



MSU Graduate Theses

Spring 2022

Measuring Gender-Related Biases and Exploring Methods to Diminish Bias by Targeting Relations for Defusion

Chynna B. Frizell

Missouri State University, Frizell5@live.missouristate.edu

As with any intellectual project, the content and views expressed in this thesis may be considered objectionable by some readers. However, this student-scholar's work has been judged to have academic value by the student's thesis committee members trained in the discipline. The content and views expressed in this thesis are those of the student-scholar and are not endorsed by Missouri State University, its Graduate College, or its employees.

Follow this and additional works at: <https://bearworks.missouristate.edu/theses>



Part of the [Clinical Psychology Commons](#), and the [Social Justice Commons](#)

Recommended Citation

Frizell, Chynna B., "Measuring Gender-Related Biases and Exploring Methods to Diminish Bias by Targeting Relations for Defusion" (2022). *MSU Graduate Theses*. 3732.
<https://bearworks.missouristate.edu/theses/3732>

This article or document was made available through BearWorks, the institutional repository of Missouri State University. The work contained in it may be protected by copyright and require permission of the copyright holder for reuse or redistribution.

For more information, please contact BearWorks@library.missouristate.edu.

**MEASURING GENDER-RELATED BIASES AND EXPLORING METHODS TO
DIMINISH BIAS BY TARGETING RELATIONS FOR DEFUSION**

A Master's Thesis

Presented to

The Graduate College of

Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science, Clinical Psychology

By

Chynna B. Frizell

May 2022

MEASURING GENDER-RELATED BIASES AND EXPLORING METHODS TO DIMINISH BIAS BY TARGETING RELATIONS FOR DEFUSION

Psychology

Missouri State University, May 2022

Master of Science

Chynna B. Frizell

ABSTRACT

Biases related to gender are an important area of empirical attention in the United States due to social challenges related to prejudice, stereotyping, and discrimination based on gender. The purpose of this study is to evaluate potential bias related to binary and nonbinary gender using a measure of relational responding rooted in Relational Density Theory (RDT) (Belisle & Dixon, 2020). Mass and volume of networks in terms of gendered stereotypical relations are assessed to further examine binary gendered stereotypes and to examine relations regarding nonbinary genders in the context of traditionally masculine and feminine labels. Implicit biases regarding male and female genders have been examined, however less research on nonbinary gender biases and stereotypes is available. As the number of individual's identifying as nonbinary increases, (estimated 1.2 million) it is of particular importance to examine this population. Using an RDT approach, binary gender stereotypes were expected to tightly cluster, but become less dense after employing an Acceptance and Commitment Therapy (ACT) technique to weaken stereotypical relations that create bias. A brief 10-minute defusion procedure was utilized to elaborate relational networks, using an approach adapted from previous research (Belisle et al., 2019). Participants randomized into the control group that did not complete the defusion task were expected to see little to no change in relational responding. In the empirical investigation of the data, using a multidimensional scaling procedure (MDS), three distinct classes emerged where 'woman' tightly clustered with feminine descriptors, 'man' tightly clustered with masculine terms, and 'nonbinary person' appeared in its own class between the other two gendered terms. When comparing the two groups between both MDS procedures administered to measure the effects of the defusion procedure on gendered stereotypical relational responding, no changes were observed between the control group (G1) and the experimental group (G2). Relational distance (Rd) was measured between gendered terms, yielding like distances between all gendered terms. The greatest change observed in Rd occurred comparing both groups at time two of the MDS procedure. Implications and avenues for future interventions to diminish unhelpful bias and stereotypical responding are discussed in terms of this empirical investigation.

KEYWORDS: gender bias, gender discrimination, nonbinary gender identity, relational frames, relational density, defusion, Acceptance and Commitment Therapy

**MEASURING GENDER-RELATED BIASES AND EXPLORING METHODS TO
DIMINISH BIAS BY TARGETING RELATIONS FOR DEFUSION**

By

Chynna B. Frizell

A Master's Thesis
Submitted to the Graduate College
Of Missouri State University
In Partial Fulfillment of the Requirements
For the Degree of Master of Science, Clinical Psychology

May 2022

Approved:

Dana Paliliunas, Ph.D., Thesis Committee Chair

Jordan Belisle, Ph.D., Committee Member

Ann Rost, Ph.D., Committee Member

Julie Masterson, Ph.D., Dean of the Graduate College

In the interest of academic freedom and the principle of free speech, approval of this thesis indicates the format is acceptable and meets the academic criteria for the discipline as determined by the faculty that constitute the thesis committee. The content and views expressed in this thesis are those of the student-scholar and are not endorsed by Missouri State University, its Graduate College, or its employees.

ACKNOWLEDGEMENTS

I would like to thank the following people for their support during the course of my graduate studies. First, Dr. Dana Paliliunas for her unwavering support and care for me throughout my years of school. Dr. Paliliunas's passion has inspired me to strive to retain her level of excellence in evidence-based practices and empirical research methods. Without her, this thesis would not be possible. Her influence aided me in finding something that brings my life so much meaning, the research I am able to conduct to spur change in the world around me.

Secondly, I would like to thank Dr. Jordan Belisle for inspiring to step outside my comfort zone and explore new paths in research. I would also like to thank Dr. Ann Rost for offering her knowledge and expertise in the context of this thesis and other domains. A special thank you goes out to my lab mates that have been encouraging throughout this process.

To conclude, I would like to thank my family for being one of my greatest support systems. Thank you to my husband, Tristan, for encouraging me in everything I do and being generous beyond compare. Thank you to my children for making this process all the more worthwhile.

I dedicate this thesis to my husband, Tristan, and Paxton and Ronin, my children.

TABLE OF CONTENTS

Introduction	Page 1
Literature Review	Page 4
Relational Frame Theory	Page 4
Relational Density Theory	Page 7
Acceptance and Commitment Therapy	Page 10
Defusion	Page 11
Methods	Page 14
Participants and Setting	Page 14
Materials and Apparatus	Page 15
Procedure	Page 17
Results	Page 28
Part 1: Data Analysis of Combined Groups at T1	Page 28
Part 2: Comparing Experimental/Control Groups at Pre/Post-Test	Page 31
Discussion	Page 40
Interpretation	Page 40
Implications	Page 43
Limitations	Page 44
Future Directions	Page 45
Conclusion	Page 45
References	Page 47
Appendices	Page 51
Appendix A. Human Subjects IRB Approval	Page 51
Appendix B. Demographics	Page 52
Appendix C. Exemplar MDS Procedure Phase 1	Page 54
Appendix D. Experimental Group Defusion Task	Page 58
Appendix E. Control Group Exemplar Language Task	Page 67
Appendix F. Exemplar MDS procedure phase 2	Page 68

LIST OF TABLES

Table 1. Multidimensional scaling procedure stimuli	Page 16
Table 2. Calculated relational distance for combined groups at Time 1	Page 39
Table 3. Change in relational distances for Group 1 and Group 2 from Time 1 to Time 2	Page 39

LIST OF FIGURES

Figure 1. Procedures flow chart	Page 18
Figure 2. First defusion task questions	Page 24
Figure 3. Two-dimensional scale Combined Groups Time-1	Page 29
Figure 4. Shepard diagram for Combined Groups Time-1 data on goodness of fit	Page 30
Figure 5. Shepard diagram for Group-1 Time-1 data on goodness of fit	Page 32
Figure 6. Shepard diagram for Group-1 Time-2 data on goodness of fit	Page 33
Figure 7. Two-dimensional scale Group-1 Time-1	Page 34
Figure 8. Two-dimensional scale Group-1 Time-2	Page 34
Figure 9. Shepard diagram for Group-2 Time-1 data on goodness of fit	Page 36
Figure 10. Shepard diagram for Group-2 Time-2 data on goodness of fit.	Page 36
Figure 11. Two-dimensional scale Group-1 Time-2	Page 37
Figure 12. Two-dimensional scale for Group-2 Time-2	Page 38

INTRODUCTION

Binary gender identity is so deeply embedded in our society that children as young as 9 months old can distinguish between a female face and a male face (Drake et al., 2018). Gender identity is one of the first language classification systems that we encounter in our lives, from the names we are assigned at birth to whether the color schemes of our first bedrooms are blue or pink. Unfortunately, activities such as decorating a nursery in shades of pale pink or blue, come with real implications for that infant's life. Gender-related biases, stereotypes, prejudice, and discrimination are experienced by individuals in their everyday lives based on their gender identity. This seems to be especially true for individuals that subscribe to the traditionally feminine gender associated with females, women. Women in the United States frequently experience and report some kind of gender discrimination in the workplace. Approximately 42% of women report gender discrimination in the workplace in the United States alone (Daumeyer et al., 2020). The discrimination women experience in the workplace increases in more science, technology, engineering, and mathematic (STEM) related fields. Even in STEM fields where the workforce is predominantly comprised of women gender-related bias, discrimination, stereotyping, and prejudice may still be experienced. An example of this is in the field of Applied Behavior Analysis (ABA); approximately 82% of Board-Certified Behavior Analysts are women, yet gender discrimination is still a prevalent issue (Baires & Koch, 2020).

