that you can move onto the next phase.

Click or press the "next" picture to continue.

Stimuli were presented as identified/depicted in the protocol stimuli section of this experiment. For example, when presented with the statement "I am sitting here in a blue chair and you are sitting there in a black chair" followed by the question "where are YOU sitting?", the participant will click/touch the "black chair" option. To meet criterion, participants must achieve 100% accuracy in the 5 most recent trials completed (see experimental 1 for details on how this is obtained) before they can advance to the next section – any failure will result in repeated stimuli presentation until criteria is met. This simple relation basic training will continue until all three frames meet mastery criteria.

Phase 5: Simple Relations Mixed Training – Participants will interact with the software the same way as phases 2-4 with identical feedback procedures using the stimuli identified in the *mixed training* of the *protocol stimuli* section in this experiment using the DRT Brief (Almada 2015). There were a total of 20 examples to which mastery criterion to progress was above 90% average accuracy on the 20 most recent completed trials before they can move onto the next phase.

Phase 6: Simple Deictic Posttest – Participants will first see the following statement regarding instructions for the next phase of the study:

In this next section, you will a GIF accompanied by a novel statement (like the ones you have seen before) and question. You will not receive feedback during this section so answer to the best of your ability! Once you answer all questions, you will be able to

move onto the next phase.

Click or press the "next" picture to continue.

After the participants respond to the 15 trials (as defined in the protocol stimuli section), they were brought to the next portion of the study.

Phase 7: GCS Pre/Posttest 2 – This was identical to phase 1 of this study. Upon completion, they will move onto the next portion of the study.

Phases 8, 9, & 10: Reversed I-YOU, HERE-THERE, NOW-THEN basic training – These phases were identical in formatting as phases 2, 3, & 4 with the addition that these phrases, which was pulled for the RFT-PT Brief assessment (Almada 2015), was the stimuli the participants will interact with. For example, a participant may see "I have a green brick and you have a red brick. If I were you and you were me…" followed by "which brick would YOU have?" to which the participant should answer by clicking/touching the "green" stimuli. Criterion will remain 100% average accuracy in each phase in order to move to the next.

Phase 11: Reversed relations mixed training – The format was identical to phase 5 with the addition of new reversed relations using the DRT Brief (Almada 2015) stimuli. A 90% average accuracy must be met before they can move onto the next phase.

Phase 12: Reversed Deictic Posttest – This phase is identical to phase 6 with reversed relations using the DRT Brief (Almada 2015). After the participants respond to the 15 trials (as defined in the protocol stimuli section), they were brought to the next portion of the study.

Phase 13: GCS Pre/Posttest 3 – This was identical to phase 1 of this study. Upon completion, they will move onto the next portion of the study.

Phase 14, 15, & 16: Double Reversed I-YOU, HERE-THERE, NOW-THEN basic training – These phases were identical in formatting as phases 2, 3, & 4 with the addition that

these phrases, which was pulled for the RFT-PT Brief assessment (Almada 2015), were the stimuli the participants will interact with. For example, the participant may see, "I am sitting here in a black chair and you are sitting there in a blue chair. If I was you and you were me and if here was there and there was here…" Followed by the question, "where are YOU sitting?" the participant would click/touch the "BLUE" option. Criterion will remain 100% average accuracy in each phase in order to move to the next.

Phase 17: Double Reversed relations mixed training – The format was identical to phase 5 with the addition of new reversed relations using the DRT Brief (Almada 2015) stimuli. A 90% accuracy score in a single trial block must be met before they can move onto the next phase.

Phase 18: Double Reversed Deictic Posttest – This phase is identical to phase 6 with reversed relations using the DRT Brief (Almada 2015). After the participants respond to the 15 trials (as defined in the protocol stimuli section), they were brought to the next portion of the study.

Phase 19: GCS Pre/Posttest 4 – This was identical to phase 1 of this study. Upon completion, they will move onto the next portion of the study.

Phase 20: GCS Generalization posttest – This was identical to phase 11 of protocol found in experiment 1.

Post-questionnaire and debrief: Once all phases were complete, participants completed the AAQ-II and AAQ-S. Participants were debriefed about the study and questions were answered for those who had them. Upon completion, participants were able to close out their web browsers.

Statistical testing

ANOVA. One-way repeated measures ANOVA tests were conducted on GCS measures

across 4 timings through the experiment – *Pre* (before any of the training phases began), *Post1* (after single frame test), *Post2* (after reversed frame test), and *Post3* (after double reversed frame test). This type of ANOVA was also run on GCS generalization stimuli comparisons (FCM, SCM, MCM) as well as percentage of capability comparisons between generalization and pre/post GCS measures. Per calculations using the G*Power software (Faul et al., 2009), an analysis of 23 participants yielded a total power of 0.797.

T-tests. A repeated measures t-test was used to compare pre-post measures of both the AAQ-2 and the AAQ-S. This test was also used for any significant ANOVA scores to assess where the potential significant differences were. Appropriate corrections were utilized (see results section) in order to better control for potential Type 1 errors. Per calculations using the G*Power software (Faul et al., 2009), an analysis of 23 participants yielded a total power of 0.75.

Results

As with experiment 1, each of the of the measures were reviewed separately and synthesized in the discussion section.

Psychological flexibility measures. A repeated measures t-test was run in Microsoft Excel indicating that there is a statistically significant increase, given an alpha level of 0.05, between pretest (M = 24.56, SD = 10.25) and posttest (M = 23.17, SD = 10.68) AAQ-2 scores, $t(22) = 2.389$ p = 0.013. This rejection of the null (e.g. that there is no difference) indicates that the computer training of deictic frames did have a statistically significant effect on increasing overall psychological flexibility.

A repeated measures T-Test was run in Microsoft Excel indicating that there was no statistically significant score changes, given an alpha level of 0.05, between pretest (M = 65.87,

SD = 11.41) and posttest (M = 66.82, SD = 14.35) on total AAQ-S scores (psychological flexibility and inflexibility measures combine score), $t(22) = -0.504$ p = 0.309. These results i= a rejection of the alternative hypothesis and suggests that the computer training of deictic frames did not have a statistically significant effects on overall psychological flexibility as it relates to stigma perceptions.

GCS perceptions measures. A one-way, repeated measures ANOVA was run in Microsoft Excel across 4 timings of the GCS Total measure – pretest (M = 152.30, SD = 18.56), post1 (M = 154.48, SD = 23.29), post2 (M = 152.39, SD = 21.84), and post3 (M = 153.52, SD = 21.00). Results indicate that there were not statistically significant differences, given an alpha level of 0.05, in GCS total scores, $f(3) = 0.378$, p = 0.769. These results suggest that for this overall measure, there was no statistically significant difference across the three phases of deictic frame training. Of note, this measure is split into PWOMD and PWD stimuli – each of which will be reviewed.

PWOMD stimuli. A one-way, repeated measures ANOVA was run in Microsoft Excel across 4 timings of the GCS PWOMD sub-measure – pretest (M = 81.00, SD = 12.08), post1 (M = 80.70, SD = 12.27), post2 (M = 79.48, SD = 12.32), and post3 (M = 79.35, SD = 12.56). Results indicate that there were not statistically significant differences, given an alpha level of 0.05 in GCS total scores, $f(3) = 0.415$, p = 0.743. These results suggest that for this overall measure, there was no statistically significant difference across the three phases of deictic frame training.

PWD stimuli. A one-way, repeated measures ANOVA was run in Microsoft Excel across 4 timings of the GCS PWD sub-measure – pretest (M = 71.20, SD = 12.29), post1 (M = 73.78, SD = 14.55), post2 (M = 72.91, SD = 13.69), and post3 (M = 74.17, SD = 13.20). Results

indicate that there were not statistically significant differences, given an alpha level of 0.05, in GCS total scores, $f(3) = 2.763$, $p = 0.048$. These results suggest that for this overall measure, there was a statistically significant difference across the three phases of deictic frame training. Further statistical testing was needed in order to test where that difference was located. A total of 6 repeated measures t-tests were run to test each comparison dyad (Pre – Post 1, Pre – Post 2, Pre-Post3, Post1-Post2, Post2-Post3). Given that running multiple t-tests may increase the chance of a type 1 error (e.g. a false positive) by 30%. In order to control for this, a Bonferroni Correction (Weisstein, 2004) was implemented by dividing the alpha level by the number of t-tests being run (e.g. 0.05/6 = 0.0083) in order to control for this increase in type 1 error potentiality. This new alpha of 0.0083 then was used to compare the mean differences across all tests. All t-test comparison data can be found in table 4, but the only close to statically significant difference was seen between pretest (M = 71.20, SD = 12.29) and post3 (M = 74.17, SD = 13.20) scores for PWD stimuli, $t(22) = -2.5583$, $p = 0.0089$.

GCS generalization stimuli. A one-way, repeated measures ANOVA was run in Microsoft Excel across 3 different stimuli subsets within the GCS generalization measure – FCM (M = 75.04, SD = 14.19), SCM (M = 72.30, SD = 12.54), and MCM (M = 66.61, SD = 14.82). Results indicate that there was a statistically significant difference, given an alpha level of 0.05, in GCS subset scores, $f(2) = 0.15.464$, $p < 0.001$. This suggests that there is a difference between score subsets FCM, SCM, and MCM. To test where these differences lay, 3 paired-subjects t-tests were conducted between the comparison dyads (FCM-SCM, FCM-MCM, and SCM-MCM). As with the previous ANOVA tests, to control for a potential increase in Type 1 errors a Bonferroni Correction was conducted (alpha of 0.05 divided by 3 total t-tests) with an adjusted alpha level of 0.017. Table 5 shows all comparisons. The significant differences were seen

between both FCM-MCM [$t(22) = 5.068$, $p < 0.001$] and SCM-MCM [$t(22) = 4.087$, $p < 0.001$] suggesting that MCM had the lowest perception scores as measured by the GCS.

General capability percentage. In order to statistically test whether or not the GCS generalization scores are similar to the Post3 capability percentage scores (see experiment 1 for calculation). A repeated measures t-test was run comparing pretest (before any training) and post3 (after all training was completed) to the GCS generalization stimuli. A two-tailed alpha of 0.05 was used and any score that is not significantly different suggests that the scores are related to each other. When comparing post3 to generalization GCS tests, the scores showed no significant difference – $t(22) = 1.768$, $p = 0.091$. However, when comparing GCS pre to generalization scores, this also did not show any significant differences – $t(22) = -0.009$, $p = 0.993$ - for a two tailed test and no directionality looks like GCS GEN scores being higher than pretest scores - $t(22) = -0.009$, $p = 0.496$.

Brief Discussion

These results suggest that this computer training taught deictic frames to the participants (supporting research question 1's alternative hypothesis as evidenced by completion of the study), increased psychological flexibility (as measured by the AAQ-2 partially supporting research question 2's alternative hypothesis), and increased capability perceptions as measured by the GCS scores (support research question 3's alternative hypothesis) suggesting that the computer training was, at least briefly, sufficient in increasing the participant's psychological flexibility. AAQ-S scores were not shown to yield significant results so there is not enough support to suggest that this computer training was able to decrease psychological inflexibility as it relates to stigma. This, however, is not the only measure of stigma and perception as the GCS comparisons did yielded significant results suggesting that the computer training was able to

increase the capability perceptions towards PWD stimuli. Future research should include more participants and perhaps break apart each deictic frame to see its general effects on stigma reduction. This would further be extended, as reviewed in experiment 1, by analyzing potential effects on PWDs in person (likelihood of approaching, befriending, assisting when asked, etc.). Procedural limitations and comparisons to the other experiments in this line of research will be reviewed more in depth during the general discussion.

Experiment 3

Metaphors

Rationale

Masuda et al. (2007) compared the results of an ACT workshop showing that the use of metaphors may be useful in the reduction of stigma towards individuals with mental health illness. To the knowledge of this author, there have not been specific studies to analyze the components of ACT trainings are the pieces that work to defuse from stigmatizing thoughts. Additionally, much of the protocols created in previous research (Edwards et al. 2017) also include elements of understanding one's self and relating the self to others in perspective taking activities. As a result, the purpose of this study is analyze the utility of a metaphor given prior learning history (within experiment) to relate the self to individuals with disabilities and whether or not this has an effect on disability perception.

Research Questions

Research Question 1: After creating a relational history, will a metaphor create a frame of coordination between frames of the self, PWDs, and ability?

Null Hypothesis 1: The metaphor used will not result in accurate derived relational responding across stimuli set 1 (Self) and stimuli set 2 (PWD).

Alternative Hypothesis 1: The metaphor used will result in accurate derived relational responding across stimuli set 1 (Self) and stimuli set 2 (PWD).

Research Question 2: Will creating new frames of coordination between PWDs and capability increase overall psychological flexibility?

Null Hypothesis 2: There will be no change between pre-training and post-training scores on psychological flexibility as measured by the *AAQ-II* or *AAQ-S*.

Alternative Hypothesis 2: There will be a change between pre-training and post-training scores on psychological flexibility as measured by the *AAQ-II* or *AAQ-S*.

Research Question 3: Will relational training of one set of stimuli result in generalization across novel, formally similar stimuli?

Null Hypothesis 3: There will be no change on the GCS Generalization task suggesting no transfer of stimulus function to novel stimuli.

Alternative Hypothesis 3: There will be change on the GCS Generalization task suggesting transfer of stimulus function to novel stimuli.

Participant and Recruitment

There were 5 total participants in the study which included 5 total participants – 3 identified as female and 2 as male – all participants were working professionals living in and around a major midwestern urban center and recruited via social media postings. Participants ages ranges from 23-57 with the most common grouping split between 23-27 (2 participants) and 28-32 (2 participants). In an effort to get a more representative sample of individuals, there is little explicit inclusion or exclusion criteria as all participants were able to read the directions to complete the study on their person computers. The study format did not need to be modified to adjust for potential visual or auditory impairments per participants report/comfort.

Experimental Setting

Setting details are identical to experiment 1.

Protocol Stimuli

Training stimuli – Stimuli for the purposes of this training will include a series of arrows for set A. The phrases "DIFFERENT APPROACH" "ACHIEVE GOALS" and "ROLLING STOP" will represent set C. For set B there are a few important distinctions. B1 stimuli was a picture of the participant themselves which was taken via screenshot during the Zoom meeting and added into the programming. B2 was a GIF of a PWD that spans across all three categories mentioned in experiment 1 (PCM, SCM, & MCM). B3 was a GIF of a willow tree swaying and will act as the control for this experiment. All of these stimuli can be seen in Figure 10.

Metaphor – Although part of the training stimuli, the metaphor used in this study was an audio clip of the author talking through the metaphor which will include the words DIFFERENT APPROACH and ACHIEVE GOALS with the overall these that people can achieve their goals in a variety of different ways – see Figure 10 for full metaphor. This will serve as the relational "bridge" between the stimuli sets.

GCS Pre/Posttest – Utilizing the same structure of the modified QOL scale, there were 3 stimuli with 5 questions asked of each for a total of 15 questions to rate on a 7-point Likert scare (1 = *never true*; 7 = *always true*). The stimuli used for this measure was stimuli set B as identified in the previous section.

GCS Generalization stimuli – This was identical to that found in experiments 1 & 2.

Experimental Design and Procedure

Pre-assessment through phase 4 w similar to those used in experiment one and will use the protocols of Dixon et al. (2006) and Dixon et al. (2009) as a model.

Pre-Assessment questionnaires **–** The consent form, demographics form, AAQ-II, and AAQ-S were first completed by the participants. Once these were finished, the participant moved to the next portion of the study.

Phase 1: GCS Pre/Post – Participants will review an identical statement and format to phase 1 od experiment 1. Once the 15 questions are completed, the participant can move onto the next phase.

Phase 2: A-B training – This is identical to the procedures found in phase 2 of experiment 1 but using stimuli sets A and B as defined for this study. Criterion remains the same at 90% average accuracy form the last 12 trials (see experiment 1 for how this was calculated) – this equates to 11 out of the12 most recently completed trials.

Phase 3: A-C training – This is identical to the procedures found in phase 3 of experiment 1 but using stimuli sets A and C as defined for this study. Criterion is the same as phase 2 of this experiment.

Phase 4: Mixed Training of A-B and A-C – This phase is identical to phase 4 of experiment 1 only using the stimuli for this experiment. Upon completion, the -participants will move onto the next phase.

Phase 5: Symmetry, Transitivity, and Equivalence Post Test 1 – This phase is identical to phase 5 of experiment 1 only using the stimuli for this experiment. Upon completion, the -participants will move onto the next phase.

Phase 6: GCS Post Test 1 – This step were identical to Phase 1. Upon completion the participants will move onto the next phase.

Phase 7: Metaphor – Participants will first be brought to the follow instructions for this phase:

In this next part of the study, you will be listening to an audio recording of a metaphor. Please pay close attention by being present while listening to the metaphor. Do not do any other beside listening to the audio clip. Once this is done, you will move onto the next phase.

Click or press the "next" picture to continue.

Upon completion of listening to the audio clip, the participants will move on to the next phase of the study – See Figure 11 depiction of what the participants would see.

Phase 8: Post-Metaphor Transitivity and Equivalence tests – In this phase, the participants will first see the below instructions:

In this portion of the study, you will be exposed to the various stimuli you have already seen in previous phases. There will be no feedback in this portion so chose the stimuli that best fits the example above the comparisons. Once you have completed all questions, you will be able to move onto the next part of the study.

Click or press the "next" picture to continue.

This portion of the study is specifically assessing any derived relations between the 6 transitivity trials (B1-C2, B1-C3, C1-B2, C1-B3, B2-C3, & C2-B3) and 6 equivalence trials (C2-B1, C3-B1, B2-C1, B3-C1, C3-B2, & B3-C2). Each of these trials were run 3 times each for a total of 36 trials to which accuracy of these relations were measured. Upon completion, participants will move onto the next phase.