Stereotyping may be defined as the application of beliefs about a social group when evaluating an individual belonging to the group that influences one's perceptions and behaviors towards that individual (Chaxel, 2015). In this respect much is known about the consequences of gender stereotyping and gender bias for binary genders. Stereotyping based on gender can and

does influence our decisions and our behaviors (Chaxel, 2015). Traditionally, gender has been widely considered dichotomous resting on either feminine or masculine, male or female states of being (Richards et al., 2016). Gender identification has also been highly dependent on physical anatomy, sexual organs, and the sex assigned at birth. If you have female sex organs, then you have likely been conditioned to identify as a woman and if you have male sex organs then you have likely been conditioned to identify as a man. Both gender identities and the language surrounding them come with their own sets of stereotypes. With this dichotomous classification, there is not much room to examine genders that do not fit solely into ‘man’ or ‘woman’ categories. A binary classification system like this also does not do a sufficient job of including individuals that are intersex. In fact, this leaves a gap in the literature for individuals who do not fit or subscribe to the binary classification system of gender at all. There are a variety of possible gender identities and language surrounding them, with limited research examining gender-related stereotyping and bias. It is also difficult to classify these individuals with a blanket terms such as ‘genderqueer’ or ‘nonbinary’ as a sufficient descriptor for all individuals that do not use binary terms to identify their gender. As others have noted, it does not seem fair to label any one person based on physical characteristics or a collective classification system set up by society (Richards, et al., 2016). Although this author knows and acknowledges this injustice, for the sake of expanding upon the minimal literary attention dedicated to gender bias associated with these individuals, the term ‘nonbinary’ will be utilized throughout this study. This is because, despite the inequality of classification systems, they are developed by society, they are used by society, and whether one subscribes to them or not, the relational networks that form as a result of classification systems implicitly and explicitly create bias, prejudice, and discrimination.

In order to examine the stereotypical relations and the language related to individuals that do not use the binary identification of gender, this study will use the term ‘nonbinary.’ The term nonbinary in the context of this study is meant to describe a gender identity that is neither entirely male nor female, but somewhere on the spectrum. It is important to start examining gender bias with populations that do not subscribe to either male or female gender identities to be inclusive of and to account for suffering of all people who experience disparities related to their gender. The number of individuals that identify in a category of nonbinary gender identity is significant. In recent years nonbinary designations of gender identity have become more common in the United States and since the year 2000, government documents have included this as an option of identification (Elias & Colvin, 2019). The Centers for Disease Control and Preventions (CDC) reported data in 2014 revealing that approximately 1.4 million individuals in the U.S., identified as transgender or gender nonbinary (Cicero et al., 2020). Even more recently it has been reported by the Williams Institute at the University of California, Los Angeles (UCLA) that 11% of individuals in the LGBTQIA+ community identify as nonbinary, apprising 1.2 million people in the U.S. (Dowd, 2021). With an increasing portion of the population identifying their gender as nonbinary, it is staggering to see a lack of acknowledgement in the gender stereotyping and gender bias literature. Thus, it is an aim of this study to also measure gender-related bias regarding nonbinary gender identities.

LITERATURE REVIEW

Relational Frame Theory

Gender bias, prejudice, and discrimination are all enveloped by language. A theory that provides a behavioral account for language and cognition is Relational Frame Theory (RFT) (Hayes et al., 2001). Relational Frame Theory is relevant to the aims of this study as it provides a comprehensive analysis of human language and its complexities. Relational Frame Theory captures the complexity of human language and cognition, such as metaphorical language and analogies (Hayes et al., 2001, p.110). Relations as defined in RFT can be described as responding to something in the context of something else. The term ‘relational frame’ may be considered an application of relational responding. Relational frames consist of a few elements including contextual variables, a history of relevant relational responding, and the understood basis of not being completely grounded in either direct nonrelational training of a particular stimuli or the nonarbitrary attributes of that stimuli. Although individuals engage in relational responding across a number of different dimensions, this study focuses on the frame of coordination (or sameness). The frame of coordination describes relational frames in terms of likeness (Hayes et al., 2001).

Gender bias and biases in general consist of attitudes including implicit and explicit attitudes. Explicit attitudes refer to conscious beliefs and implicit attitudes refer to unconscious beliefs (Hehman et al., 2019). Although an individual may not be consciously aware of their implicit beliefs, those views still inform that individual’s perception and their behavior, even when implicit attitudes do not align with that person’s explicit attitudes (Hehman et al., 2019). In psychological research there are tools commonly used to examine explicit bias such as self-

report measure, but these methods will not capture implicit attitudes separate from explicit beliefs. There are tools, however, specifically designed to measure implicit attitudes. Such tools include the Implicit Relational Assessment Procedure (IRAP), which has been utilized to measure specific biases (Barnes-Holmes et al., 2006). The IRAP incorporates methodologies developed from RFT in examining stimulus relations by presenting relational terms and stimuli to be assessed. This is done through the latency and accuracy of responses that are either consistent or inconsistent with the established rules of responding. Shorter response latencies and more accurate responding are shown to reveal the participants' implicit attitudes toward the relational task. The IRAP has been previously employed to measure gender and gender-related bias. In fact, gender stereotypes are among the most investigated biases regarding the IRAP (Errasti et al., 2019).

In a translational study by Paliliunas and Frizell (2021), relational responding related to sexism and the believability of sexual assault claims given the style of women's clothing was examined. In this study relational responding was measured using the IRAP in terms of the believability of sexual assault claims using stimuli of women dressed in modest or revealing clothing, where participants either completed the task in a public or private context. This study solely focused on the gender identity 'woman' as it related to implicit bias towards that group and how believable they were based on their appearance. The results of this study suggested a positive bias existing towards believing women making sexual assault claims that were dressed modestly in both contexts (Paliliunas & Frizell, 2021). This study provides an example of the utility of employing a measurement of relational responding based on the principles of RFT to study bias. This study only highlights empirical exploration of bias relating one gender identity, woman. Other studies have explored relational frames of gender identity with two differing

gender identifications: man and woman.

Another study examined gender-binary identities (Cartwright et al., 2017) as they pertain to gender inequality in the workplace. This study not only examined gender inequality, but they also inspected the IRAP as a measure of gender-binary beliefs utilizing two IRAP procedures. Each of the IRAPs contained gender-binary traits that were masculine and feminine. Each procedure contained masculine or feminine stimuli with one containing only positive traits and the other only containing negative traits. Participants in this study also completed explicit measures, such as self-report measures related to sexism. The results of this study indicated that binary gender stereotypes, such as women being 'feminine' and men being 'masculine,' were significant. This was evident when the participant completing the task identified with the gender being described. One example that was most evident was men having a strong bias towards men as masculine and not feminine. The inferences made from this research are that there is workability in examining gender using an RFT account, that the language surrounding gender identities may be more rigid in certain contexts, and that gender-binary biases may play a role in occupational discrimination (Cartwright et al., 2017). This is just one empirically driven example in the literature of gender-binary bias utilizing an IRAP. The IRAP is not the only means to measure relational responding. Recent literature cites critiques of the utility of the IRAP in detecting bias due to the potential interference of other factors such as the single-trial-type-dominant effect (STTDE) and the differential arbitrarily applicable relational responding effects (DAARRE), which may affect outcomes based on a participant's history with certain stimuli (Finn et al., 2018). This is not to suggest that the IRAP does not contain utility, but to suggest that research in these areas should be supported through ongoing research and empirical evidence. Another approach rooted in RFT to apply in supporting this important research

regarding gender-related bias, stereotyping, and discrimination is Relational Density Theory (RDT).

Relational Density Theory

As a quantitative extension of RFT, Relational Density Theory (RDT) also provides an account of human language and complex cognitive behaviors (Belisle & Dixon, 2020). In RDT, theory not only expands on RFT, but also is an expansion of Behavioral Momentum Theory (BMT). An approach grounded in RDT is used in the context of this study to expand evaluation of relational responding regarding gender bias of binary and nonbinary gender identities and to empirically measure visible biases regarding gender-related language of men, women, and nonbinary individuals. Relational density theory provides an even more extensive account to interpret complex relational frames and classes. The application of this theory does this by utilizing the most significant aspect of the theory thus far, which is measuring differences in relations by their type of relation (C-rel) and by their degree of relatedness (relational density, R_p) (Belisle et al., 2022). Using RDT allows for prediction of the interaction between behavior and environment as a result of understanding these relational events including relational density. The properties measured within RDT not only include relational density (R_p), but also relational volume (R_v) and relational mass (R_m). Relational volume describes the size of the class. Relational mass is a derivative of R_p and R_v that predicts resistance to change (Belisle et al., 2022).

During this study R_p , R_v , and R_m will not be the only terms describing units of relational measurement. I will measure how these classes move and dissipate through a language activity derived from an Acceptance and Commitment Therapy (ACT) intervention approach called

defusion. For this reason, relational coherence, relational acceleration, relational deceleration, and relational relativity are all relevant concepts of RDT in this context. Relational coherence may be described as, “the distance between two or more classes that predicts the merging of relational classes” (Belisle, et al., 2022). Relational acceleration is the rising rate of variation among relational classes over time. Relational deceleration is the inverse of relational acceleration, as it is the decreasing rate over time. Finally, relational relativity is the concept that each relational behavior operates relative to another in dynamic ways. Each stimulus in this study is relative to one another, meaning that they all affect each other.

The theoretical framework of RDT has previously been applied when examining gender-related stereotypes as they pertain to the frames of gender-binary identities such as man and woman. In a study by Sickman et al. (2022), gendered relational frames were explored in four phases using a multidimensional scaling procedure (MDS), and hypothetical gendered and non-gendered scenarios to evaluate transformation of stimulus function. This study examined positive and negative gender stereotypes related to men and women mapped out in a two-dimensional space using the data accrued from the MDS procedure. The results of this study indicate that there were strong relations between binary genders and their perspective stereotypes including ‘male’ associated terms clustering tightly together (e.g. ‘strong’ and ‘forceful’) and ‘female’ associated terms clustering tightly together (e.g. ‘emotional’ and ‘prudish’). These two distinct classes emerged in the geometric space and were highly resistant to change based on responding during the first scaling procedure to the second. The results also point to the social significance of these relational networks, suggesting that individuals are not exclusively responding to the provided scenarios, but that they may be responding in accordance with pre-existing gender binary relational framing patterns. This study paved the way for more exploration into gender

bias through relational responding, where RDT provides an interpretation of implicit bias (Sickman et al., 2022).

Such studies, like one exploring the believability of sexual assault claims of women is an additional example of the usefulness of RDT as it replicates results of an experiment described earlier by Paliliunas and Frizell (2021). This translational study explored believability of women based on their appearance through the theoretical lens of RDT, empirically measuring gender-related bias (Frizell & Paliliunas, 2021). Similar to Paliliunas and Frizell (2021), this study sought to examine relational frames regarding sexism towards women and believability. Modest and revealing silhouettes, as well as believability terms, such as ‘honest’ and ‘liar’ were used in a multidimensional scaling procedure where two multidimensional scales were compared. This investigation led to similar results of the IRAP study regarding sexism and believability, finding more believable terms densely related to modestly dressed women. This replicability is indicative of the validity of both theoretical methodologies of the IRAP and RDT. However, both were exploratory in nature and explored a singular gender identity, ‘woman.’

Numerous experimental studies exist on gender-related implicit bias and relational frames. Empirical support for the efficacy of RDT approaches to capturing and mapping out two-dimensional relational networks exists. All the evidence on gender bias suggests the acknowledgement of its existence and the potential negative impact on individuals and minority groups as these biases lead to greater issues of prejudice and discrimination. A wealth of information is accessible regarding binary gender stereotypes and biases. For the growing population of individuals that identify as gender-nonbinary, this narrative is not the case. Little research exists on implicit biases and gender stereotypes towards individuals that identify their gender as nonbinary. The absence of the literature is not indicative of this problem not existing

for nonbinary people but is evidence for the need to take action to examine how these individuals may be experiencing prejudice and discrimination based on implicit and/or explicit biases others may hold regarding their gender identity.

Acceptance and Commitment Therapy

As it is already clear that binary gender discrimination is a relevant issue in the United States and the stereotypical relational networks surrounding binary gender identities are highly related and resistant to change, this study seeks to intervene on these issues (Daumeyer et al., 2020; Baires & Koch, 2020; Chaxel, 2015). Language is a definitive factor contributing to the issue, but language may also be a key component to help dissipate the issue. Relational Frame Theory provides an account for language and is a theoretical foundation of Acceptance and Commitment Therapy (ACT) (Belisle & Dixon, 2022). Acceptance and Commitment Therapy has over 30 years of empirical support and is an approach intended to modify functional patterns of relational framing. This intervention approach takes a dynamic approach to relational behavior and consists of six core processes, often displayed in a diagram referred to as the ‘hexaflex.’ Although ACT has been seen as the ‘third-wave’ of Cognitive Behavioral Therapy (CBT), this therapy has its basis in functional contextualism. Functional contextualism has a focus on context as an ongoing process concentrating on the entirety of an event, emphasizing pragmatism, understanding the role of context pertaining to the function of an event, and specifying goals related to pragmatic criterion (Hayes, 2016). From an ACT perspective, change is possible and living a meaningful life is possible. From this approach, human psychological distress is a product of language processes, and the goal of the intervention is to address these processes by increasing psychological flexibility (Luoma et al., 2017). Psychological inflexibility

leads to human suffering and as an antidote we can foster psychological flexibility. Luoma et al. (2017) stated, “The human ability to think and reason is truly amazing. Our system of language is unlike any other; as an ongoing process, it fills our awareness with a never-ending stream of verbal connections” (p. 1).

Defusion

Psychological flexibility is the ability to attend to the here and now with our full attention as a conscious human-being and behave in coherence with the values that give our life purpose (Luoma et al., 2017). The six core processes of ACT include mindfulness-based processes and commitment to behavior change targeted at increasing psychological flexibility. These ACT processes are acceptance, defusion, self-as-context, present moment awareness, values, and committed action. The core process of defusion emphasizes observing thoughts with curiosity, instead of attempting to get rid of unwanted thoughts or feelings. Quite literally, defusion encourages an individual to see words for exactly what they are, just words. A defusion intervention aims to decrease the attachment an individual may have to a thought and bring that thought under contextual control (Luoma et al., 2017). From an RFT perspective, defusion involves the elaboration of relations networks to change the function of any single verbal relation (Hayes, et al., 2012).

The ACT core process of defusion has been examined to investigate the utility of the concept in practice. In a study by Healy et al. (2008) the impact of defusion was analyzed through the context of positive and negative ‘I am’ statements. This study was conducted with a nonclinical sample, consisting of the three experimental conditions. These conditions included a manipulation of the defusion instructions where the conditions were either neutral, pro-defusion,

or against defusion. Participants in each group rated the ‘I am’ statements that were presented to them, which were also manipulated based on defusion strategy. Each participant rated levels of willingness, comfortability, and believability related to negative ‘I am’ statements presented to them. The results of this study showed that defused forms of negative statements increased willingness in participants and indicated that there was a decrease in discomfort in the defusion context based on their presentation content (Healy et al., 2008). This study illustrates the processes of defusion as a potential coping strategy to use with negative cognitions.

Defusion activities have previously been employed to target verbal relations related to vastly different relational networks as well. Belisle et al. (2019) target verbal relations associated with recreational gambling using a defusion task. During this experiment, recreational gamblers were divided into an experimental group (defusion) and a control group. All the participants, before their experimental or control task completed a slot machine task, which included red and black machines. Following the relational task or control task all participants were exposed to the simulated slot machines again. Time one of the slot machine tasks was compared to time two of the slot machine tasks in their analysis. The results of this study suggest a difference between the groups post-relational training, where participants in the control group exhibited a bias toward the black slot machine versus the red slot machine, and the participants in the experimental group did not display this same bias. In addition, the implication of this study is that the targeted behavior of recreational gambling may be influenced by verbal relations and can be brought under contextual control (Belisle et al., 2019).

Defusion has been demonstrated as a potential tool to target verbal relations that may be harmful and is conceptually designed to combat cognitive fusion to harmful and non-harmful verbal relations. Defusion is a key process in ACT that is aimed to increase psychological

flexibility in individuals to move through the inevitable experience of human suffering through verbal relations in pursuit of living a valued life. Acceptance and Commitment Therapy is an evidence-based intervention compatible with RFT where relational networks are conceptualized. As an extension of RFT, a theory that gives a quantitative model of relational behavior is RDT. Verbal relations and relational networks have previously been examined using RDT in a variety of contexts. Gender-bias and stereotypes as they associate with gender-related prejudice and discrimination is an area of in need of attention in the United States, especially as little has been examined regarding nonbinary gender identity. The purpose of the present study is: first, to evaluate potential bias related to binary and nonbinary gender identities using a measure of relational responding rooted in RDT and second, to observe the effect of a defusion-based task on the density of those relations. This investigation serves to start the empirical narrative of where nonbinary gender identities lie in relation to binary gender stereotypes. This will be a starting point to examine gender bias regarding nonbinary gender identity and it will be an investigation of the utility of defusion procedures in attempts to alter dense relational networks. If the relational networks are not resistant to change, it is predicted that participants exposed to the defusion task will see an increase in relational distance from pre- to post-test compared to participants in the control group, and it is predicted that the nonbinary gender identity will be equally distant to the binary gender identities (man and woman). If the relational networks are resistant to change, it is predicted that the defusion task will not produce a change in participants' responding. Results will be analyzed to explore the responding of all participants at pre-test, and to evaluate any changes in relational responding regarding gender identities and stereotypical relational terms. These have previously been found (Sickman et al., 2022) to tightly cluster, including the gender identity 'nonbinary' following the experimental or control task.

METHODS

All parts of this study were approved by the Missouri State University Institutional Review Board (IRB-FY2022-214; Approval Date: February 28, 2022; See Appendix A).

Participants and Setting

Participants included a total of 48 undergraduate students attending courses at Missouri State University in the psychology department. Participants were recruited either in a class approved by the course instructor (in person) or through the experimental system (online) of the psychology participation pool. Participants who completed at least 75% of the survey were included in the final analysis. Participants were excluded if they completed less than 75% of the survey or if they replied with little variation throughout the course of the study (e.g., providing the same response for all items). A total of 13 participants were excluded based on these criteria. Students received course credit or extra credit in the class they were recruited from as compensation for participation; no other compensation was provided in this study. All participants reserved the right to decline participation, or to participate then withdraw from the study at any point without penalty. Participants reported their gender, including 36 females, 9 males, and 3 individuals who identified as nonbinary. The age ranged from 18 to 33 ($M = 20.68$, $SD = 2.92$). Thirty-three participants reported their race/ethnicity as White/Non-Hispanic, two participants reported as Black/Non-Hispanic, two reported as Hispanic, one reported as Asian/Pacific Islander, two reported as biracial, and one reported as other, identifying as Afro-Caribbean (See Appendix B).