Phase 9: GCS Post Test 2 – This step was identical to Phase 1. Upon completion the participants will move onto the next phase.

Phase 10: GCS Generalization posttest – This was identical to phase 11 of protocol found in experiment 1.

Post-questionnaire and debrief: Once all phases were complete, participants completed the AAQ-II and AAQ-S. Participants were debriefed about the study and questions were answered for those who had them. Upon completion, participants were able to close out their web browsers.

Results

For overall results, there was an increase in average psychological flexibility across all participants in the AAQ-II (figure 19) which was also seen in the AAQ-S (figure 20). For the GCS total score, 4 out of 5 participants increased their perception scores of what an individual is capable of doing from pretest to posttest 1 and posttest 2 (see figure 21). For GCS generalization (figure 22), the average score was 224.8 out of 315 (SD = 65.98) with each score breakdown based on collateral manifestation categories seen in figure 23. As seen in experiment 1, each of the three dependent variable categories (psychological flexibly, derived relations, and GCS perceptions) will be reviewed in depth throughout the following sections.

Psychological flexibility measures. The AAQ-II and the AAQ-S were run before the training began and were the last surveys taken at the end [and not in between posttest 1 and 2] in order to detail overall change the protocol evoked. Overall, there was a decrease in pretest (M = 22.80, SD = 7.92) and posttest scores (M = 20.20, SD = 7.12) in the AAQ-II with only 1 of the 5 participants (participant 3; Figure 19) showing an increase in scores. There was also an overall change in pretest (M = 64.60, SD = 9.02) and posttest (M = 60, SD = 6.96) AAQ-S scores with only participant 1 experiencing as overall score increase.

Derived relations tests. After posttest 1 & 2 (e.g. before and after the metaphor phase), participants 1, 2, and 3 showed 100% accuracy for all symmetry, transitivity, and equivalent trials (table 6). Participant 4 scored 83% or higher for all symmetry and transitivity trials but the

equivalent trials (e.g. the reverse of transitivity) remained at 75% accuracy after the conditional discrimination and the metaphor phases. Table 7 does depict a 27% increase after the metaphor phase. For participant 5, B-A symmetrical trials yielded 100% accuracy while C-A symmetry trials yielded only 33% accuracy across both post conditional discrimination and metaphor phases. There was, however, 34% and 23% increase in transitivity and equivalent trials post metaphor phases respectively (table 8).

GCS perception measures. The GCS stimuli used in pre and post stimuli included 3 directly trained stimuli (a PWD, a GIF of the participant, and a tree GIF) and 3 stimuli in each of the collateral manifestation categories (FCM, SCM, MCM) that were not trained (figure 24). For trained stimuli, participants had an average pre-test percentage of capability score (perception score divided by 105 multiplied by 100%) of 61.71% with post-conditional discrimination and post-metaphor scores at 61.90% and 64.00%. Participants 1 and 2 showed increases in scores with each subsequent post measure and participants 4 and 5 showing only post 1 (e.g. after metaphor) scores that were higher than pretest. Only participant 3 showed increasingly lower scores from pretest across all phases. For stimuli not trained (e.g. PWD stimuli), the average percentage of capability score in pretest was 69.33%, and the two post-measures were 71.24% and 72.94%. Participants 4 and 5 showed exponentially increasing scores after each post measures compared to pretest while participants 1 and 2 yielded increase after post measure 1 (conditional discrimination) but no change after post measure 2 (metaphor) – see figure 21. Participant 3 showed increasingly lower scores after each post-measure when compared to pretest scores. Figure 25 and 26 show score changes between pretest and posttest scores as well as between posttest scores. Scores below 0 indicate post measure being higher than pre across stimuli directly trained and stimuli not directly trained to corroborate the above changes. All five

participant scores comparisons for trained stimuli (neutral, self, and DD) across pretests, post 1 (conditional discrimination) and post 2 (metaphor) are depicted in figures 27 through 31. In all but participant 3, scores for the neutral stimuli were lower than scores for the self and DD across all testing conditions. Participants 2, 3, and 5 showed consistently higher rating towards themselves than towards the stimuli including an individual with a DD.

As noted previously, across all 5 participants, the average score (out of 315) was 224.8 (SD = 65.98). Figure 23 depicts the breakdown across manifestation categories with stimuli in the MCM category scoring the lowest across all 5 participants. In table 9, the percentage capability scores across GCS generalization and the PWD stimuli not trained in the GCS Pre- and posttests with GCS generalization at 71.37% compared to GCS pre scores of 69.33%, Post 1 at 71.24%, and Post 2 at 72.95% showing an overall comparison in post-test scores.

Brief Discussion

These results suggest that the collective whole of this programming (conditional discrimination and metaphor application) increased the psychological flexibility (supporting research question 2) of its participants. For frames of coordination creation (research question 1) after conditional discrimination and metaphor, the results suggest that for 3 of the participants, there were not changes in frame formation between the conditional discrimination phase and metaphor phase. This suggests that for these participants, the metaphor phase was not needed as 1) these frames may have already been present or 2) the conditional discrimination phase had already helped the participants to create stronger frames of coordination between trained stimuli and capability measures as the minimal changes between pre- and posttest measures seen in Table 3 – participants 1, 2, and 3 has already reached 100% accuracy after this phase. The metaphor may not have been needed for these participants however, participants 5 and 6 did

show increases in transitive and equivalent (e.g. completely derived relations) after the metaphor suggesting that perhaps for some, metaphors may be a useful tool for creating these additional frames and will be covered further in the general discussion section. The GCS Generalization scores support research question 3 in that the scores from the training did generalize to novel stimuli. Additionally, the scores form untrained stimuli (which all include PWDs in their depictions) had also shown increases in GCS scoring suggesting that after both conditional discrimination and metaphor training the participants showed increase in perceptions of capability. When comparing capability percentage scores, these results suggest that generalization scores were not significantly different in either pretest GCS or post3 scores and that these scores did not indicate true generalization. Further correlational analyses suggested that when using Pearson's r, there was a strong positive correlation between both pretest and generalization scores ($r = 0.828$) and post3 and generalization scores (0.828). As a result, we fail to reject the null hypothesis and state that there is not enough evidence to support that claim that the deictic frame computer training resulted in generalization across novel stimuli (supporting the null hypothesis of research question 4). It is difficult to test overall generalization of skills and future research should review what other factors might be present in these results – this topic will be talked about at length in the procedural considerations section. As with the previous studies, these implications will be described in more detail during the general discussion section.

CHAPTER 6

GENERAL DISCUSSION

Experimental Discussion

Each of the three experiments were successful in 1) increasing overall psychological flexibility (as measures by the AAQ-II), 2) formed new relations between PWDs and perceptions of capability (experiments 1 and 3) as well as deictic relations (study 2) utilizing a brief computer program, and 3) showed overall increases in in capability perception as measured by the GCS. In the following subsections, each experiment will be reviewed in depth followed by overall comparisons between observations.

Experiment 1 – Frames of Coordination. The results above suggest that doing a brief, computer-based training has the ability to affect immediate responding in the way of creating frames of coordination between PWD stimuli and general capability (supporting alternative hypothesis 1) consistent with similar results in Dixon et al. (2007) and Dixon et al. (2009) with the extension of targeting psychological flexibility support the claims of Kohlenberg et al. (1991) and Schulenberg et al. (2019) in that RFT applications reducing overall perceptions of stigma. The psychological flexibility measures of the all 5 participants AAQ-II scores and 4 out of 5 participants AAQ-S scores also supports Krafft et al. (2018) affirmation that stigma and psychological flexibility measures may be correlated with each other – this supports the alternative hypotheses 2 (training will increase psychological flexibility). This is corroborated by the GCS pre-/posttest scores for PWD stimuli showing score increases, suggesting a greater overall perception of ability/capability with tasks of daily life. Comparative scores in the GCS Generalization measure suggesting that this training also helped to create derived and generalized relations to other stimuli sets in similar class groupings with a transformation of

stimulus function towards greater perception of overall capability – supporting alternative hypothesis 3 (after training, scores will generalize). When compared to PWOMD stimuli, PWD GCS scores not only have a higher overall change in score, but that the PWD stimuli began to approach similarly perceived levels of PWOMD scores (as seen in figure 14). This further suggests that through this brief training, not only did a frame of coordination appear between PWD stimuli and capability derive (e.g. without direct training), but that these scores results in similar responding towards PWOMDs – closing the "gap" that PWDs are not capable of achieving goals in daily life that PWODs may take for granted.

Although this has practical implications for parsimonious trainings in social service agencies or graduate professional trainings, there were several notable limitations to these methods that should be noted. First and foremost, there were only 5 participants in this study so the differences in the mean scores between pre- and posttest GCS scores, although visually shows an increase, may not be a statistically and potentially culturally significant change. Although one may adhere to considerations made by Morgan (2017), replicating this methodology to a larger sample size (e.g. >30) would be ideal to discover potential significant effects within subjects change.

Beyond sample size, the measures used have a number of procedural, moral/ethical, and psychometric limitations should be addressed in future research. For all GCS stimuli in the pre-/posttest and GCS Generalization stimuli, many assumptions were made by the researcher on the person's perceived disability. First, basing disability off only what can be seen within a GIF is not inclusive of unseen disabilities (e.g. mental health concerns, individuals with visual impairments, etc.). As a result, the stimuli included are only overt behaviors and physical structures of the individual taking a decidedly medical model approach to disability – something

that will be covered in more depth during the procedural considerations section. For the purposes of this experiment, conducting a conditional discrimination task online (and not using in-person stimuli) may have been appropriate. Future research, however, should use stimuli from individual willing to share (and not just use publicly available images or videos – this would ensure more accurate labelling of individuals. This would also allow for open dialogue between researchers and stimuli actors to review disability conceptualizations and how they would like to be represented in research.

Another limitation includes there being no maintenance measures [to see if these perceptions maintain] or generalization to actual situations (in schools, workplaces, etc.). Future research should include not only basic computer programs but extending this basic research study to actual in-person changes. Perceptions alone may differ from what people may actually do (e.g. you may experience stigmatizing thoughts but may not act upon them; Murphy et al., 2019). These measures as well are behavioral measures via self-report (which may present some potential issues on reliability; Newsome et al., 2019), the construct of stigma is not 100% agreed upon as it is contextually based in what verbal community one may reside in. Therefore, measures that try to assess stigma are only correlational and perhaps forever will be. This will be covered in more depth in the procedural considerations.

Regardless of the limitations presented in this study, this is the first, to the author's knowledge, attempt at utilizing basic RFT research in order to address stigma towards individuals with disabilities. Studies like this may help to further inform what relations frames are potentially responsible for stigma formation and, by extension, help to inform therapeutic practices (e.g., ACT) to more parsimoniously address stigmatizing perceptions. In line with this effort to further address other relational frame families, experiment 2 addresses deictic framing

and its relation to empathetic responding and its effects towards disability perception.

Experiment 2 – Deictic Frames. This training specifically targeted PWD stimuli to increase overall perception based on GCS scores. The PWOMD stimuli GCS scores not significantly changing compared to the PWD stimuli suggests that the training did accurately target the changing of perceptions for PWDs. The PWOMD stimuli may have already had frames of coordination with capability before the study began and by increasing empathy, this did not change significantly after each presentation of the stimuli but did for the PWD given that these were included. This comparison helps to control for sequencing effects of being presented the stimuli multiple time and the PWD (included in on the mixed trials during the training) had a significantly effect on increasing overall capability perceptions. PWOMD stimuli responding showed that even when learning the new deictic frames, these stimuli remain relatively the same in terms of overall perception based on the GCS measure. This may be why the GCS total score results were not significant but the PWD stimuli scores were as the target of this intervention was specifically for increase perception of PWD stimuli.

For the GCS generalization stimuli, results suggest that individuals in the MCM category received the lowest perception of overall capability – which will be reviewed in the next section. Future research would do well to further examine these general relations and, as noted in experiment 1, these categorizations may not have been correct or ethically sensitive. Work with individuals identifying as having a disability is needed in order to be more aware and generally sensitive towards these concerns. Although these results are promising in the usage of deictic framing for the purpose of increasing positive perceptions towards PWDs, an important component of perspective-taking is the conceptualization of the self in relations to others and the final study will look to analyze the effects of self-perceptions as it relates to others

Experiment 3 – Metaphors. This study more specifically looked at the usage of a metaphor to mediate the frame of coordination between PWDs and perceptions of capability. The results did suggest that a frame of coordination may have resulted in a transformation of stimulus function as seen in overall increase GCS perceptions of trained stimuli (figure 24) and PWD stimuli not directly trained (figure 21). The metaphor phase yielded the highest GCS perception scores for all but participant 3 in trained stimuli suggesting that for trained stimuli, this methodology may have been correlated with these increased changes. Although participants 1, 2, and 3 did show increases in GCS scores for not directly trained PWD stimuli, for participant 4 and 5, the combination of both increase transitive (in participants 4 &5) and equivalent frames (in participant 5) suggests that the metaphor may have been a more effective tool for increasing disability perception. Upon visual inspection, these data for participants 4 & 5 may appear to support Masuda et al. (2009) that metaphors may be relevant for changing perception, however future research is needed to assess the whole treatment package (e.g. all aspects of the ACT hexaflex) as, at least in this study, the component of metaphor did not show generalized effects for all participants. More expansive ACT treatment packages as seen in Lillis & Hayes (2007) and Masuda et al. (2009) reviewing the effects of this training in the reduction of at mental health stigma and prejudice respectively as this study did not specifically target the reduction of psychological flexibility but rather the basic components at what psychological flexibility is form a behavioral orientation using RFT and CBS. Future research will also be needed with more participants to see whether or not these changes that are seen are statistically significant. A potential limitation in the presentation of these results may also be sequencing effects having been presented the same stimuli multiple times may have resulted in the change rather than the phases the participants completed.

When analyzing individual participant GCS pre-/post 1 & 2 scores of the neutral, self, and PWD stimuli (figure 27 through 29), the neutral stimuli (a GIF of a tree) had the lowest scores, which also remained consistently low with minimal or no change across all phases in all but participant 3 with only minor changes between the self and individuals with DD stimuli. These data suggest that the neutral stimuli of the tree were truly neutral and that the self and DD stimuli were affected by both the conditional discrimination trials and the metaphor trials as seen with increase (if only minor) scores in 4 out of the 5 participants. Participants 1 and 4 showed little difference between the self and PWD stimuli as measured by the GCS and 2, 3, and 5 showing higher perceptions of self over PWD. This wide spread of perceptions may have resulted in the minimal changes for trained stimuli across all phases of training and warrants future research further assessing of the role of self-perception in disability stigma.

Perhaps the most surprising results observed were in the not directly trained, PWD stimuli in the pre- and post-measures showing consistently higher scores after conditional discrimination and metaphor phases or all but participant 3. Given that these were not directly trained, there was an increase that was greater in comparison to the stimuli that were directly trained (compare Figure 25 to Figure 26). These data can either suggest that the training had generalized effects to novel stimuli and an overall transformation of stimulus function. Conversely, this may also be a result of sequencing effects with the participants having come in contact with the material 3 times overall so the increase may be a result of seeing the stimuli multiple times. Given the comparison of differences between trained and not trained stimuli (Figure 25 to Figure 26) in that the PWD stimuli had greater score differentials overall, this would suggest the former may be true but future research with more participants would be needed in order to see if these results are significant.

GCS generalization scores were within 2% percentage capability of the posttest GCS scores which suggests that these generalization gradients may be correlated with each other – however, given the size of the study, this cannot be deemed as statistically significant and future research should increase the sample size in order to better analyze these results. A potential limitation here is that both PWD stimuli not directly trained and GCS generalization all had novel stimuli, the differences are were still all within 3% of each other. As it stands, only upon visual inspection (figures 22, 23, and 21) do these differences show suggesting an overall correlated trend. However, there is not enough data to support a statistically significant increase and as a result, research question 3 (that the scores will generalize) is not fully answered. Of note, the MCM category in the GCS generalization phase, as seen in the previous experiments, was consistently lower in score across all participants.

Overall limitations in this study first and foremost include a lack of participants to examine/analyze differences with enough statistical power to say with any certainty that the results are different. As with experiment 1 of this manuscript, all stimuli including PWDs was under the assumption their diagnosis was inferred by the research themselves based on provided labelling of that diagnosis. Future research should include PWDs both in what stimuli would be appropriate as well as overseeing the ethical usage of these stimuli.

Another general limitation was the teaching relations between stimuli with the hopes that participants would derive their own relations between the trained stimuli and capability as measured by the GCS may have also interfered with the metaphor phase having already formed relations. As seen in experiment 1, conditional discrimination did yield higher results in overall changes but there was an extra phase (the D stimuli) adding to frames of capability that may have already been present for PWODs – when adding/training PWD stimuli as related to/same as

the PWOD, there were positive changes. This current study (experiment 2) used the metaphor as that "D stimuli" in an effort to create those transitive and equivalent frames while observing the potential effects on a transformation of stimulus function related to PWDs did not yield the same magnitude as experiment 1 suggesting that 1) the metaphor was not needed, 2) the conditional discrimination interfered with the metaphor, 3) the metaphor phase should be included in a total ACT package as see in Lillis and Hayes (2007) and Hayes et al. (2008) [for self-stigma], or 4) the inclusion of the self may have altered the results. On the 4th topic, each of the 5 participants wrote [in the social validity feedback section] that they were uncomfortable having themselves included in this study. Participants 3 and 5 both expressed low self-image saying that they were not able to do much and that including themselves in this study had tapped into frames of self-doubt and ability. This may be why there was little change in the self-category in not only participants 3 and 5 but in the other three as well. Future research should further analyze the effects of one's own perceptions as it relates to how they perceive others.