Materials and Apparatus

The materials and apparatus utilized in this study were adapted from a similar study analyzing gender stereotyping study (Sickman et al., 2022). A multidimensional scaling procedure (MDS) was completed by all participants utilizing an online survey software, Qualtrics (Qualtrics, Provo, UT). The online survey was customized by our research team for the purpose of this study. Qualtrics is a secure software provided by the Mid-Western university where this study took place and the data collected by this software are only accessible to the researchers. The distribution link was provided via an online experimental management system and through in-class recruitment. In the Qualtrics survey software an MDS procedure was customized to present participants with a series of paired words, known as descriptors, containing every combination of the three gender identities and 12 stereotypical adjectives used in the study (15 x 15 combinations produce a total of 120 questions representing one of each possible combination). The gender identities were three commonly known gender identities (man, woman, and nonbinary). The adjectives were selected from the stimuli included in the prior gender stereotyping study (Sickman et al., 2022). All descriptor words included in this study are as follows: man, woman, nonbinary, masculine, aggressive, strong, tough, forceful, adventurous, feminine, affectionate, sentimental, emotional, nagging, and prudish (See Table 1 on the next page).

As part of the MDS procedure, participants were instructed to rate the strength of the relation for each pairing of descriptor words on a scale of 1 (no relationship) to 10 (strong relationship). Participants were required to complete a minimum of 75% of the possible pairs within each MDS procedure for the purpose of collecting sufficient data. The pairs presented to each participant were randomized in Qualtrics. These data were analyzed in a statistical software,

Statistica, using the methods described by Belisle and Clayton (2021). The participants complete the MDS procedure twice, before and after the experimental or control task.

Table 1. Multidimensional scaling procedure stimuli.

Female Gender Stereotypes	Male Gender Stereotypes	Gender Identity
Feminine	Masculine	Man
Affectionate	Aggressive	Woman
Sentimental	Strong	Nonbinary
Emotional	Tough	
Nagging	Forceful	
Prudish	Adventurous	

In addition to completing the MDS procedure in Qualtrics, participants were randomly assigned to a control condition or an experimental condition. After completion of the MDS phase 1 task, participants in the experimental condition completed an Acceptance and Commitment Training-based (ACT) defusion activity and participants in the control condition completed a reading and comprehension task. In the experimental condition, the participants were instructed to complete three language exercises involving the gendered words (man, woman, and nonbinary person) that were designed to elaborate relational networks related to these stimuli. The defusion tasks were adapted from a previous study by (Belisle et al., 2019). During these tasks the participants were presented with hypothetical scenarios that included each gender (man, woman, and nonbinary person) (e.g., Now what if I said that the majority of women all around the world have become the most athletic group of individuals in history?). Then they were presented with a

second scenario with each gender (e.g., ‘Now what if I said that the majority of women all around the world have abandoned athletics and are now the most prolific artists in history?’). Participants were exposed to all three combinations in a random order. Participants answered open-ended and multiple-choice questions throughout each scenario. The second task in the experimental condition included instructions to write words that are related to each gendered person in the columns presented after the instructions. Participants were provided with a column labeled man, woman, nonbinary person, and all groups, with corresponding columns to respond with the three words they related to each. The third and final task included in the experimental condition prompted participants to repeatedly type each gendered word as fast as possible for a minute each in the box provided (e.g., ‘nonbinary, woman, man’ and ‘man, nonbinary, woman’) and answer three open-ended questions. The participants randomized into the control condition were instructed to read a nonrelated, neutral article about sea turtles and answer comprehension questions related to the article. Both experimental and control tasks took approximately the same amount of time of 10 minutes.

Procedure

First, the consent form was provided at the beginning of the Qualtrics survey where participants electronically signed. Once consent was electronically obtained participants proceed to the next page where all participants were provided with a definition of nonbinary gender identity for the purpose of this study. Participants then proceeded to the next three phases of the study. The subsequent section presents the experimental progression of the study, broken down into three phases: Multidimensional scaling procedure one (MDS 1), experimental task (defusion

activity) or control task (comprehension activity), and multidimensional scaling procedure two (MDS 2) (See Figure 1 for a breakdown).

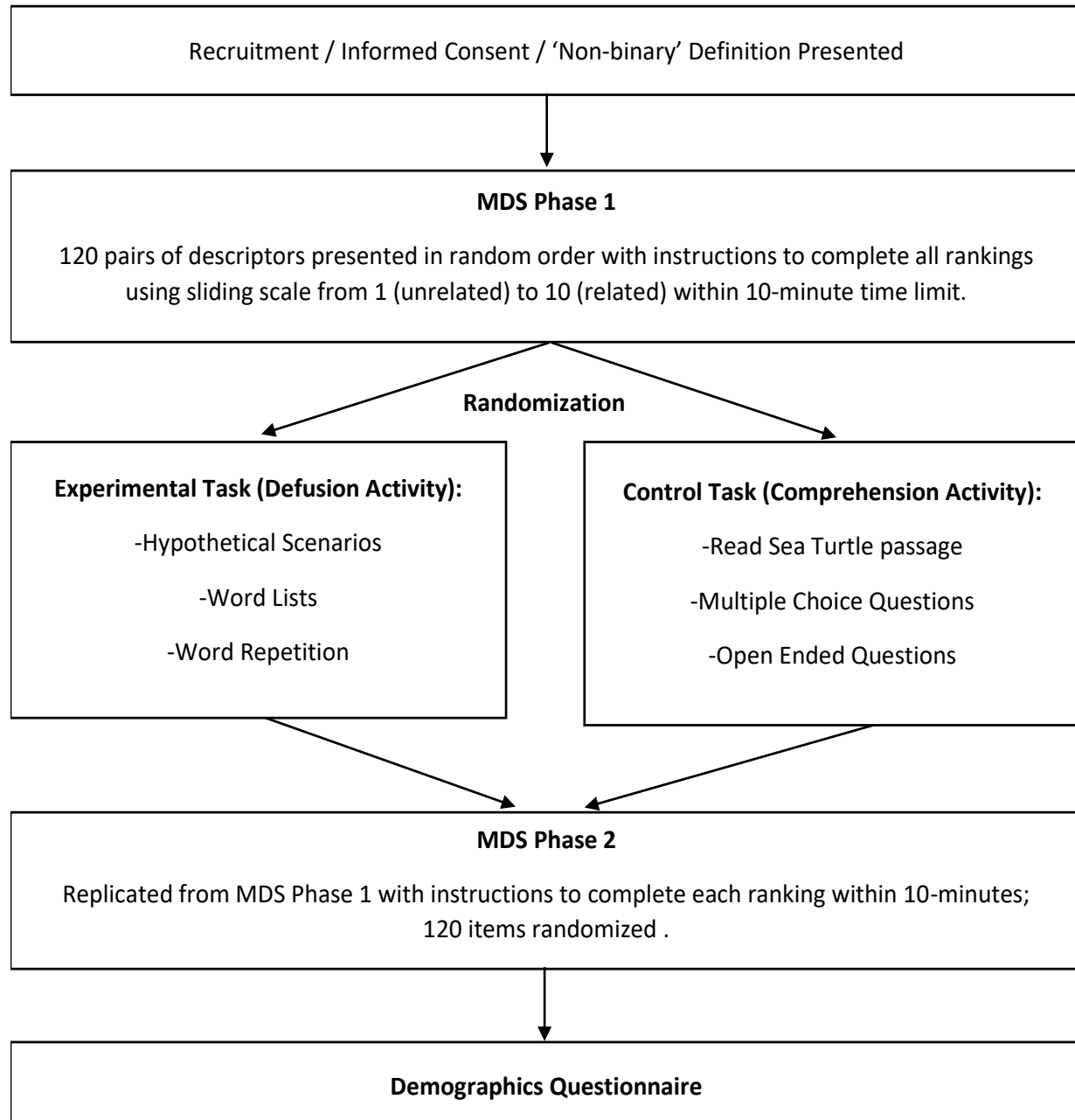


Figure 1. Procedures flow chart.

Phase 1: Multidimensional Scaling Procedure (MDS 1). The multidimensional scaling (MDS) portion of this study proceeded after receiving each participant's electronic signature obtaining consent. Our research team programmed both phases of the scaling procedure to present every possible combination of pairs of adjectives adapted from a gender study (Sickman et al., 2022) that found close relations to these adjectives and binary gender scenarios (See Appendix C). We included the gendered term 'nonbinary' in addition to 'man' and 'woman' as descriptor words in the combinations of pairs for the scaling procedures. Prior to reading the instructions, participants were exposed to a definition of the gender descriptor word 'nonbinary,' accessed from the Merriam-Webster online dictionary (n.d.) for the purpose of providing the context for the use of this term in this study. This is the only instance of previous acknowledgment of one of the descriptor words utilized throughout the study. No other acknowledgment to descriptor words were provided. No trainings were provided to the participants regarding the descriptor words utilized in this study to ensure responding was based on prior history and context of the words provided. Participants were provided with the following introductory definition of nonbinary:

The following is a definition from of the adjective nonbinary describing gender. Please read the definition carefully prior to completing the next task.

Nonbinary Gender: Being a person who identifies with or expresses a gender identity that is neither entirely male nor entirely female.