Quilliam et al. (2018) analyzed staff self-perceptions in an agency working with individuals diagnosed with ID and suggested that negative self-perceptions also affected their self-perceived power to help others. Bryne and Muldoon (2017) had also done a study with individuals diagnosed with ID and their self-perception noting that with a greater negative self-perception, the social comparisons and outward experience of stigma is also greater towards others. Taking these two results together, future research and extensions of the current experiment should review not only frontline staff but also the individuals they serve with relation to the interaction of their self-perception and their perceptions of others. Participants 4, and 5 were the only of the 5 that said they related to the metaphor used in the study saying that they were the beaver with no disabilities and that they were able to more easily relate to the beaver

with impairments. This comment is corroborated by the PWD GCS scores increase in the metaphor beyond both pre and post 1 measures. For these two participants, they were actively engaging in self-reported dialogue about themselves which did affect their score sin a positive manner. This has implications for a tailored approach to stigma reduction by including the self should this be appropriate for the participant. A potential way to expand on the current methodology to tackle this is to create a study splitting apart each of these phases with one group receiving conditional discrimination only, one group receiving metaphor only, and a third receiving both (with the necessary limitations addressed above). Regardless, the current experiment does offer useful information that may help to inform future studies looking to review the basic components of how stigma forms and how one can change those immediate perceptions through basic and applied research.

Overall Procedural Commentary

Psychological flexibility measures. The AAQ-II and the AAQ-S measured psychological flexibility (both measures) and this as it related to stigma perceptions (AAQ-S). However, the experiments in this study did not specifically target psychological flexibility as a psychological measure. The utility of including these measures in, a stated in previous sections, is that Krafft et al. (2018) as well as Matsuda et al. (2020) suggested in their reviews that psychological *in*flexibility is related to higher levels of stigma and prejudice. Psychological flexibility can be conceptualized as a contacting the present moment while responding to that moment based on one's values (Hayes et al., 2004) which can be behaviorally conceptualized as an operant behavior that manipulates covert behaviors (e.g. values and attending to present moment) under the control of contextual variables within the environment (Bond et al., 2006). In the case of the current experiments, by providing additional concepts of capability (e.g. the

conditional discrimination phases) and then assessing the subsequent derived relations formed after these direct trainings, this provides a veritable multiple exemplar training (MET). This provides different stimuli and potential relations to expand the frames the participants may have had before entering into the experiment. With language mediating perceptions of stigma (Lillis & Hayes, 2007; Kraft et al., 2018; Matsuda et al., 2020) due to these frames, by training new potential frames, flexibility regarding those frames are indirectly targeted. Put simply, by introducing new frames of capability, these then compete with previous frames of incapability for PWDs. Due to the nature of the training (e.g. providing correct/incorrect feedback), the reinforcement of the "correct" feedback and the potential negative reinforcement contingencies of finishing the experiment sooner [as participants had to hit a certain criteria before moving on], these may have loosened the incapability perceptions allowing for more flexible covert behavior regarding the increase of capability perceptions. When comparing these scores to the GCS scores, the experiment results in the present manuscript were able to lend to a more concrete analysis of the construct called stigma and prejudice.

These measures, however, are not without their own limitations. Levin et al. (2014) noted that the AAQ-II was a stronger measure of psychological flexibility but that the AAQ-S more specifically looked at stigma. This is why each of these measures were used in the current study. However, Tyndall et al. (2019) suggest that the AAQ-2 was not as strong a measure of experiential avoidance, and by extension psychological inflexibility, as the brief experiential avoidance questionnaire (BEAQ). This suggests that future studies should include the BEAQ over the AAQ-II for assessing the inflexibility and experiential avoidance components of participant responding. There is not enough research in this particular area and assumptions and future work would be wise to include comparisons of these scores for the concepts of the

differences and interplay between experiential avoidance, psychological inflexibility, and prejudice.

Levin et al. (2016) offer potential interventions based on models of prejudice formation in a flexible connectedness model targeting empathetic concern, perspective-taking, and psychologically flexibility with thoughts of prejudice. The AAQ-S was a measured used within these studies in order to make these overall suggestions and, given the international expansion of CBS methodology, measures such as the AAQ-S should be expanded into other languages with their various culturo-contextual variables accounted for as seen in Trigueos et al. (2020) beginning to expand this measured into a Spanish context. There has, however, been little research to this author's search in the use of AAQ-S – especially in reference to overt, publicly observed/measured behaviors both in laboratory settings (like the current set of research) and in-situ (e.g. therapeutic clinics). Behaviorism would hugely benefit from conceptualizing what other fields have done in the area of stigma (anthropology, disabilities studies, social psychology, social work, etc.) and adding to the field with more concise and objective ways to measure the construct of stigma.

Stimuli considerations. The way in which the stimuli were chosen may pose potential ethical concerns regarding the way this study was carried out. This author, although have been diagnosed with learning disabilities themselves, has not have lived experience of the manifestations that were present in the stimuli throughout this study. These stimuli were found by searching YouTube for search terms such as "Down Syndrome", "Cerebral Palsy", and "stereotypy in Autism" to name a few. Although it is the hope of the researcher that these videos were accurate representations of individuals with these diagnoses, it is not completely known if they were entirely accurate.

Furthermore, the usage of the terms involving "collateral manifestations" was utilized in an effort to address the previously mentioned bias – mainly pointing to disabilities that can more or less be seen through biological structures or movements associated with various diagnoses. Disability spans an incredible amount of diagnoses and impairments. With the various ways to conceptualize what disability is not universally agreed upon (Smart, 2015), behavioral research in this area particularly challenging. As a result, the current research that has been done, including what has been completed by this author in the present studies, may experience a certain level of their own biases – subconscious or otherwise. This may be seen in areas such as research and subject recruitment (Borowska-Beszta, 2017) or in overall worldview of the researcher (Wadams & Park, 2018). Future research should not only continue to assess these potential research biases (and their overall effects on the results shown), but should also include individuals with disabilities as researcher partners to 1) engage in cultural humility, 2) increase adequate funding for communities in need, and 3) elevate the voices of individuals with disabilities (Stack and McDonald, 2014; Minkler, 2005; Wright, 2019).

Technical considerations. The usage of this study is both the utility and the learning curve associated with the use of the PsychPy3 program (Pierce et al., 2019). This is an open-source program that is very powerful in the creation of various psychological and behavioral programs with larger reaching implications for types of research that have yet to be fully realized. Anecdotally, open-ended feedback regarding the usage of this program, as solicited by the author to the participants of all studies, should include direction that are more concise as well as potentially include practice trials in order to increase participants understanding of the response expectations during the study. Although these questions were addressed as feedback from one study informed the usability of the next, future work in this area, especially during the

time of COVID-19, should analyze the utility of not distance research projects as a learning and inquiry tool, but also as a potential flexible software platform in order to carry out stigma reduction research. This is something that researchers using the implicit relational assessment procedure (IRAP), which was originally written on PsychPy3, have been particularly good at both in the dearth of extended applications (Maloney et al., 2020; Inoue et al., 2020). Although all methodology has their limitations (Hussey & Drake, 2020), with procedural considerations accounted for (Vahey et al., 2015), the accessibility and ease of use for programming like this may help to allow an increase in online research studies studying stigma and bias (Kane et al., 2020; Obeid et al., 2020; Bast et al., 2020).

Social validity. Figure 30 depicts the overview of rated questions. Study 2 yielded the lowest social validity scores on measures such as likelihood that this study would reduce stigma towards others, simplicity of the study, and overall comfort. This was corroborated by solicited feedback on the study overall with 18 of the 23 participants suggesting that completing this was very hard, time consuming, and overall stressful. Interesting enough, this of the three studies also yielded some of the most promising results of capability perception increased so future research should take time to further examine the utility of this computer program as a methodology for teaching deictic relational frames.

Study 3 had higher scores of study simplicity and overall comfort while completing. This is contrary to the open-ended feedback where 3 out of the 5 participants said that they felt very uncomfortable rating themselves as being capable or not with participants with participant 5 stating that they did not see themselves as a very capable person, so when comparing themselves to people with disabilities, they began to question whether or not they themselves may have a disability and how they should assess that. The utility of these studies and research should further

look into not only the effects of the methodology used, but also the human-computer interaction and overall acceptably/comfort of the individual during these studies. Future research should look into the overall effects that comfort during a study has on the learning on new frames.

Study 1 had the highest level of acceptability of the study procedures that was further corroborated by the open-ended feedback. All 5 participants said that they liked the study, felt like it was a manageable amount of time to complete, and evoked further thoughts regarding overall capabilities of individuals with disabilities. The results in experiment 1further support these claims as all measures show significant changes towards increase psychological flexibility, decreased stigma, and increased positive perceptions of PWDs. As noted previously, future research is needed to assess the effects of this training protocol on actual interactions with others but this took an important first step towards understanding the underlying frames that may be involved in stigma formation and ultimately, reduction.

Final remarks

To the knowledge of the author, this is one of the first studies analyzing these relational frames in the context of disabilities perceptions within the fields of applied behavior analysis (ABA) and contextual behavioral science (CBS). There is a lot that the ABA field has to learn in terms of approach to individuals who may or may not identify as having a disability. This current manuscript was completed in hopes of taking the necessary first forays into ethically questionable practices completed by its clinical applications as Shyman (2016) had so diligently pointed out. Aberrant behavior reduction, skill acquisition, and curriculum-based instruction should not be the only parts of good ABA programming. Parents and other caregivers need to be included (Brodhead, 2015) in a more collaborative, sociopolitical approach to disability – especially in communities that do not have the requisite access to the resources needed in order

to get quality care whether it be financial, cultural, or geographic barriers. Studies such as this, although basic in its methodology, have larger reaching implications at an overall cultural analysis of disability perception from the vantage point of caregivers, clinicians, and individuals identifying as having disabilities. It is only through the combined effort of the verbal community writ large that those who are marginalized can have their voices elevated not out of pity or saviorism from the majority, but as equal members of society receiving the equitable care that everyone deserves.

EXHIBITS

Table 1.

Derived Relations Overview for Stimuli Sets A, B, and C

	Relation	P1	P2	P3	P4	P5
Symmetry	B – A	100%	100%	100%	100%	100%
	C – A	100%	92%	83%	100%	100%
Transitivity	B – C	100%	100%	92%	83%	92%
Equivalent	C – B	100%	100%	100%	100%	100%

Note. This table depicts and overview of percentage accuracy for symmetrical relations (B-A, C-A), transitive relations (B-C) and equivalent relations (C-B) across all participants of study1.

Table 2.

Derived Relations Overview for Stimuli Sets A, B, C, and D

Family	Relation	P1	P2	P3	P4	P5
Symmetry	B-A	100%	100%	100%	100%	100%
	C-A	100%	100%	100%	100%	100%
	D-A	100%	100%	100%	100%	100%
Transitivity	B-C	100%	100%	100%	100%	100%
	D-B	100%	100%	100%	100%	100%
	D-C	100%	100%	92%	100%	100%
Equivalent	C-B	100%	100%	92%	100%	100%
	B-D	100%	100%	92%	100%	100%
	C-D	100%	100%	83%	100%	100%

Note. This table depicts and overview of percentage accuracy for symmetrical relations (B-A, C-A, D-A), transitive relations (B-C, D-B, D-C) and equivalent relations (C-B, B-D, C-D) across all participants of study1.

Table 3.

Percentage of Capability across GCS Generalization, GCS Pretest, and GCS Posttest Scores

Comparison	P1	P2	P3	P4	P5	**Avg.**
GCS Generalization Total Score Only	93.65%	69.21%	65.08%	83.17%	94.29%	**81.08%**
PWD GCS Pre Scores	76.19%	62.86%	56.19%	70.48%	57.14%	**64.57%**
PWD GCS Post Scores	90.48%	70.48%	73.33%	78.10%	97.14%	**81.90%**

Note. The above table depicts the percentage scores of each participant rated the stimuli out a score of 315 – closer to 100% signifies "totally capable of achieving any goal with minimal to no support." GCS Generalization total score percentage depicted along with comparisons to pre-/posttest GCS scores.

Table 4.

Pre, Post1, Post 2, and Post 3 GCS t-test comparison results

		Mean		SD				
Comparison	n	1	2	1	2	t-stat	DF	p-value
PRE-POST1	23	71.304	73.783	12.294	14.548	-2.126	22	0.022*
PRE-POST2	23	71.304	72.913	12.294	13.694	-1.498	22	0.074
PRE-POST3	23	71.304	74.174	12.294	13.203	-2.558	22	0.008**
POST1-POST2	23	73.783	72.913	14.548	13.694	0.822	22	0.219
POST1-POST3	23	73.783	74.174	14.548	13.203	-0.332	22	0.371
POST2-POST3	23	72.913	74.174	13.694	13.203	-1.439	22	0.082

Note. *significant at 0.05, **significant at 0.008 Bonferroni correction

Table 5.

FCM, SCM, and MCM GCS Generalization t-test comparison results

		Mean		SD				
Comparison	n	1	2	1	2	t-stat	DF	p-value
FCM-SCM	23	75.043	72.304	14.195	12.535	1.742	22	0.048*
FCM-MCM	23	75.043	66.607	14.195	14.819	5.068	22	<0.001**
SCM-MCM	23	72.304	66.607	12.535	14.819	4.087	22	<0.001**

Note. *significant at 0.05, **significant at 0.017 Bonferroni correction

Table 6.

Derived Relations Overview for Stimuli Sets A, B, and C Post-Conditional Discrimination Training Percent Accuracy

	Relation	P1	P2	P3	P4	P5
Symmetry	B – A	100%	100%	100%	83%	100%
	C – A	100%	100%	100%	92%	33%
Transitivity	B – C	100%	100%	100%	83%	33%
Equivalent	C – B	100%	100%	100%	75%	33%

Note. This table depicts and overview of percentage accuracy for symmetrical relations (B-A, C-A), transitive relations (B-C) and equivalent relations (C-B) across all participants in study 3.

Table 7.

Derived Relations Overview for Stimuli Sets A, B, and C Post-Metaphor Percent Accuracy

	Relation	P1	P2	P3	P4	P5
Symmetry	B – A	100%	100%	100%	83%	100%
	C – A	100%	100%	100%	92%	33%
Transitivity	B – C	100%	100%	100%	100%	67%
Equivalent	C – B	100%	100%	100%	75%	50%

Note. This table depicts and overview of percentage accuracy for symmetrical relations (B-A, C-A), transitive relations (B-C) and equivalent relations (C-B) across all participants of study3.

Table 8.

Derived Relations Overview for Stimuli Sets A, B, and C Percent Accuracy Change Comparison between Post-Conditional Discrimination and Post-Metaphor

	Relation	P1	P2	P3	P4	P5
Symmetry	B – A	0%	0%	0%	0%	0%
	C – A	0%	0%	0%	0%	0%
Transitivity	B – C	0%	0%	0%	+27%	+34%
Equivalent	C – B	0%	0%	0%	0%	+23%

Note. This table depicts and overview of percentage accuracy for symmetrical relations (B-A, C-A), transitive relations (B-C) and equivalent relations (C-B) across all participants of study 3 comparing assessment post conditional discrimination and post metaphor.

Table 9.

Percentage of Capability across GCS Generalization, GCS Pretest, and GCS Posttest 1 & 2 Scores

Comparison	P1	P2	P3	P4	P5	**Avg.**
GCS Generalization Total Score	93.97%	71.43%	46.67%	90.16%	54.60%	**71.37%**
PWD GCS Pre Scores	91.43%	63.81%	44.76%	88.57%	58.10%	**69.33%**
PWD GCS Post 1 Scores	94.29%	69.52%	38.10%	90.48%	63.81%	**71.24%**
PWD GCS Post 2 Scores	94.29%	69.52%	37.14%	97.14%	66.67%	**72.95%**

Note. The above table depicts the percentage scores of each participant rated the stimuli out a score of 315 – closer to 100% signifies "totally capable of achieving any goal with minimal to no support." GCS Generalization total score percentage depicted along with comparisons to pre-/posttest GCS scores.

Table 10.