Following this brief description and definition, instructions were presented to the participants before proceeding to the first phase of scaling procedure. In the first phase of the scaling procedure participants are provided with instructions as follows:

During this phase of the study, you will be judging how closely related or unrelated words are to one another. Because people judge things in different ways, there are no right or wrong answers. We are interested in finding out how you as an individual compare these words/stimuli. You will be shown two words and a sliding scale. Using the sliding scale, you will rate how closely the two items are related. 1 indicates the words are not at all related. 10 indicates the words are the same. You will rate the relatedness of all pairs presented on the screen as fast as you can. You will have no more than 5 seconds to answer each question. Work as fast as you can and use the scale to rate as many pairs as possible. You will be automatically advanced to the next section after 10 minutes.

Thereafter, MDS 1 task begins. In this task participants were presented with two descriptor words, such as ‘nagging’ and ‘woman’ and were required to rate how related each word was to the other on a sliding scale from 1 (no relationship) to 10 (completely related). Each sliding scale was programmed to have the curser positioned in the center of the scale (between five and six) on every occasion to prevent careless clicking through each scaling procedure and to control for bias being skewed in either direction toward unrelated or related. Each possible pairing of 120 scales were presented on the screen all at once with the timer counting down from 10 minutes fixed at the top of the screen. The pairs of descriptor words, such as ‘masculine’ and ‘nonbinary person,’ were presented on the top left of the scale, followed by the scale, underneath the pairing above the scale on the left is the word ‘unrelated’ representing the indicated response ‘1’, and above the scale on the right is the word ‘related’ representing the indicated response ‘10.’ With the curser automatically positioned in the middle of the scale, participants then used their mouse or keypad to select the curser and slide the marker to the desired number that determined their relations to the two stimuli. Using the MDS procedure the participants ranked along a scale from 1 to 10 as many pairs as they could within the time limit with pairings presented in a randomized order. After the 10-minute limit was met, participants were auto-advanced to the next page and participants that did not complete at least 75% of the pairings

were excluded from the analysis. This procedure and the participants' rankings provided the researchers with data necessary to statistically analyze the ranking in order to produce a geometric space using 2-dimensions. The values obtained from phase 1 of the MDS were used to complete analysis of all participants responding at time one and to compare responding during the second phase of the MDS procedure that are described in the results section.

Phase 2: Experimental and Control Conditions. During this portion of the study participants were randomized through programming done by our research team using the software Qualtrics. Following phase 1 of the MDS procedure, participants were randomly selected in Qualtrics to complete an Acceptance and Commitment Therapy-based (ACT) task using one of the six core processes, defusion, or to complete a passage reading and comprehension questions on sea turtles. Completion of both conditions took approximately the same amount of time, depending on the efficiency of the participant in completing the provided task.

Experimental Condition: Defusion Intervention. The research team designed this portion of the study as a three-part defusion intervention consisting of language exercises (See Appendix D). Each language exercise used the gender identities man, woman, and nonbinary individual and required participants to respond to questions related to each exercise. For the first language exercise, the participants were provided with instructions to the hypothetical scenario task. The instructions to the first task were as follows:

We are going to talk about and complete some language exercises. As humans, our language abilities allow us to plan, problem-solve, and find meaning in our lives. However, just as umbrellas are not useful in all weather, neither is language. Science has found that our language may create illusions that trick us into having thoughts that often are not accurate. This happens when we make comparisons between events or items based upon perceived relations to other events or items. This becomes a problem when

we experience events based upon our evaluations rather than the experiences themselves. Let's play a few games to demonstrate this.

Participants were then presented scenarios in a random order involving each gender identity including men, women, and nonbinary people. The scenarios involved an initial question about the gender identity and a space for the participant to type their response. Then there were statements presented about one of the gendered individuals (e.g., 'Now what if I said that the majority of women all around the world have become the most athletic group of individuals in history? What is the first thing that comes to mind when you think of women now?') and a space for the participant to fill in their reply. Participants were exposed to all combinations of the scenarios involving the same questions, but different gendered stimuli. For example, questions were repeated with different genders (e.g., Now what if I said that the majority of men all around the world have become the most athletic group of individuals in history? What is the first thing that comes to mind when you think of men now?') and like the proceeding set of questions regarding the gendered individual, participants were provided with a space to fill in their reply. This continued for male stimuli with the previous gendered term being replaced with 'men' (e.g., 'Now what if I said that the majority of men all around the world have become the most athletic group of individuals in history?') The questions in each gendered scenarios of the task consisted of two open-ended questions where the participant could fill in their response and one multiple choice question (e.g., 'If you needed to recruit athletes to your championship team, which group of individuals below would you hope to see at your tryout?' (Multiple choice: men, women, nonbinary people). The context of the scenario was then flipped to include gendered individuals in an opposite task (e.g., 'Now what if I said that the majority of women all around the world have abandoned athletics and are now the most prolific artists in history. What is the first thing

that comes to mind when you think of women now?'). In the presentation of the opposite scenario, participants were asked one open-ended question where they could fill in their response and one multiple choice question related to the scenario. There was a total of three scenarios for men, women, and nonbinary people and five questions per scenario for a total of 15 questions (See Figure 2 for full list).

After completion of the first language task, participants proceeded to the second task where they were presented with instructions to write three words related to each gendered person listed. The gendered stimuli 'man,' 'woman,' and 'nonbinary person' were presented with a space for participants to fill in their responses. Additionally, there was a column with 'all groups' identified for participants to respond with three words related to all the previously listed groups. There were a total of four listed stimuli to respond to and required total of 12 responses per participant.

Following the completion of the second language task participants were given instructions for the third and final task within the experimental condition. The instructions for the final language task were as follows:

For 1 minute repeatedly say in your head and type in the box below the words woman, man, nonbinary as fast as you can, then answer the questions that follow.

The participants typed their response within the Qualtrics form, as well as presumably repeated the words covertly until the exercise was completed. After one minute the participants were auto-advanced to the next task where they were instructed to do a similar task for another minute. However, the stimuli were presented in a different order from the previous task (e.g., 'nonbinary, man, woman.').

Man

Part 1:

1. What is the first thing that comes to your mind when you think of men?
2. Now what if I said that the majority of men all around the world have become the most athletic group of individuals in history? What is the first thing that comes to mind when you think of men now?
3. If you needed to recruit athletes to your championship team, which group of individuals below would you hope to see at your tryout? (Multiple choice: Men, Women, Nonbinary People)

Part 2:

4. Now what if I said that the majority of men all around the world have abandoned athletics and are now the most prolific artists in history. What is the first thing that comes to mind when you think of men now?
 5. If you were at an art museum and saw a new masterpiece on display, who might have been the artist? (Multiple choice: Man, Woman, Nonbinary Person)
-

Woman

Part 1:

1. What is the first thing that comes to your mind when you think of women?
2. Now what if I said that the majority of women all around the world have become the most athletic group of individuals in history? What is the first thing that comes to mind when you think of women now?
3. If you needed to recruit athletes to your championship team, which group of individuals below would you hope to see at your tryout? (Multiple choice: Men, Women, Nonbinary People)

Part 2:

4. Now what if I said that the majority of women all around the world have abandoned athletics and are now the most prolific artists in history. What is the first thing that comes to mind when you think of women now?
 5. If you were at an art museum and saw a new masterpiece on display, who might have been the artist? (Multiple choice: Man, Woman, Nonbinary Person)
-

Non-binary Person

Part 1:

1. What is the first thing that comes to your mind when you think of nonbinary people?
2. Now what if I said that the majority of nonbinary people all around the world have become the most athletic group of individuals in history? What is the first thing that comes to mind when you think of nonbinary people now?
3. If you needed to recruit athletes to your championship team, which group of individuals below would you hope to see at your tryout? (Multiple choice: Men, Women, Nonbinary People)

Part 2:

4. Now what if I said that the majority of nonbinary people all around the world have abandoned athletics and are now the most prolific artists in history. What is the first thing that comes to mind when you think of nonbinary people now?
 5. If you were at an art museum and saw a new masterpiece on display, who might have been the artist? (Multiple choice: Man, Woman, Nonbinary Person)
-

Figure 2. First defusion task questions.

Both one-minute exercises had a timer counting up to 60 seconds and participants were auto-advanced to the next page if the 60 seconds had lapsed. Participants were then presented with three questions related to the activity consisting of two open-ended questions for participants to fill in their responses and one open-ended question where they were then asked to explain their answer. Participants in the experimental condition proceeded to phase 3 (MDS 2) after completing all of the defusion tasks.

Control Condition: Passage and Comprehension Questions. Participants randomized into the control condition were presented with a different set of instructions (See Appendix E). After being randomized into the control condition by Qualtrics the participants were given the following instructions:

Please read the article below from Conserveturtles.org and answer the following questions related to the article.

The article provided to the participants was an informational passage on sea turtles (Sea Turtle Conservancy, 1996). This task did not contain any language or defusion activities and did not require the participants to evaluate the verbal relations they were making to the passage provided. No additional relations were established with the gendered stimuli provided to the participants in phase one of the MDS procedure. The article on sea turtles was provided as follows:

Sea turtles are large, air-breathing reptiles that inhabit tropical and subtropical seas throughout the world. Their shells consist of an upper part (carapace) and a lower section (plastron). Hard scales (or scutes) cover all but the leatherback, and the number and arrangement of these scutes can be used to determine the species.