Percentages of Responding to Disability-related Demographics Questions

	Experiment 1		Experiment 2		Experiment 3	
	Yes	No	Yes	No	Yes	No
Do you currently identify as having a disability?	20%	80%	8.70%	91.30%	0%	100%
Do you currently work with individuals who have diagnosed disabilities?	60%	0%	47.83%	52.17%	0%	100%
Have you ever experienced discrimination based on your capabilities?	40%	60%	21.74%	47.83%	0%	60%

Note. The above table depicts representative percentages of participants in their responses to the above questions

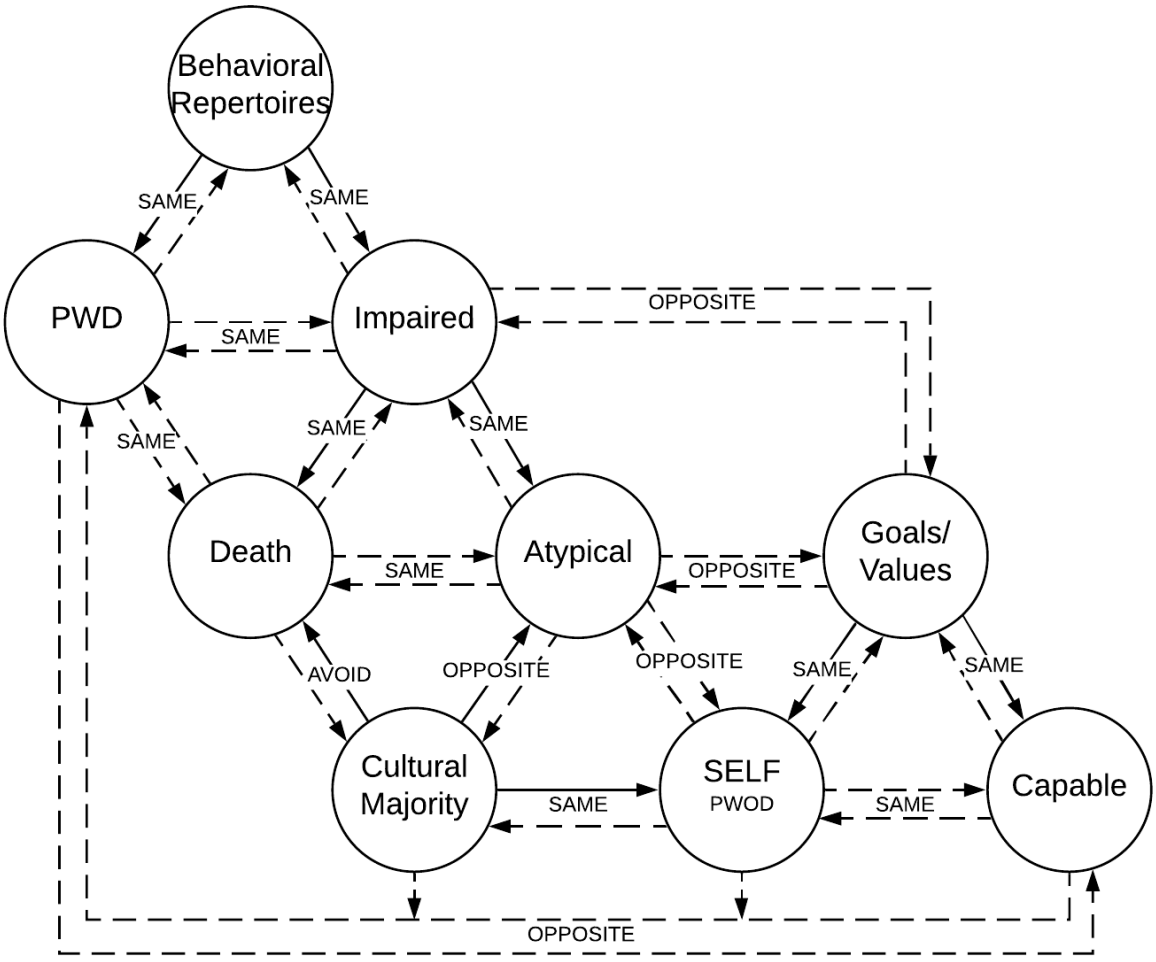


Figure 1.

RFT Disability Conceptualization

Note. The above depicts the RFT disability conceptualization detailed in Chapter 3. Further details regarding utility in that section of this manuscript. Solid lines are directly taught and dotted lines are derived relations.

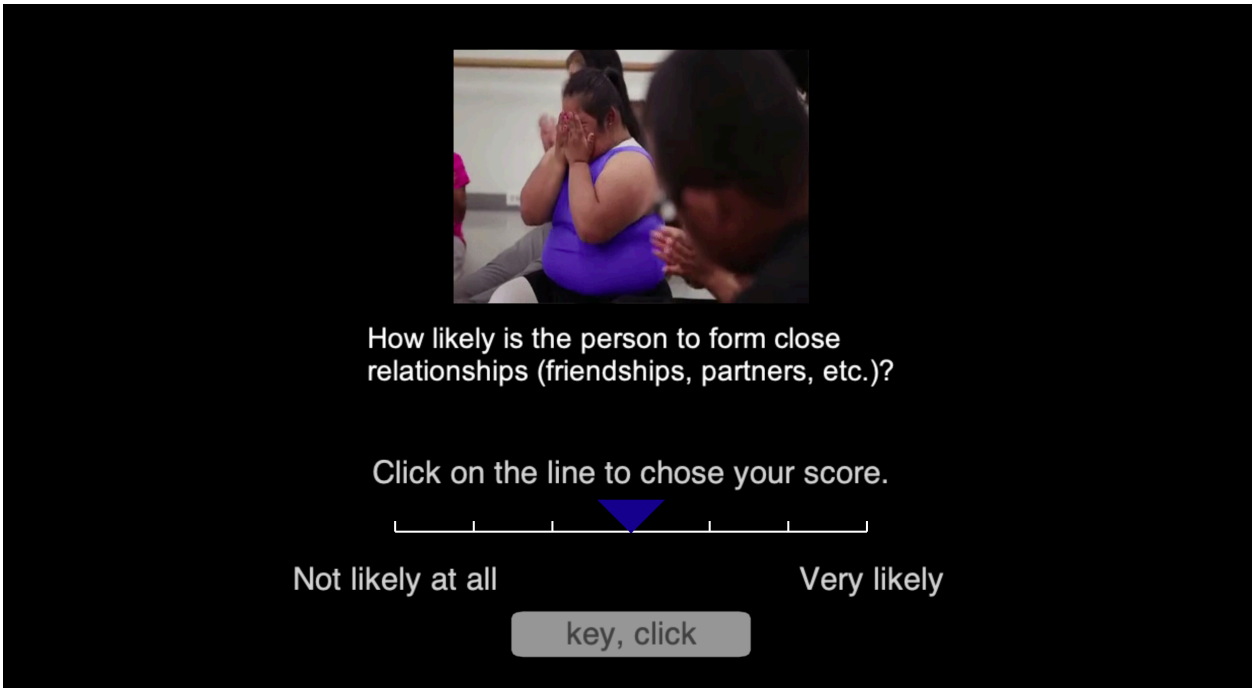


Figure 2.

General Capability Scale (GCS) PsychoPy3 Presentation

Note. The above depicts the formatting for the General Capability Scale (GCS) that was run in experiments 1, 2, and 3. High contrast between shapes and text as it relates to the background were used so that 1) those with low vision can more easily see the stimuli, and 2) there may less eye fatigue if the participants are interacting with the experiment for a long time.

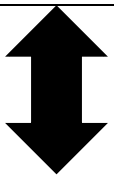
	Set 1	Set 2	Set 3
Stimuli A			
Stimuli B			
Stimuli C	**CAPABLE**	**SKILLED**	**TRAINED**
C distractors	**INCAPABLE**	**UNSKILLED**	**UNTRAINED**
Stimuli D			

Figure 3.

Study 1 Training Stimuli

Note. Above is the training stimuli that participants will interact with in experiment 1. Additionally, items in Stimuli B and Stimuli D were used in the GCS Pre/Post testing phases. Arrows were all white while using the software. They are black here so as to more easily see them in this figure.

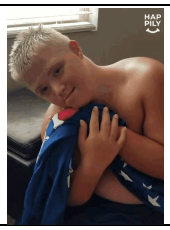
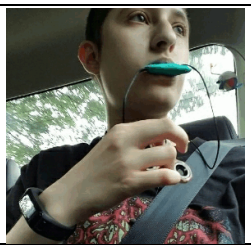
	Set 1	Set 2	Set 3
FCM			
SCM			
MCM			

Figure 4.

General Capability Scale (GCS) Stimuli

Note. Above is the testing stimuli for the General Capability Scale (GCS) generalization testing across three categories: *Facial Collateral Manifestation* (FCM), *Stereotypic Collateral Manifestation* (SCM), & *Movement Collateral Manifestation* (MCM).

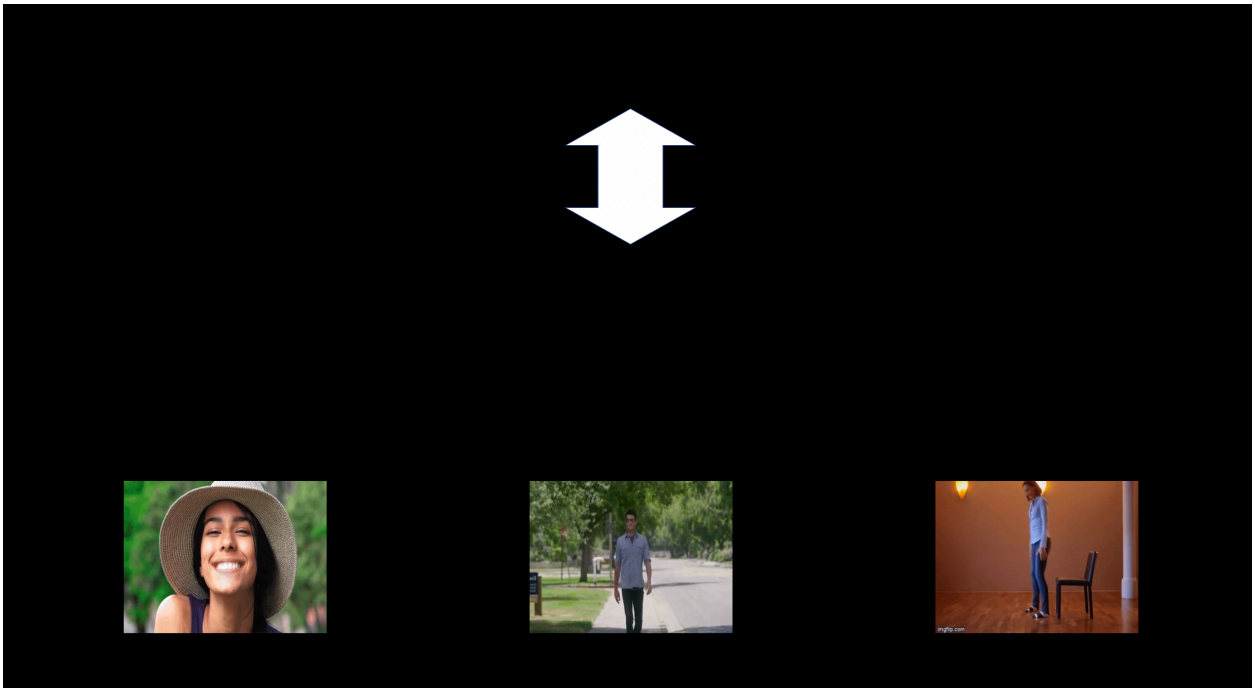


Figure 5.

A-B Training PsychoPy3 Presentation Example

Note. The above figure depicts the format a participant saw during the A-B training and mixed training phases for experiments 1 and 3 only with relevant stimuli as defined by that experiment. Participants were expected to look at the above comparison arrow stimuli then pick one of the below sample GIF stimuli that matches. Those with visual impairments were able to request a copy where there is a description under each GIF. High contrast between shapes and text as it relates to the background were used so that 1) those with low vision can more easily see the stimuli, and 2) there may less eye fatigue if the participants are interacting with the experiment for a long time.

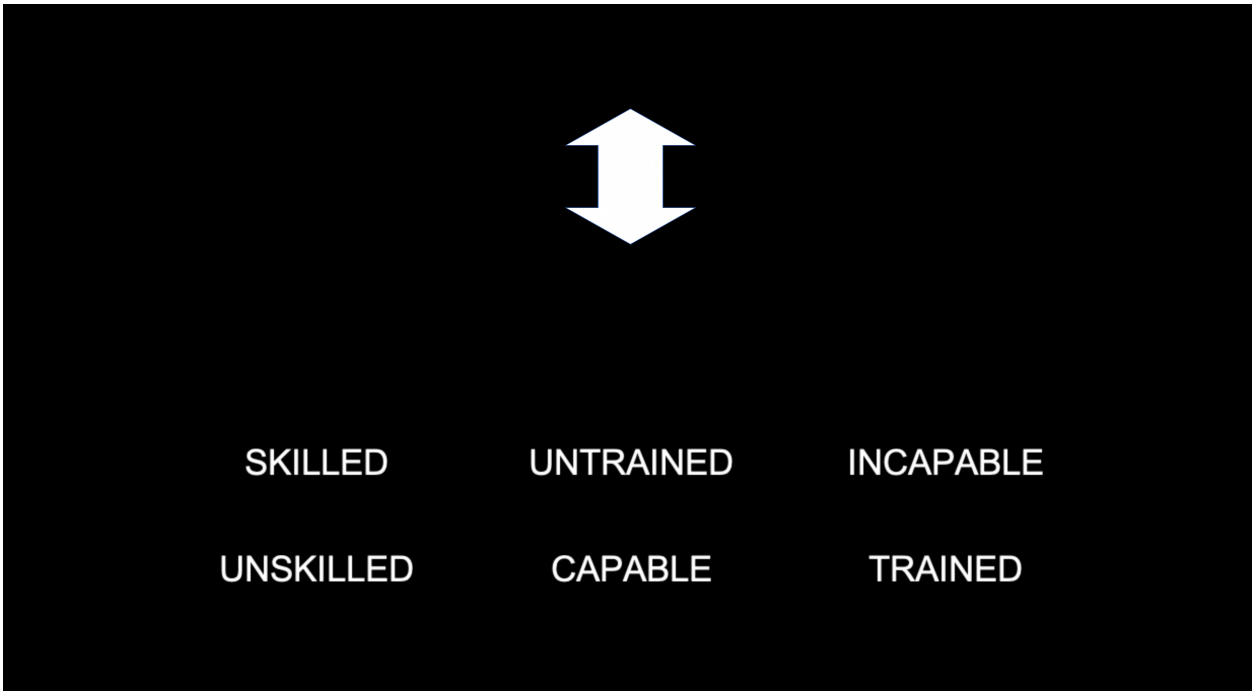


Figure 6.

Study 2 A-C Training PsychoPy3 Presentation

Note. The above figure depicts what a participant saw during the A-C training and mixed training phases with relevant distractor stimuli. Participants were expected to look at the above comparison arrow stimuli then pick one of the below sample words that matches. Those with visual impairments were able to request a copy where there is a description under each GIF. High contrast between shapes and text as it relates to the background were used so that 1) those with low vision can more easily see the stimuli, and 2) there may be eye fatigue if the participants are interacting with the experiment for a long time.

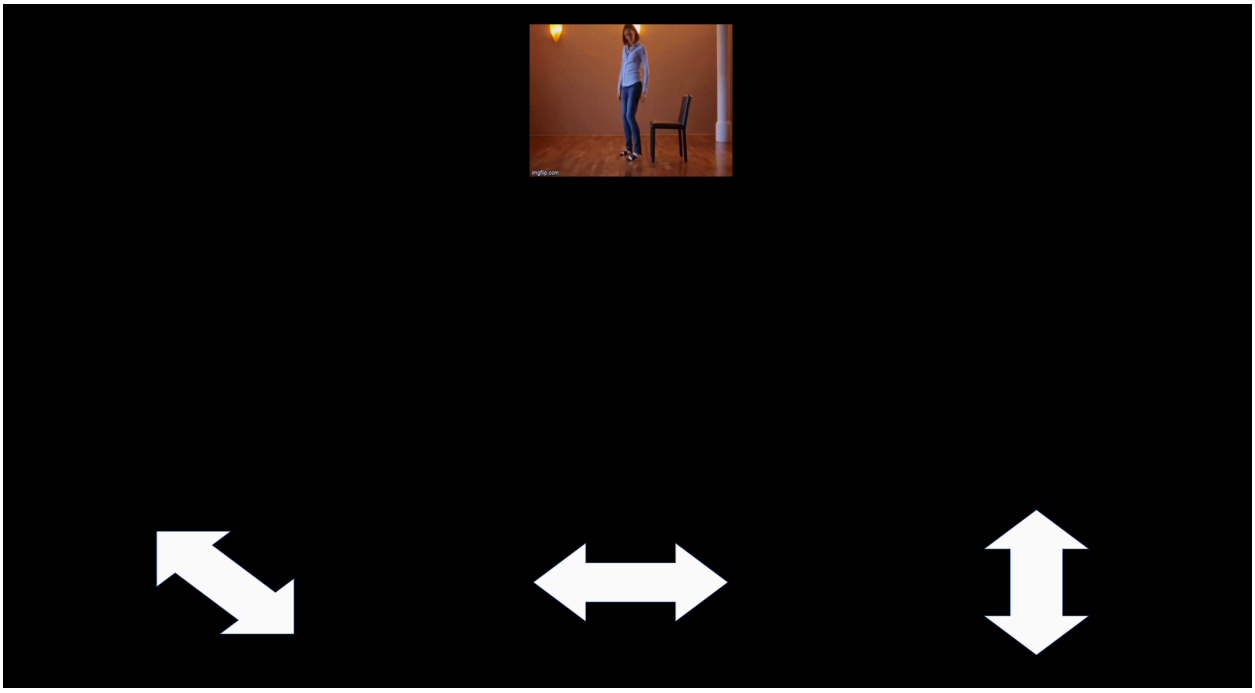


Figure 7.

Study 1 B-A Symmetry Test PsychoPy3 Presentation

Note. The above figure depicts what a participant saw during the B-A symmetry test during the relevant phases. Participants were expected to look at the above comparison GIF stimuli then pick one of the below sample stimuli that matches. Those with visual impairments were able to request a copy where there is a description under each GIF. High contrast between shapes and text as it relates to the background were used so that 1) those with low vision can more easily see the stimuli, and 2) there may be less eye fatigue if the participants are interacting with the experiment for a long time.

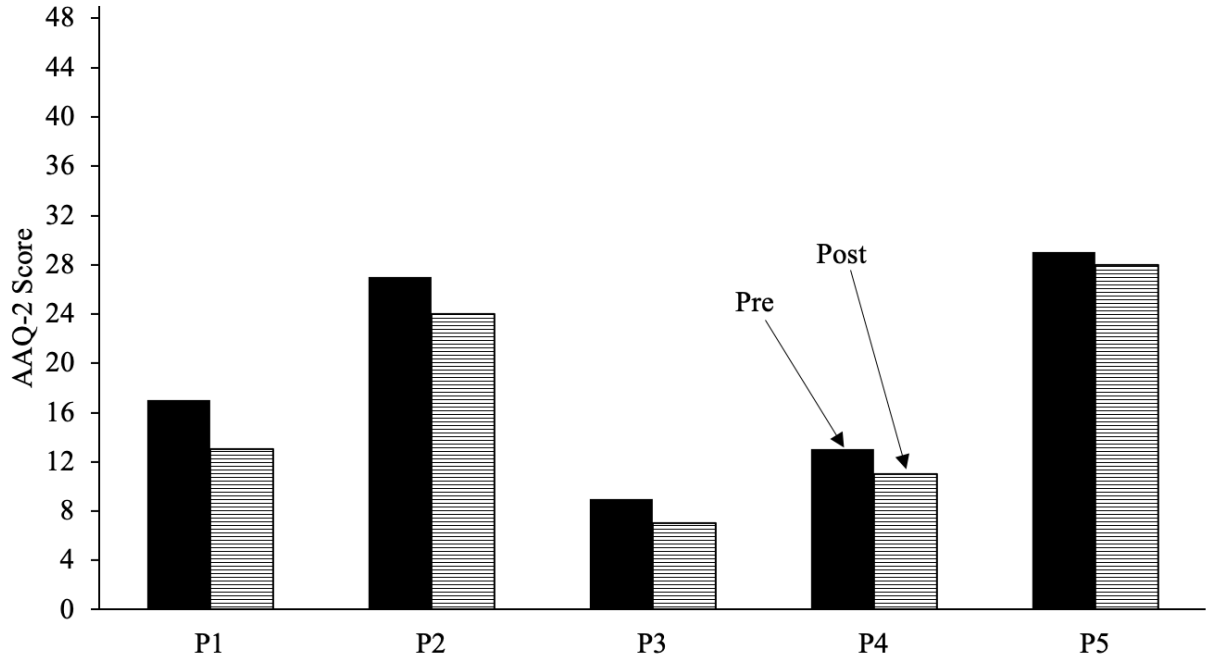


Figure 8.

Acceptance and Action Questionnaire (AAQ-2) Pre- and Posttest Scores

Note. The above figure depicts pre- and posttest AAQ-2 scores across each participant – lower scores indicate greater psychological flexibility.

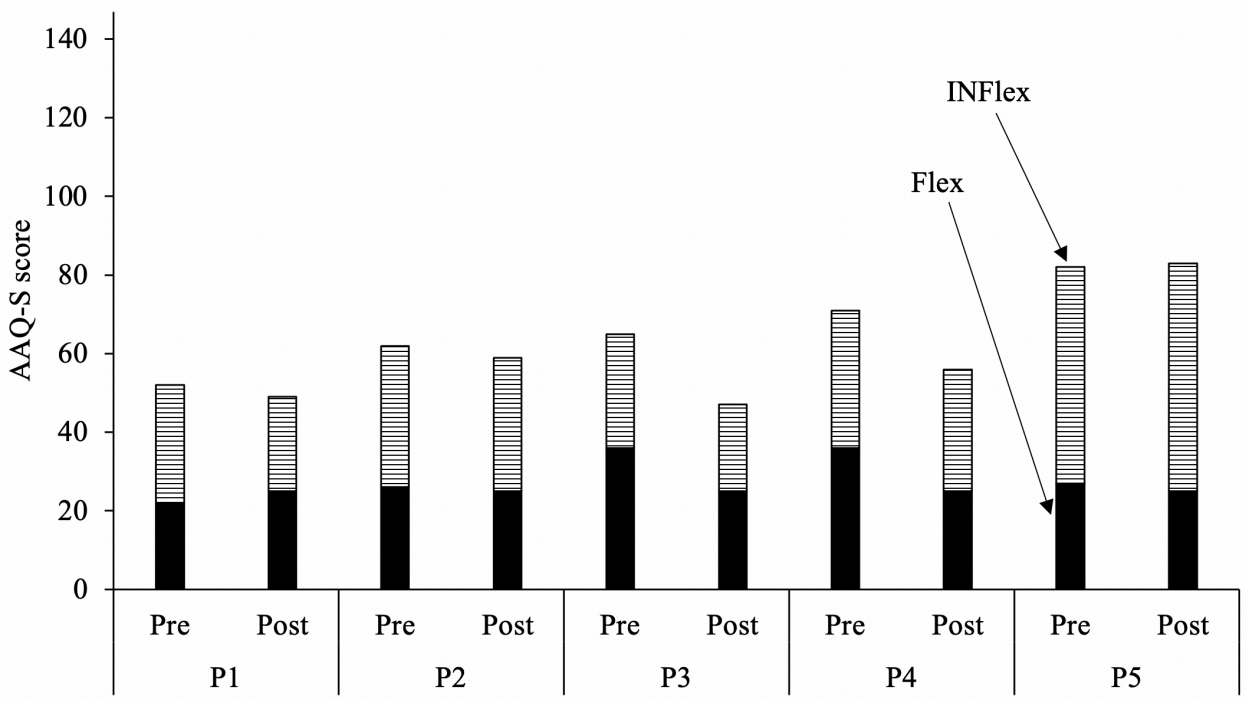


Figure 9.

Acceptance and Action Questionnaire - Stigma (AAQ-S) Pre- and Posttest Scores

Note. The above figure depicts AAQ-S pre- and posttest scores (out of possible score of 147) across participants with psychological flexibility (Flex) and psychological inflexibility (INFlex) subscales – lower scores indicate greater psychological flexibility with stigmatizing thoughts (e.g. lower stigma towards others).

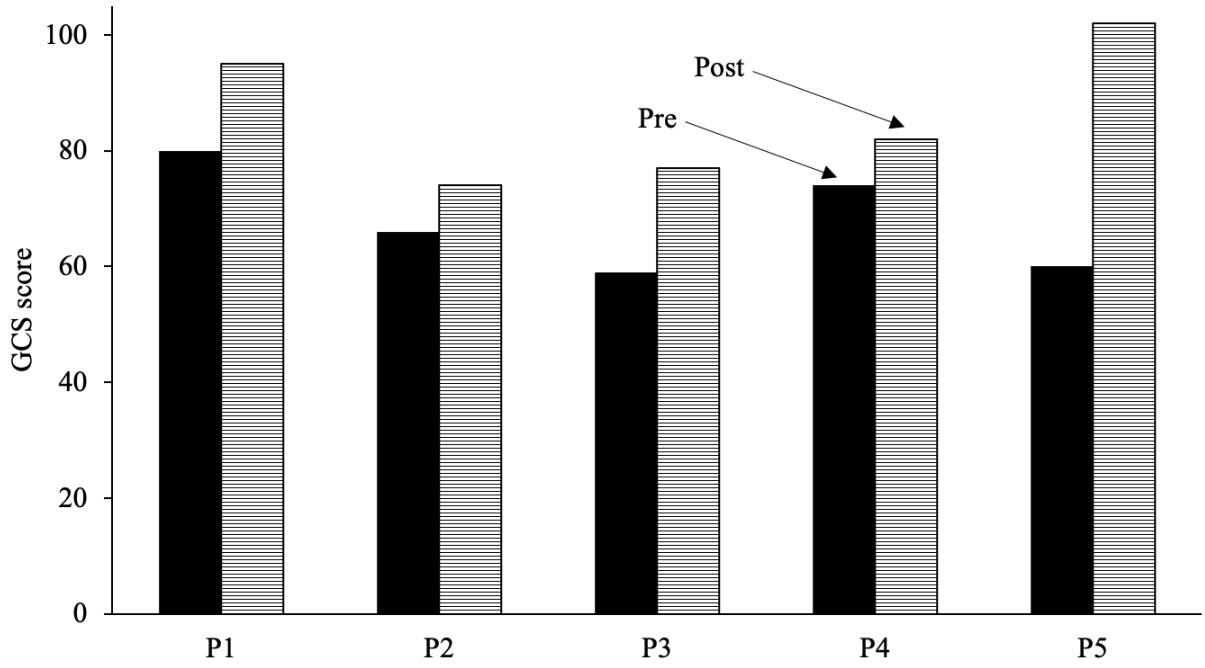


Figure 10.

General Capability Scale (GCS) Pre-Post Total Score for People with Disabilities (PWD)

Note. The above figure represents each participants' GCS Generalization score (out of a possible score of 105) compared between pre-test and post-test GCS scores for PWDs – the greater the score, the greater perceived daily living ability of the depicted individuals were.

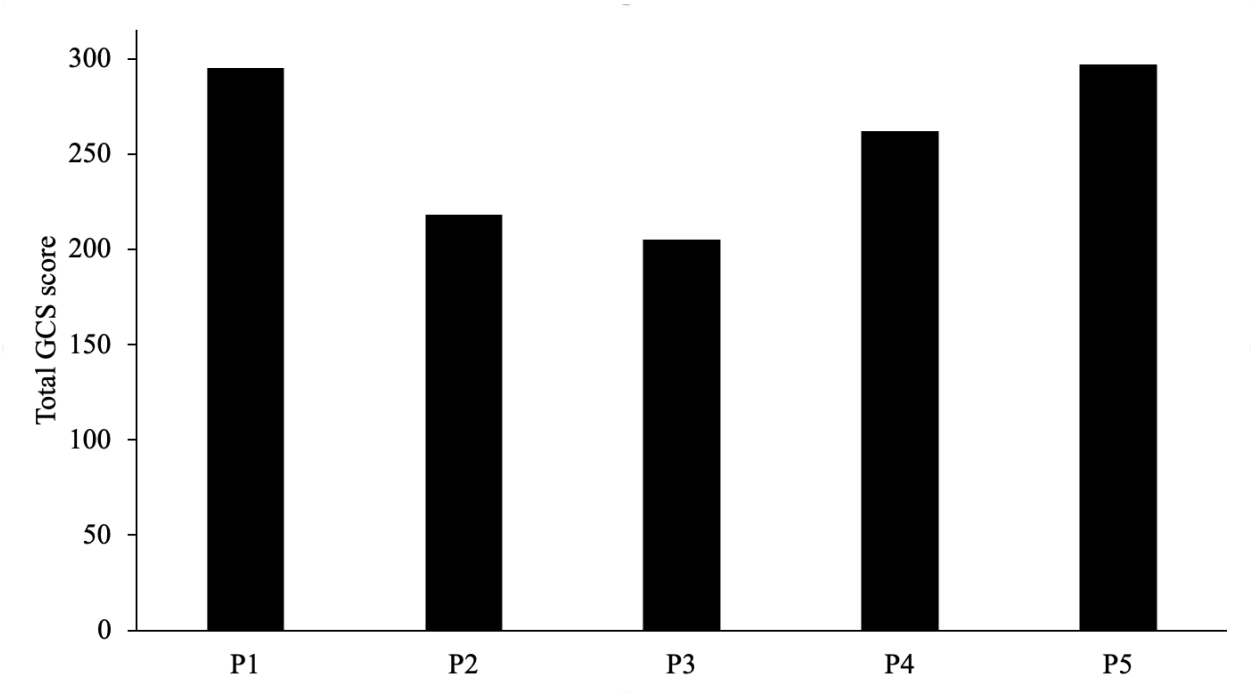


Figure 11.

General Capability Scale (GCS) Generalization Total Score

Note. The above figure represents each participants' GCS Generalization score (out of a possible score of 315) – the greater the score, the greater perceived daily living ability of the depicted individuals were.

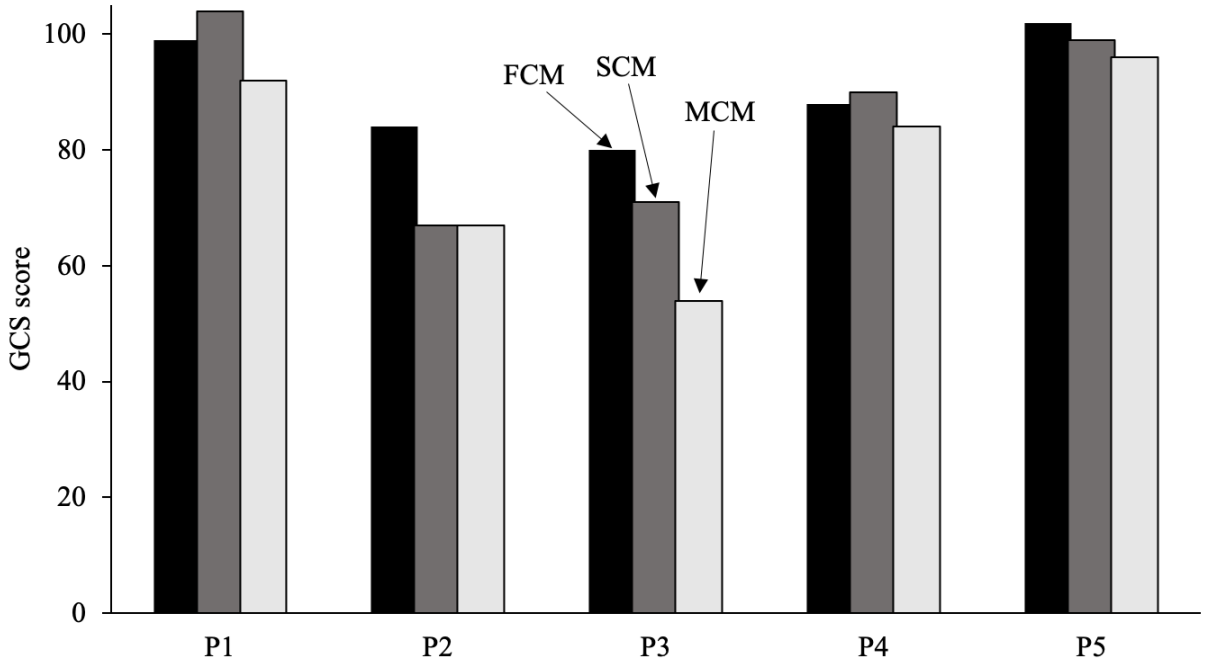


Figure 12.

General Capability Scale (GCS) Generalization Category Score Breakdown

Note. The above figure represents each participants' GCS Generalization score per category (each out of a possible score of 105) across *facial collateral manifestation* (FCM), *stereotypic collateral manifestation* (SCM), and *movement collateral manifestation* (MCM) – the greater the score, the greater perceived daily living ability of the depicted individuals were.

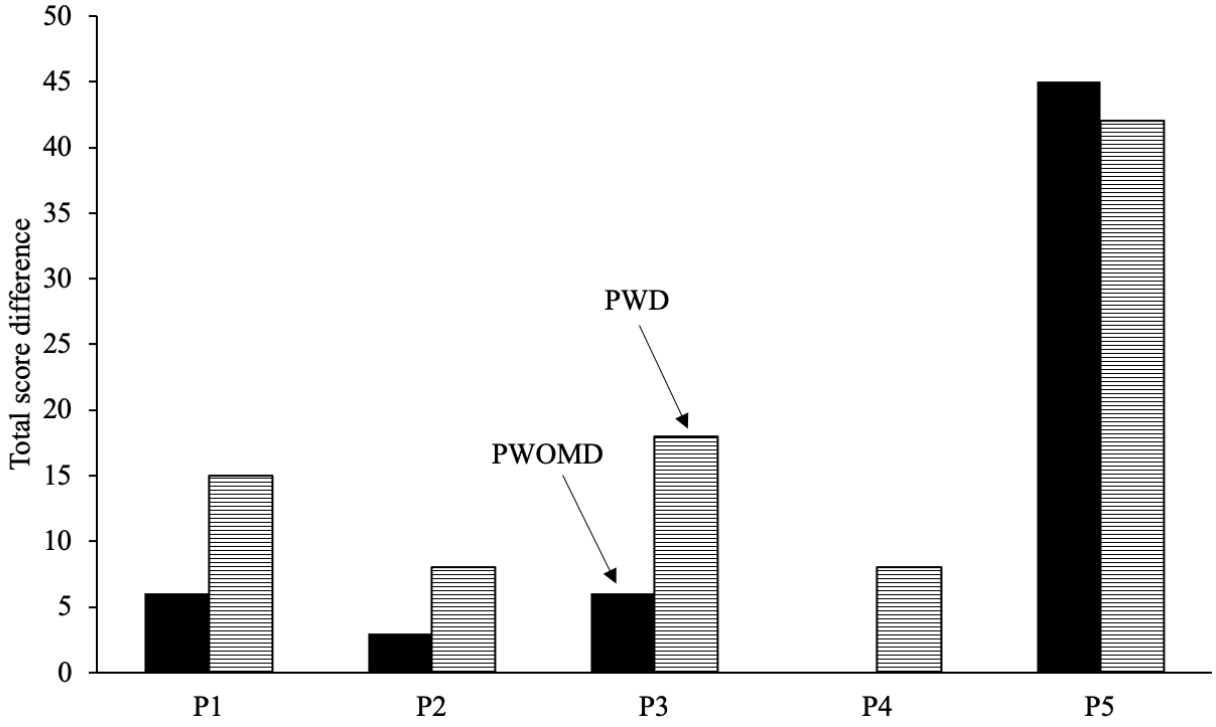


Figure 13.

General Capability Scale (GCS) PWD and PWOMD Pre/Post Test Score Differences

Note. The above figure represents the difference between pre- and posttest scores across PWOD GCS scores and PWD GCS scores (score differences across pre and posttest) for each participant – larger numbers indicate a greater difference in overall ability perception.