Sea turtles come in many different sizes, shapes, and colors. The Olive Ridley is usually less than 100 pounds, while the leatherback typically ranges from 650 to 1,300 pounds! The upper shell, or carapace, of each sea turtle species ranges in length, color, shape, and arrangement of scales.

Turtles do not have teeth, but their jaws have modified 'beaks' suited to their particular diet. They do not have visible ears but have eardrums covered by skin. They hear best at low frequencies, and their sense of smell is excellent. Their vision underwater is good, but they are nearsighted out of water. Their streamlined bodies and large flippers make them remarkably adapted to life at sea. However, sea turtles maintain close ties to land. Females must come ashore to lay their eggs in the sand; therefore, all sea turtles begin their lives as tiny hatchlings on land. Research on marine turtles has uncovered many facts about these ancient creatures. Most of this research has been focused on nesting females and hatchlings emerging from the nest, largely because they are the easiest to find and study.

Thousands of sea turtles around the world have been tagged to help collect information about their growth rates, reproductive cycles, and migration routes. After decades of studying sea turtles, much has been learned. However, many mysteries still remain.

After reading this article, the participants in this condition were then given comprehension questions related to the reading. The comprehension questions consisted of four multiple choice questions and three open ended questions. After answering the seven questions related to the article they read, participants in the control condition were presented with the final task, the second multidimensional scaling procedure (MDS 2). Everyone involved in this study completed phase three.

Phase 3: Multidimensional Scaling Procedure 2. In the final phase of this study, the multidimensional scale was reintroduced with identical pairings to the first MDS procedure but presented in random order that differed from MDS phase 1 (See Appendix F). The same time limit of 10 minutes was applied to this procedure with 75% completion of the possible pairings required for inclusion in data analyses. Any participants that did not meet these criteria were excluded from statistical analysis. Participants were informed in the introduction of the time constraint and auto-advanced to the next page after 10 minutes elapsed. After the

multidimensional scaling procedure was represented, participants were asked to answer a sequence of demographic questions. The demographics portion included questions regarding race, gender, age. Afterwards participants were thanked for their time and debriefed on the purpose of the experiment.

RESULTS

The results from the first and second phase of the MDS procedure were analyzed. First, relational responding of all participants at time one was analyzed in order to examine classes related to each of the included gender stimuli. Second, pre- and post- data were analyzed between the two groups to examine any potential effects of the experimental activity. Data was analyzed using Statistica, which produced a graph on a two-dimensional geometric space, referred to as the geospace for the analysis of the current study. During Part 1 of the analysis, I combined Time 1 between both the control and experimental groups (See Figure 3). In Part 2 of the analysis, the MDS results from the control group (G1) and experimental group (G2) from Time 1 (T1) to Time 2 (T2) were compared. Relational classes that emerged at T1 and T2 were examined within the geospace and were determined by their relative strength (R_p) to other relations within a class, which consists of the relational volume (R_v), and relational mass (R_m). The relational coherence between the gendered descriptor words ‘man’, ‘woman’, and ‘nonbinary person’ were calculated to examine the relational distance of those coordinates from the center point of the class. Participants that did not complete 75% of each MDS procedure were excluded from data analysis. The data were prepared for analysis in Statistica using a correlational matrix from each procedure calculated in Excel and described below.

Part 1: Data Analysis of Combined Groups at T1

Data from Time 1 for both groups combined were analyzed to examine the relational responding of participants in terms of gender identities. This part of the analysis replicated and extended the findings from a study previously discussed (Sickman et al., 2022) exploring gender

stereotypes. In both studies, a clear dimensional distinction was shown based on gendered context where stereotypically feminine descriptors (emotional, sentimental, affectionate, feminine) clustered tightly together near ‘woman’ and stereotypically masculine descriptors (aggressive, forceful, tough, strong, masculine) clustered tightly together on the opposite plane of the geospace near ‘Man’ (See Figure 3). Additionally, these results replicated the results from Sickman et al. (2022) in which the descriptor terms ‘prudish’ and ‘nagging’ appeared as their own class distinct from the feminine and masculine classes. In the current study, the gendered term ‘nonbinary person’ (NB Person) was also depicted within the geospace. As represented in Figure 3, this gendered term appears in its own class separate from the distinct classes of ‘Man’ and ‘woman,’ although the ‘nonbinary person’ stimulus is located between these two classes. As well, the ‘nonbinary person’ stimulus fell opposite the stimuli ‘prudish’ and ‘nagging’ within the geospace and the nearest gender stereotype descriptor was ‘adventurous.’ Examining nonbinary identity within the context of binary gender stereotypes is an extension of previous exploration into binary gender identities.

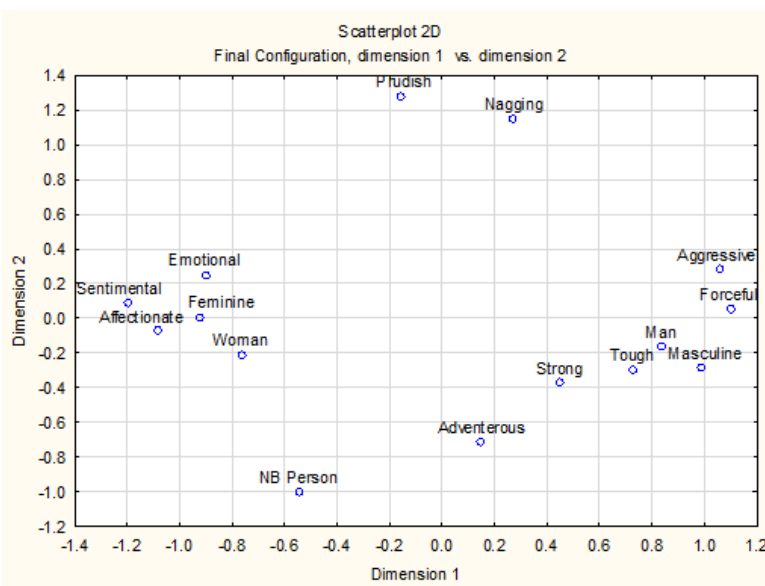


Figure 3. Two-dimensional scale Combined Groups Time-1.

The statistical software examined number of iterations of the data analyzed, presenting the model in Figure 3 as the best fit model for these data. The optimal number of iterations for a two-dimensional space is 15 iterations. The last iteration computed for the combined groups at T1 was 13, indicating that the two-dimensional scale is the best fit for the data. Another goodness of fit analysis was calculated for both groups at T1 examining the two-dimensional space using a Shepard diagram in which the red data path represents the expected value (D-hats) and blue data points represent the obtained value (See Figure 4). In a Shepard diagram blue circles should cluster around the red line and the red D-hats. The program also produces a stress value, suggesting the degree to which participant responding was consistent with this model. Lower stress values are desirable, but a value below 0.13 is the most optimal (the maximum stress value is 1.0). The stress value obtained in this iteration is stress = .062, indicating a low degree of stress for this model in the two-dimensional space.

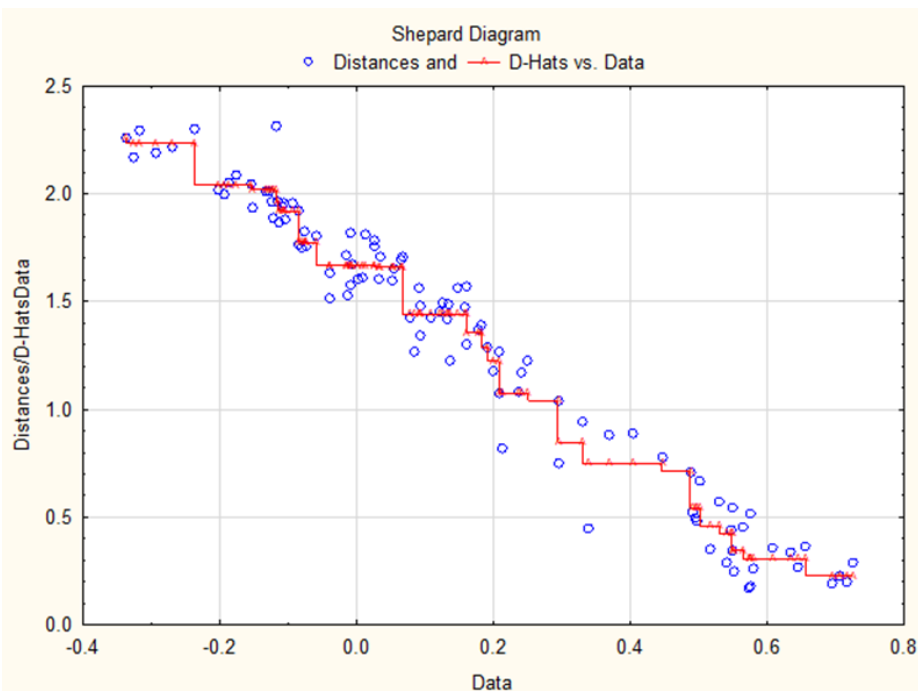


Figure 4. Shepard diagram for Combined Groups Time-1 data on goodness of fit.