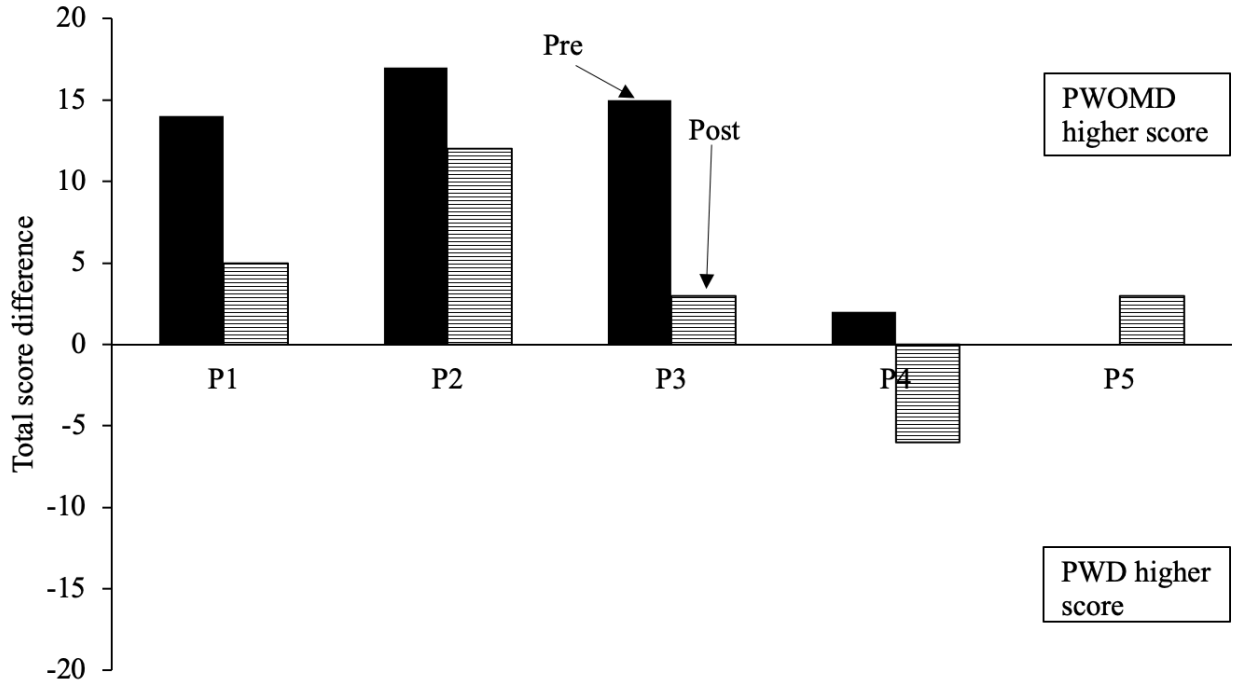


Figure 14.

General Capability Scale (GCS) PWD and PWOMD Pre/Post Test Score Comparison

Note. The above figure represents the difference between PWOMD GCS scores and PWD GCS scores (PWD subtracted form PWOMD score) during pre- and posttest scores across participants – positive numbers indicate that PWOD scores were higher.

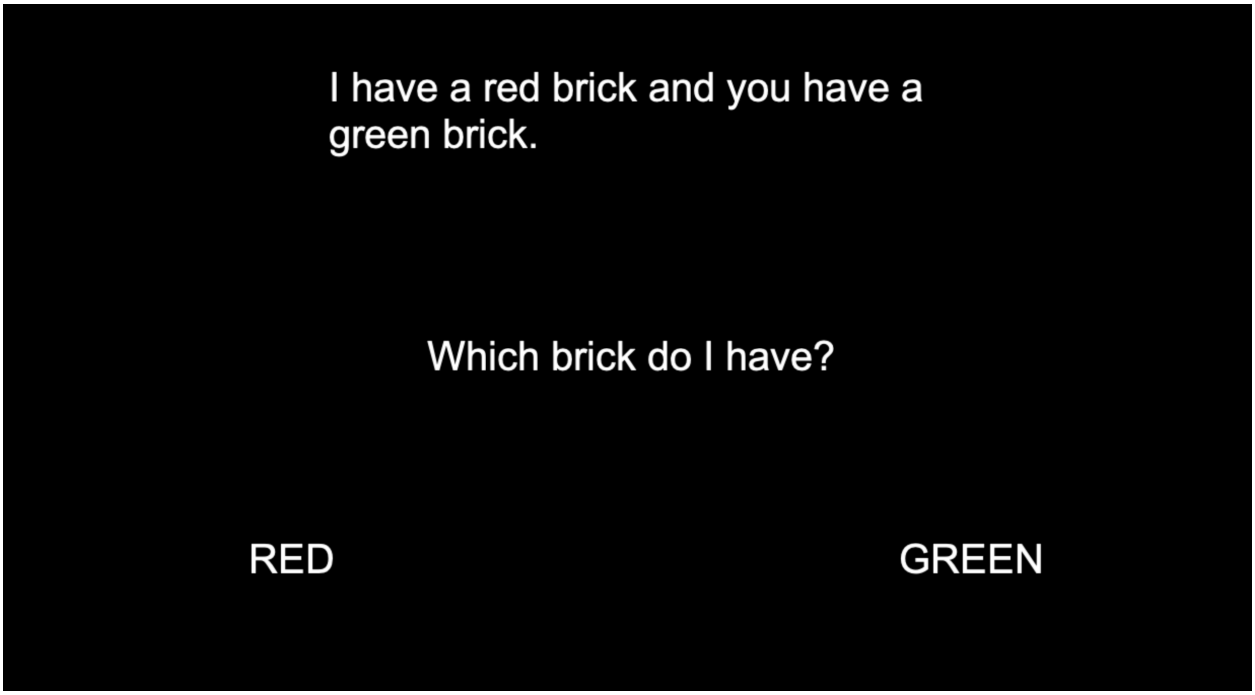


Figure 15.

Study 2 Training PsychoPy3 Presentation

Note. This figure depicts what a participant saw during the training and test phases with the relevant deictic frame (e.g. the above example is of the simple I-YOU relation). They will then be expected to pick one of the two options below (in this case, the correct answer is "Red"). High contrast between shapes and text as it relates to the background was used so that 1) those with low vision can easier see the stimuli, and 2) there may be less eye fatigue if the participants are interacting with the experiment for a long time.

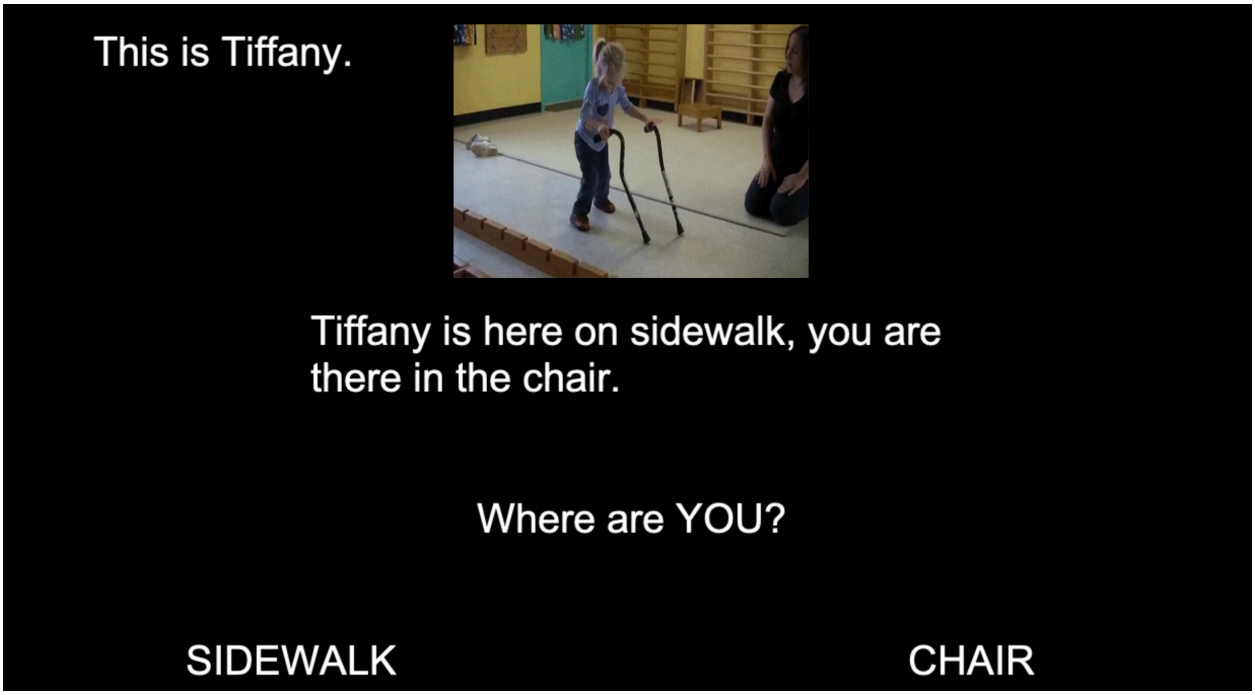


Figure 16.

Study 2 I – YOU Training PsychoPy3 Presentation

Note. Example simple I-YOU mixed trail training. Those with visual impairments can request a copy where there is a description under each GIF. High contrast between shapes and text as it relate4s to the background will be used so that 1) those with low vision can easier see the stimuli, and 2) there may be less eye fatigue if the participants are interacting with the experiment for a long time.

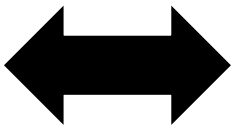
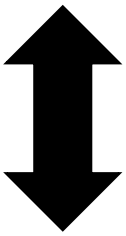
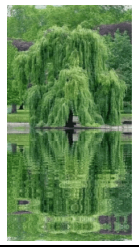
	Set 1	Set 2	Set 3
Stimuli A			
Stimuli B		***A picture of the participant***	
Stimuli C	**DIFFERENT APPROACH**	**ACHIEVE GOALS**	**ROLLING STOP**
Metaphor	***See Appendix B for full metaphor.***		

Figure 17.

Study 3 Training Stimuli

Note. Above is the training stimuli that participants will interact with in experiment 3. Arrows were all white while using the software. They are black here so as to more easily see them in this figure. See relevant figures for examples of what it will look like during the experiment.

Figure 18.

Study 3 Metaphor PsychoPy3 Presentation

Note. The above figure depicts what a participants saw during the A-B training and mixed training phases. High contrast between shapes and text as it relates to the background were used so that 1) those with low vision can more easily see the stimuli, and 2) there was less eye fatigue if the participants are interacting with the experiment for a long time.

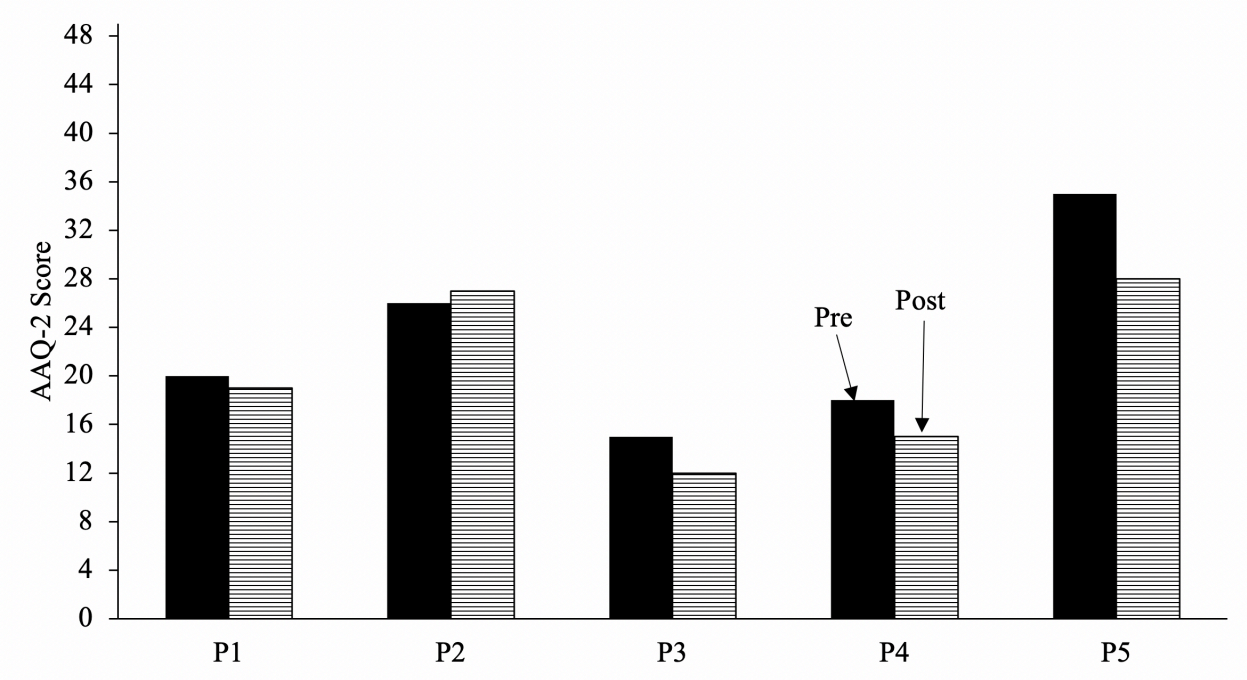


Figure 19.

Acceptance and Action Questionnaire (AAQ-2) Pre- and Posttest Scores

Note. The above figure depicts pre- and posttest AAQ-2 scores across each participant – lower scores indicate greater psychological flexibility.

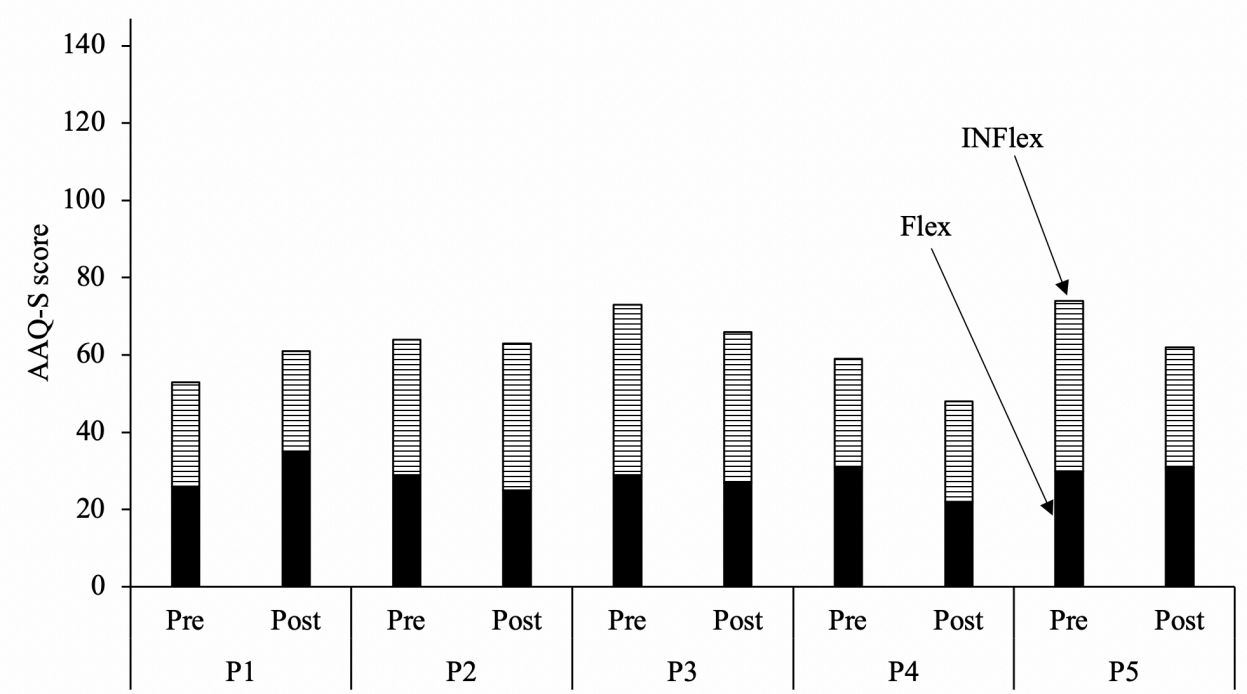


Figure 20.

Acceptance and Action Questionnaire - Stigma (AAQ-S) Pre- and Posttest Scores

Note. The above figure depicts AAQ-S pre- and posttest scores (out of possible score of 147) across participants with psychological flexibility (Flex) and psychological inflexibility (INFlex) subscales – lower scores indicate greater psychological flexibility with stigmatizing thoughts (e.g. lower stigma towards others).

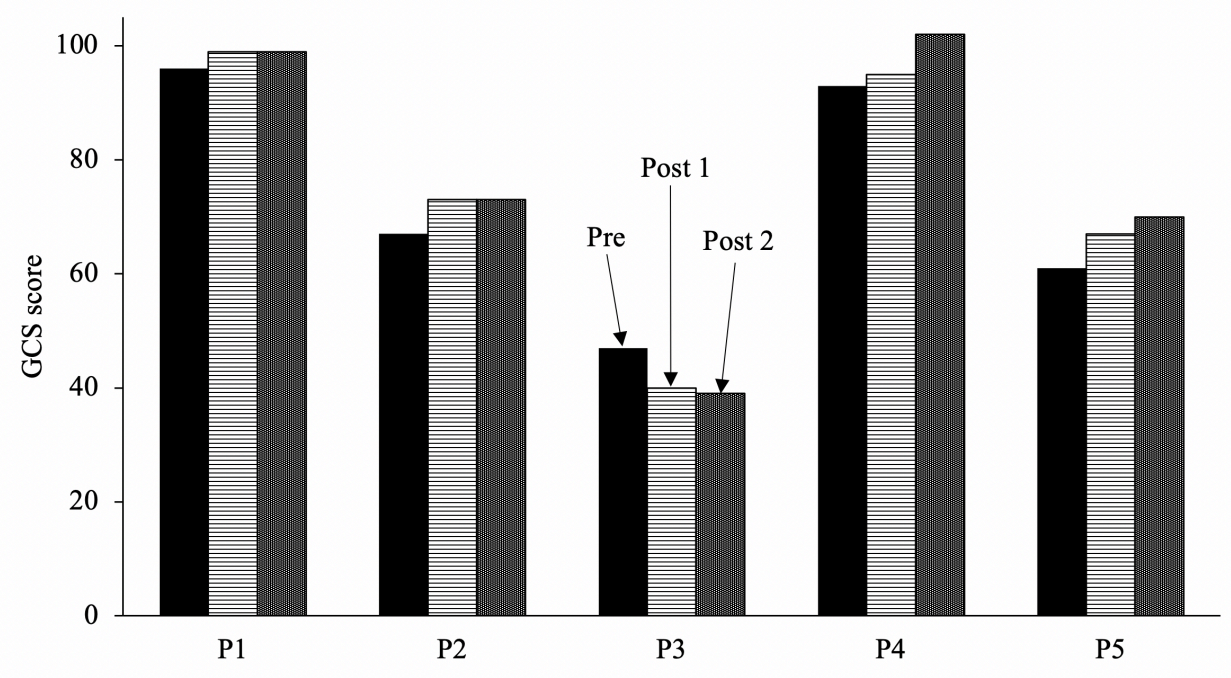


Figure 21.

General Capability Scale (GCS) Pre-Post1&2 Total Score for People with Disabilities (PWD)

Note. The above figure represents each participants' GCS score (out of a possible score of 105) compared between pre-test, post-test 1, and post-test 2 GCS scores for PWD, stimuli not directly trained – the greater the score, the greater perceived daily living ability of the depicted individuals were.

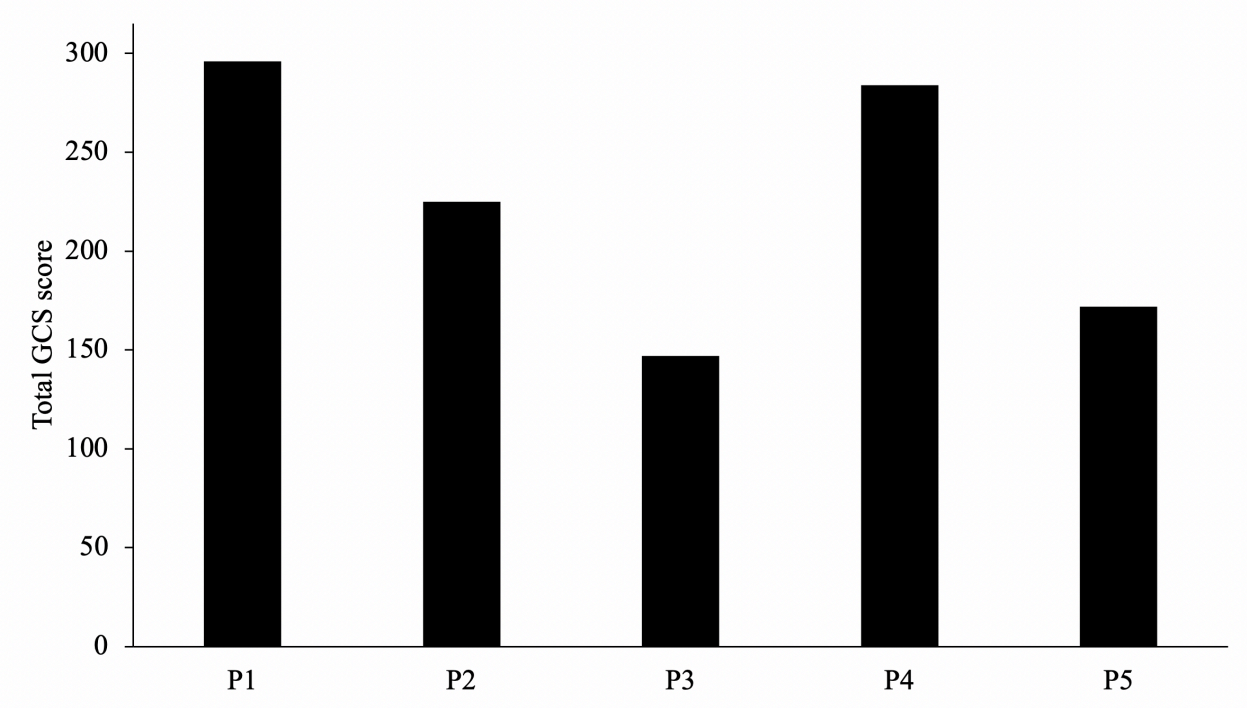


Figure 22.

General Capability Scale (GCS) Generalization Total Score

Note. The above figure represents each participants' GCS Generalization score (out of a possible score of 315) – the greater the score, the greater perceived daily living ability of the depicted individuals were.

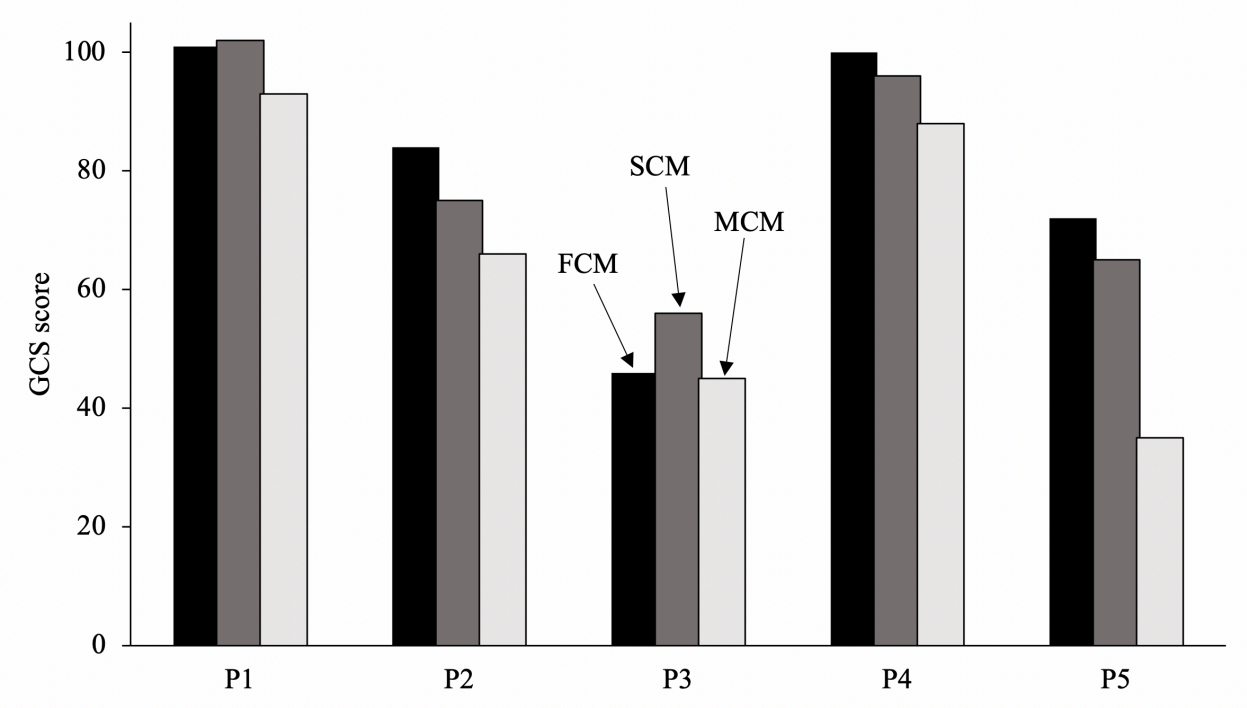


Figure 23.

General Capability Scale (GCS) Generalization Category Score Breakdown

Note. The above figure represents each participants' GCS Generalization score per category (each out of a possible score of 105) across *facial collateral manifestation* (FCM), *stereotypic collateral manifestation* (SCM), and *movement collateral manifestation* (MCM) – the greater the score, the greater perceived daily living ability of the depicted individuals were.

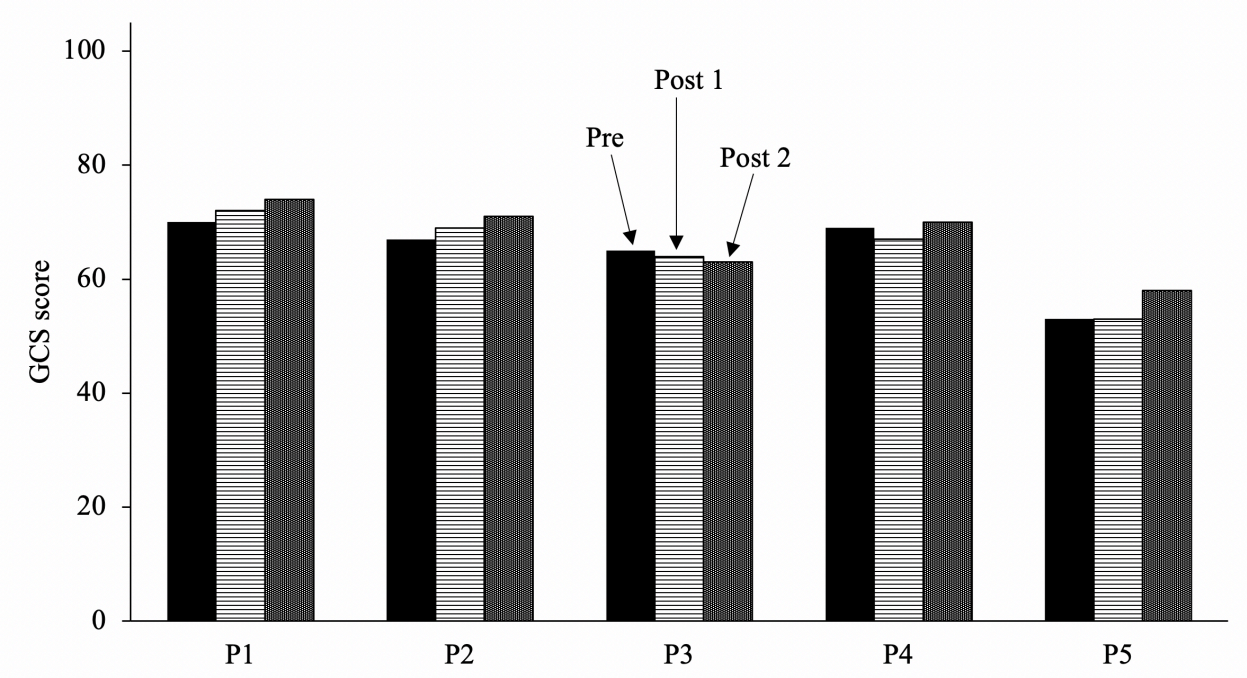


Figure 24.

General Capability Scale (GCS) Pre-Post Total Score for Stimuli Directly Trained

Note. The above figure represents each participants' GCS Generalization score (out of a possible score of 105) compared between pre-test, post-test 1, and post-test 2 GCS scores for stimuli that were directly trained throughout the study – the greater the score, the greater perceived daily living ability of the depicted individuals were.

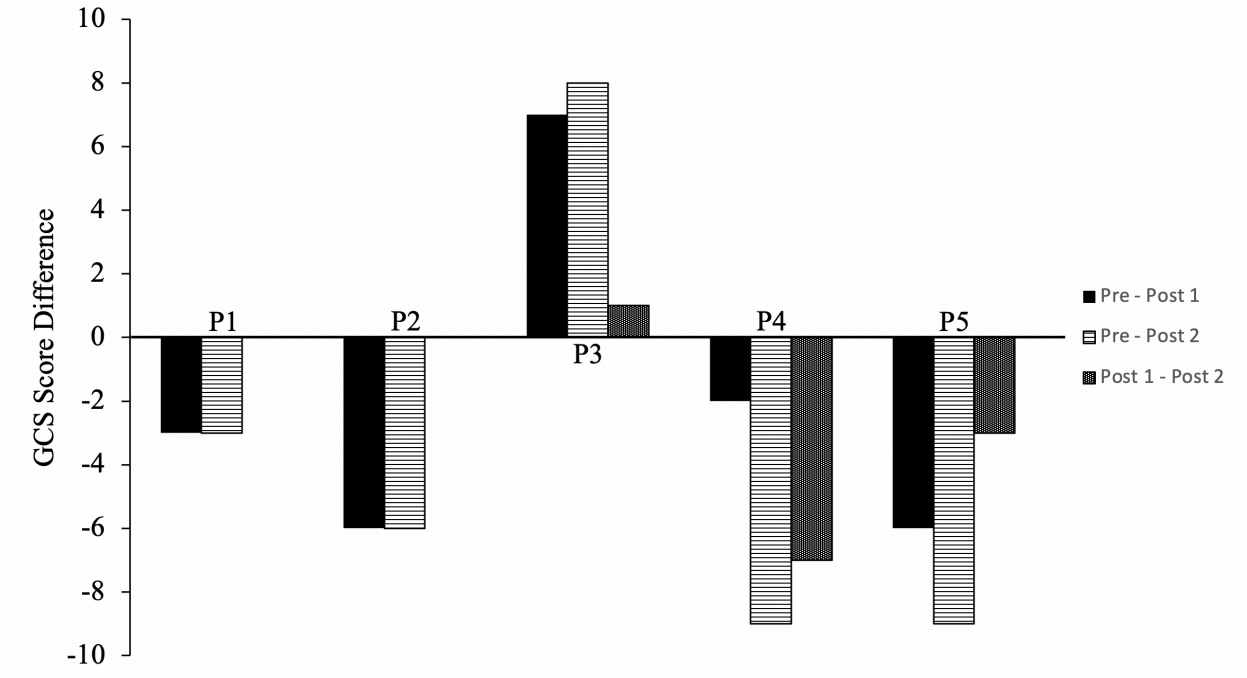


Figure 25.

General Capability Scale (GCS) Score Difference Pre- and Posttests Comparison for People with Disabilities (PWD) Stimuli Not Directly Trained

Note. The above figure represents the difference between pre- and posttests comparisons (pre-test the subtract the post test score) then posttests comparison (posttest 1 then subtract post-test 2) across PWD untrained stimuli. Negative numbers indicate increase in posttests scores (when compared to pretest scores) or increase in posttest 2 score compared to posttest 1 – negative values indicating an increase in a greater perceived daily living ability of the depicted individuals were.

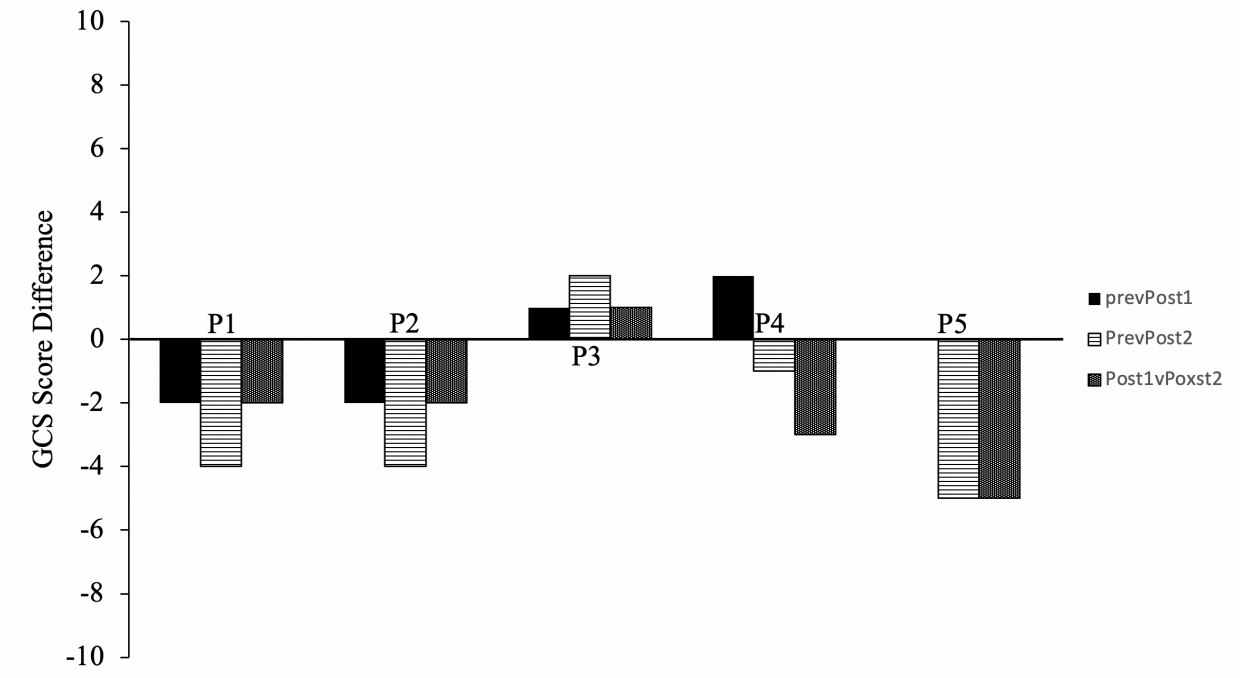


Figure 26.

General Capability Scale (GCS) Score Difference Pre- and Posttests Comparison for Stimuli Directly Trained

Note. The above figure represents the difference between pre- and posttests comparisons (pre-test the subtract the post test score) then posttests comparison (posttest 1 then subtract post-test 2) trained stimuli. Negative numbers indicate increase in posttests scores (when compared to pretest scores) or increase in posttest 2 score compared to posttest 1 – negative values indicating an increase in a greater perceived daily living ability of the depicted individuals were.