Further analyses of the relational strength (Rp) and relational coherence, the distance of relations between gender identities, were calculated combining both groups at T1. This was calculated in Excel using a formula described by Belisle and Clayton (2021) with the following equation:

$$Rd = \sqrt{(x2 - x1)^2 + (y2 - y1)^2}$$

These data represent the relative distance between two stimuli included in the geospace, indicating the strength of the relation between the stimuli. For this analysis, the distance between the gender identity stimuli were of interest (given that the gender stereotype descriptors were like those found in the previous literature). For the combined groups at T1 the distance between the stimuli ‘man’ and ‘woman’ was $Rd = 1.62$. For the stimuli ‘nonbinary person’ and ‘man’ the distance was calculated as $Rd = 1.61$. Finally, for the stimuli ‘nonbinary person’ and ‘woman,’ the distance was calculated as $Rd = 0.82$. The relational distance between man and woman ($Rd = 1.62$), and nonbinary person and man ($Rd = 1.61$) are similar. The relational distance between woman and nonbinary person was less ($Rd = 0.82$). These results indicate that, among this sample, the stimuli ‘woman’ and ‘nonbinary person’ were more closely related than the other gender identity relations, although the stimulus ‘nonbinary person’ was similarly related to certain gender stereotype descriptors for both binary genders (i.e., ‘adventurous’ and ‘affectionate’).

Part 2: Comparing Experimental/Control Groups at Pre/Post-Test

Next, the experimental group and control group MDS results were compared pre- and

post- experimental task. These analyses were examined to analyze the effect of the experimental defusion tasks on participants' relational responding. Data from Group 1 (G1), the control group, was analyzed first. The data from G1, T1 and T2 were compared to detect changes between the MDS procedures.

The last iteration computed for $G1-T1 = 16$, indicating that a two-dimensional scale is the best fit for the data. A Shepard diagram to illustrate the stress of the values was calculated for G1-T1 examine the two-dimensional space (See Figure 5). The blue values (obtained) cluster tightly to the red line (expected value). The stress value for this model was 0.064, indicating that the values are not stressed enough to increase the dimensions.

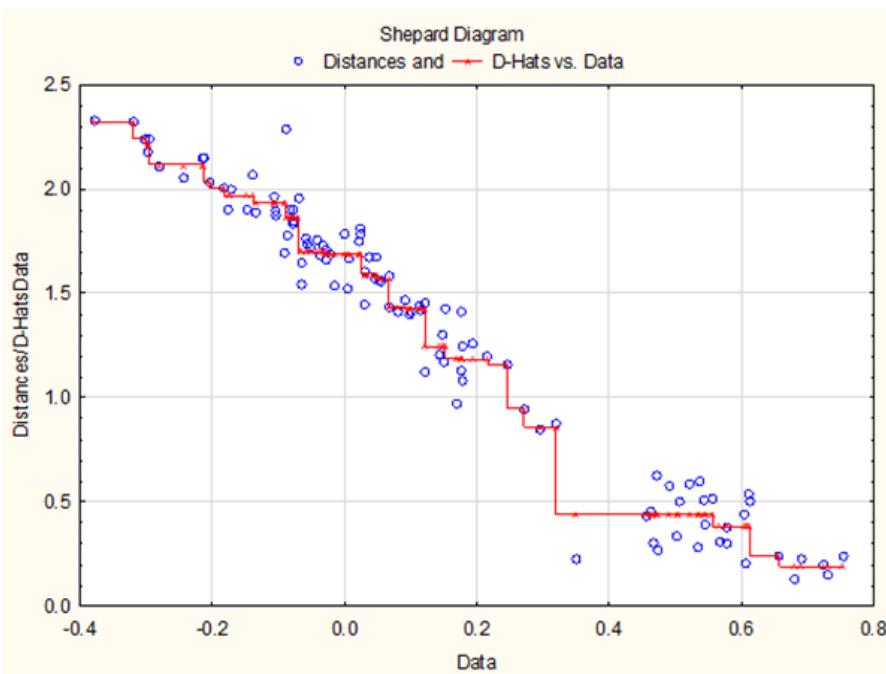


Figure 5. Shepard diagram for Group-1 Time-1 data on goodness of fit.

For Group 1, T2 iterations and stress values were obtained. For G1-T2, the best iteration calculated for this data was 20, slightly above the desired value of 15. However, the obtained

stress value for G1-T2 was, stress = .08, indicating that the final configuration of two-dimensions is a good fit for the data (See Figure 6).

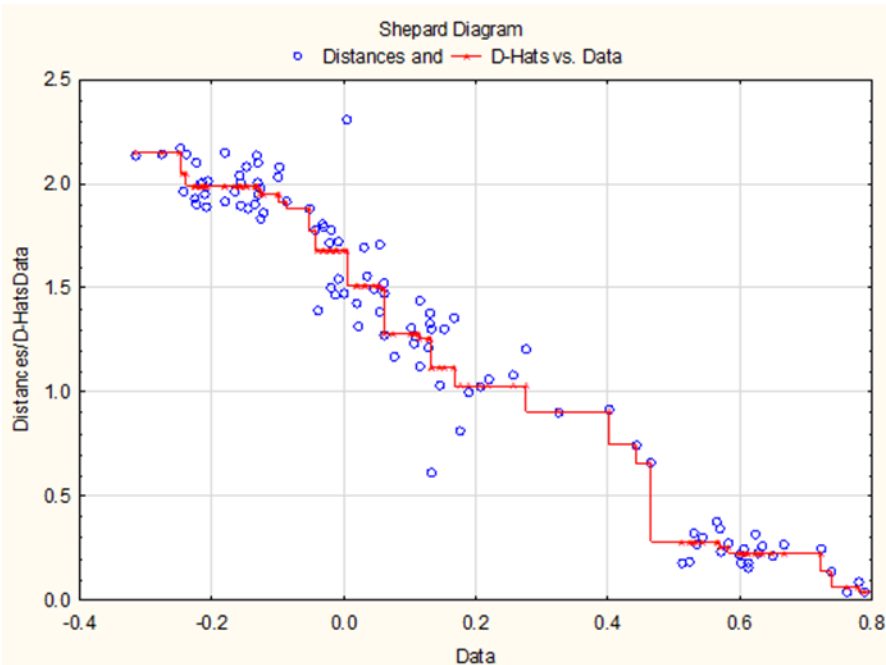


Figure 6. Shepard diagram for Group-1 Time-2 data on goodness of fit.

The changes in responding were compared using the geometric space of G1-T1 (Figure 7) and G1-T2 (Figure 8). In G1 changes in responding between T1 and T2 were not anticipated due to the passage activity being an arbitrary task to compare to the experimental group. As seen in Figure 7 and 8 below, there were not significant changes in the relational classes. There is a distinct class of feminine descriptors on the left side of the geospace and a separate class of masculine descriptors clustered tightly together on the right side. Nonbinary person is in its own class separate from masculine and feminine distinctions, yet still related more closely to ‘woman’ than ‘man.’ Using the equation described previously to calculate the coherence between gender identities for G1, relational distance between ‘man’, ‘woman,’ and ‘nonbinary person’ were calculated.

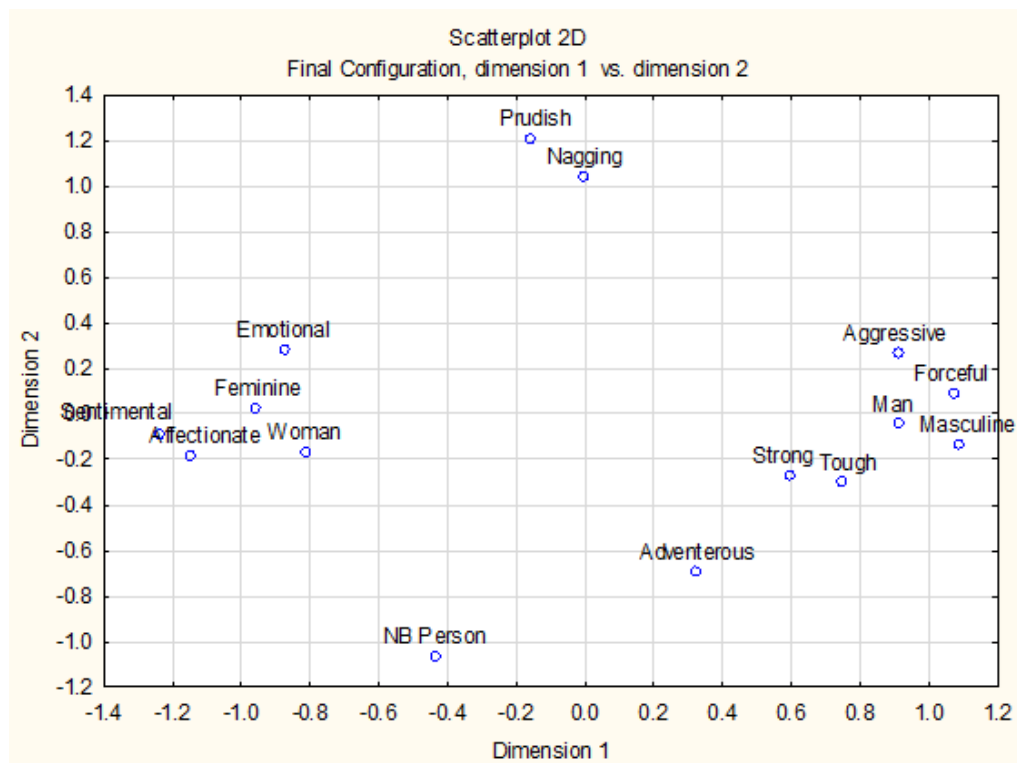


Figure 7. Two-dimensional scale Group-1 Time-1.