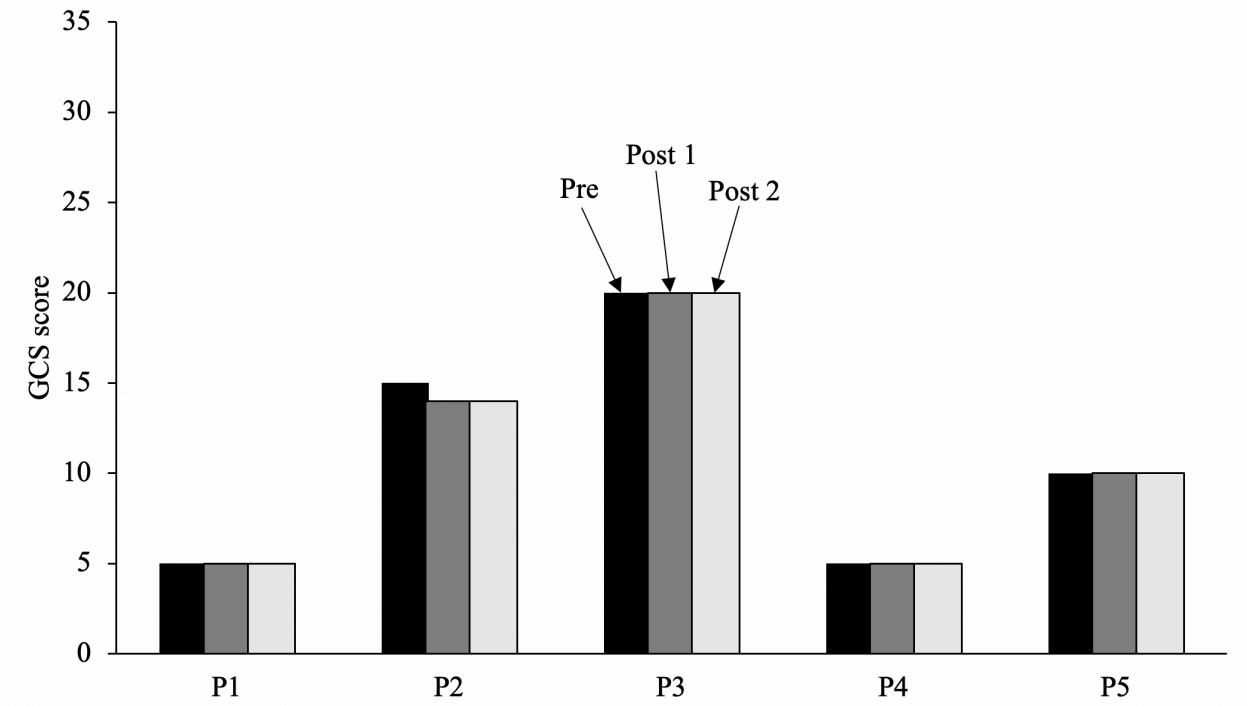


Figure 27.

Neutral GCS Stimuli Pre/Post Test Score

Note. The above figure depicts the participants' GCS scoring (out of a possible 35 for each section) for the neutral trained stimuli throughout the pre- and posttests conditions of the study.

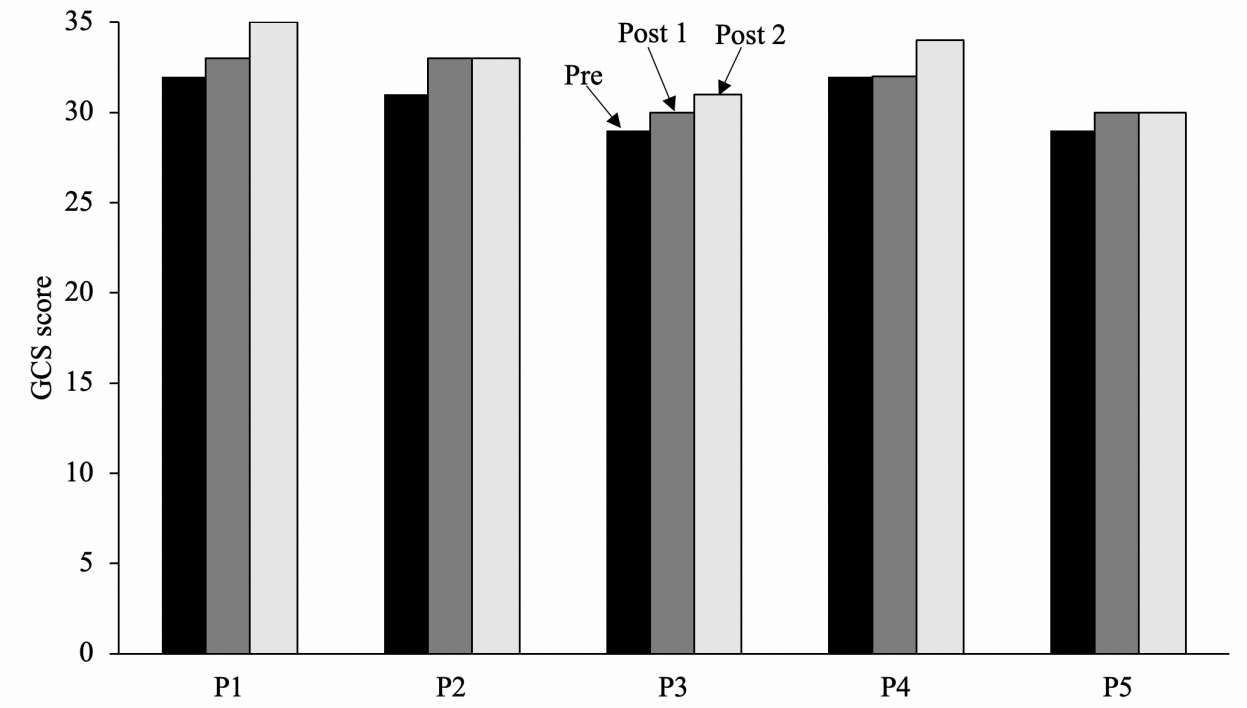


Figure 28.

Self GCS Stimuli Pre/Post Test Score

Note. The above figure depicts the participants' GCS scoring (out of a possible 35 for each section) for the self (e.g. the participant) trained stimuli throughout the pre- and posttests conditions of the study.

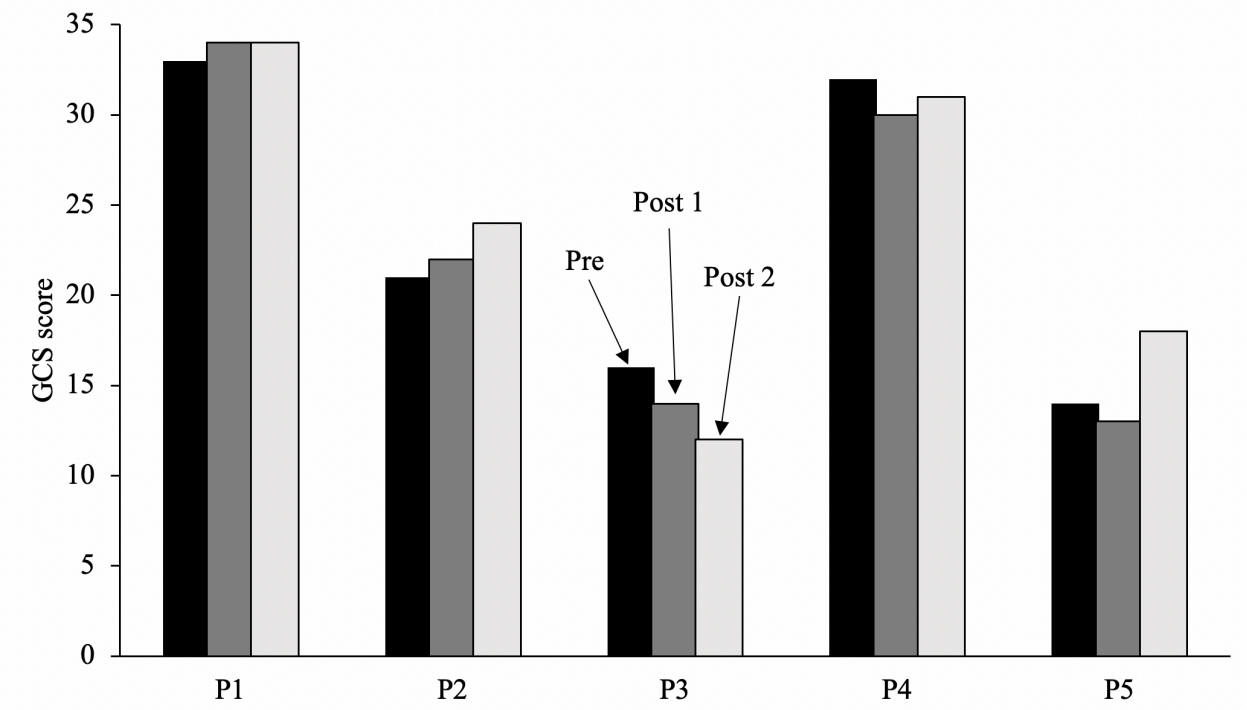


Figure 29.

PWD GCS Stimuli Pre/Post Test Score

Note. The above figure depicts the participants' GCS scoring (out of a possible 35 for each section) for the PWD trained stimuli throughout the pre- and posttests conditions of the study.

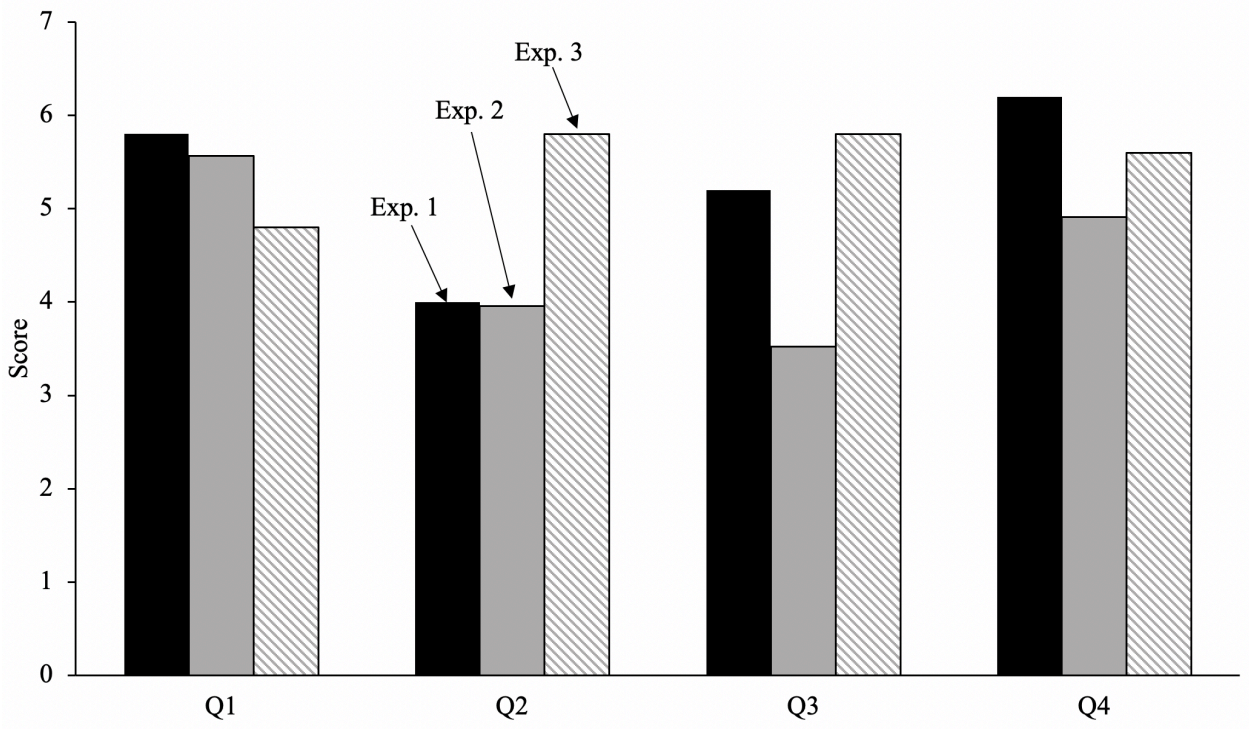


Figure 30.

Social Validity Questions Overview

Note. The above figure depicts the final social validity questions regarding – Q1 (How likely are you to be aware of your own stigma towards individuals with disabilities after this study? 1=not likely, 7 = very likely), Q2 (How likely do you think a study like this will help to reduce stigma towards individuals with disabilities? 1=not likely, 7 = very likely), Q3 (How simple was it to complete this study? (1=very hard, 7 = very easy), and Q4 (How comfortable were you when you were completing this study? 1=very uncomfortable, 7=comfortable).

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APPENDIX A

GENERAL DEMOGRAPHICS FORM

The below demographics form was conducted completely online using the created software before each of the experiments

How old are you?		
What gender do you identify as?		Male
		Female
		Other
		I prefer not to answer
Highest Education Level Completed (Check all that apply)		GED
		High School Diploma
		Associate's Degree (A.A. or A.S.)
		Some College (less than 1 year)
		Some College (more than 1 year)
		Bachelor's Degree (B.A., B.S., B.F.A., etc.)
		Master's Degree (M.S., M.A., A.M., etc.)
		Professional Degree (Psy.D., MD, DDS, JD, DVM, etc.)
		Doctoral Degree (Ph.D., Ed.D)
		Other (Ed.S., EMT, Journeyman, etc. - please list):
Race/Ethnicity (Check all that apply)		American Indian or Alaskan Native
		Asian
		Black or African American
		Biracial
		Hispanic or Latino
		White
		Unknown
		Other:
		Prefer not to answer
Martial Status (Check one)		Now Married
		Single/never married
		Widowed
		Divorced
		Separated
Employment Status (Check all that apply)		Employed for wages (i.e. hourly wages)
		Salaried Employee
		Out of work and currently looking for work

		Out of work and NOT currently looking for work
		Student
		Self-Employed
		Retired
		Unable to work
Housing (Check only one)		Owned by you or someone in this household with a loan or mortgage
		Owned by you or someone in this household free and clear (no loan/mortgage)
		Renting from someone
		Homeless
		Prefer not to answer
Household income (Check only one)		Less than $10,000
		$10,000 to $19,999
		$20,000 to $29,999
		$30,000 to $39,999
		$40,000 to $49,999
		$50,000 to $59,999
		$60,000 to $69,999
		$70,000 to $79,999
		$80,000 to $89,999
		$90,000 to $99,999
		$100,000 to $149,999
		$150,000 or more
Do you currently work with individuals who have diagnosed disabilities?		Yes
		No
		I don't know
Do you currently have a disability?		Yes
		No
		I don't know
		Prefer not to answer
Have you ever experienced discrimination based on your race, ethnicity, or ideologies?		Yes
		No
		I don't know
		Prefer not to answer
Have you ever experienced discrimination based on your capabilities and a human being?		Yes
		No
		I don't know
		Prefer not to answer

APPENDIX B

STUDY 3 METAPHOR

Below is the written metaphor used for the audio in Study 3.

Hello! You will now hear a metaphor for this portion of the study. Once it is complete, the program will move you onto the next phase. Again, remember to FOCUS on what is being said and do not engage in any other activities but this one until it is complete.

I would like you to imagine that there are two beavers, each living in their own wetland not too far from each other.

Both the beavers want to create dams so that they can protect their families. Each damn takes a long time to build as they need walls, a den, and be able to divert water around their home.

One beaver is your typical beaver – strong, good sized tail, and tough teeth to gnaw through the trees needed to create the dams. The other beaver has a small tail, a missing tooth, and has a hard time remembering things like where the best trees are. Both beavers set out to achieve their goals of creating these important structures.

One day, both beavers go out to start building a new home for their families. The typical beaver quickly goes and finds all the best trees, quickly gnawing through the tough bark and wood, carrying this back to their building site, and returning to the same spot since they have a really good memory for this sort of thing. The other beaver is not so fast and does not have a chance to get all the best trees since the typical beaver is getting to them before this beaver ever has a chance. The other beaver is not mad at the typical beaver because they do not know that is what is happening, and the typical beaver is just working to find the best trees for their family. The typical beaver quickly constructs their dam and home while successfully diverting water around it to create a moat of protection for their family. They are almost done. The other beaver is only about halfway done as they did not have the same resources available as the other beaver since those trees were gone and it is difficult to remember where the other good spots for building materials were.

The other beaver does, however, figure out different approaches to remember the new spot where the best trees are – they make little bite marks to leads the way. As such, they do not have to remember the path "in their head" – they just need to follow the trail they made. Once they get to the glen where the good trees are, it takes a while to bite through the wood since they only have one tooth instead of two like the typical beaver. The other beaver does, however, figure out that they only need to bite halfway through the tree trunk and then they can use their body to push it down the rest of the way. The other beaver is happy that they are able to find these new trees and, at their own pace, is able to build their home.

The typical beaver does finish their home before the other beaver; however, the other beaver still completes their home in a good amount of time. Both beavers live a happy life with their partners and their children. They teach their children how to find the trees needed for their own homes in

the future based on how they found the trees to build the homes they are in now. The two beavers and the families eventually become friends and share their ideas with each other so that next time they build a home, they can do so with help in a variety of ways based on their skillsets.

Just because you are built a certain way and others may have better skills than you, doesn't mean that you are not able to achieve your goals. This doesn't mean that you will never achieve your goals. You just have to take a different approach given the skills and abilities you have. When this is considered, everyone has a chance at a happy life doing the things they want and reaching their goals at their own pace.

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