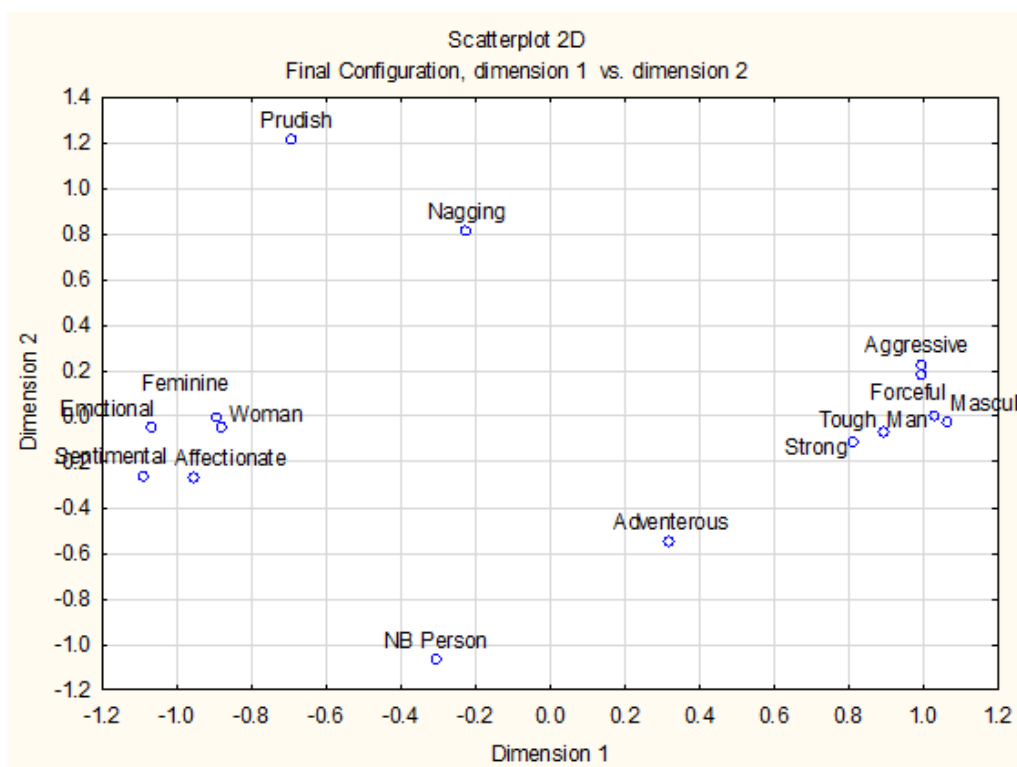


Figure 8. Two-dimensional scale Group-1 Time-2.

The following distances were acquired through analysis of G1-T1: 'woman' and 'man' ($R_d = 1.72$), 'nonbinary person' and 'man' ($R_d = 1.69$), and 'nonbinary person' and 'woman' ($R_d = 0.97$). The relational responding among all gender identities was similarly distant, except the gender identities of nonbinary and woman were closer in relation to each other than the other gender identities. The following distances were observed for G1-T2: 'woman' and 'man' ($R_d = 1.91$), 'nonbinary person' and 'man' ($R_d = 1.71$), and 'nonbinary person' and 'woman' ($R_d = 1.17$).

G2 T1 and T2 were compared to each other to detect changes in relational responding for the experimental group. For G2-T1 the program generated 20 variations until calculating the best iteration to fit the data. This is above the ideal number of iterations (15). However, the stress value calculated, $\text{Stress} = 0.06$, indicated that the two-dimensional configuration is best fit for the data. The Shepard diagram for G2-T1 shows that the data obtained clusters closely to the D-hats with few outliers (See Figure 9 on the next page). In G2-T2 the number of iterations calculated by the program was 10 as the best iteration, and the stress value calculated for G2-T2 were computed as, $\text{stress} = 0.06$. Both iteration and stress level leads to the conclusion that the two-dimensional configuration is the best fit for the G2-T2 data. Additionally, the Shepard diagram illustrates the obtained values tightly cluster with the expected values, suggesting a good fit (See Figure 10 on the next page).

There was a potential change in relational responding between G2-T1 to G2-T2 expected, as this group completed a brief defusion task regarding the gender identities 'man,' 'woman,' and 'nonbinary person.' If relational responding was not resistant to change, it was expected that at T2 this group would see a change in relational responding where the strength of the relationship between classes were less dense than the pre-test MDS procedure.

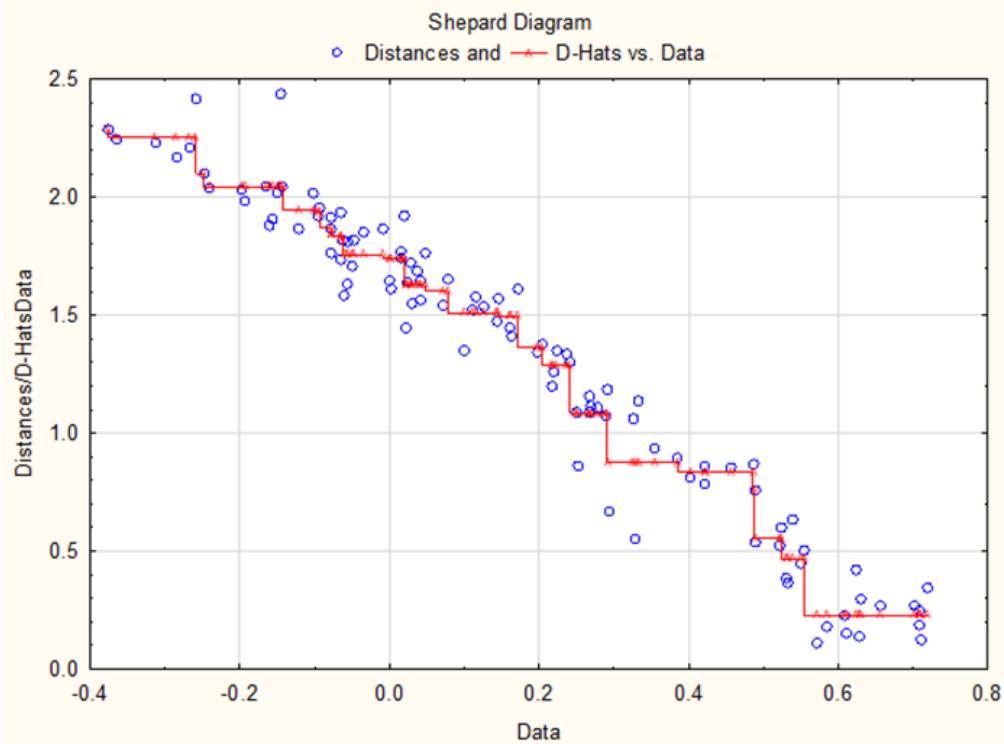


Figure 9. Shepard diagram for Group-2 Time-1 data on goodness of fit.

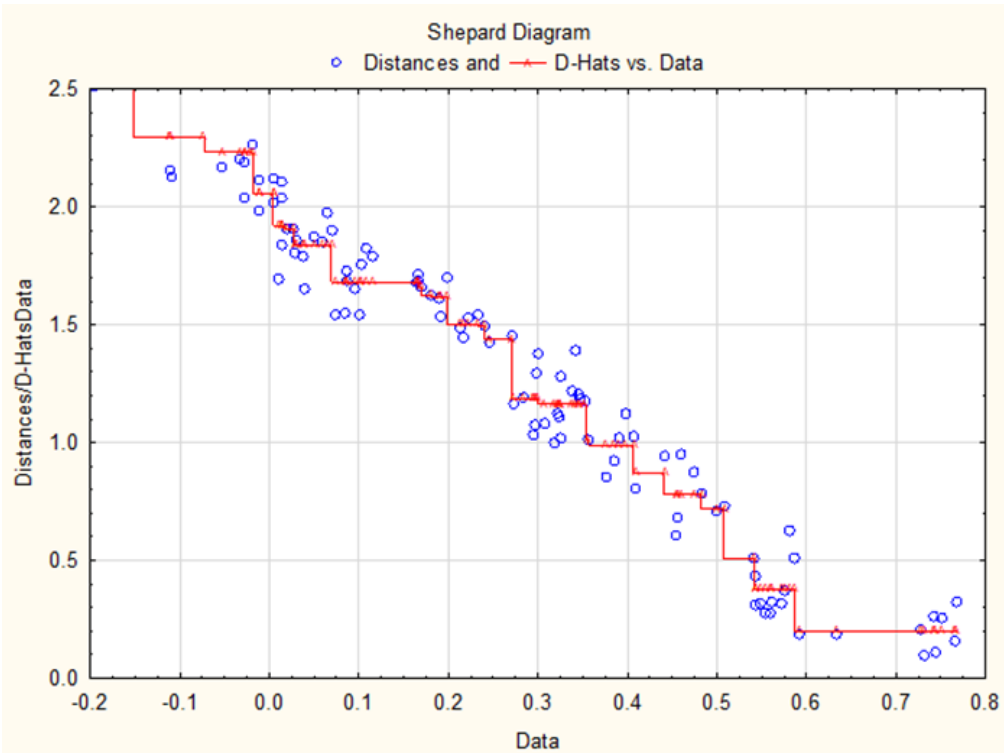


Figure 10. Shepard diagram for Group-2 Time-2 data on goodness of fit.

However, relational change regarding the associated gender identities did not change from T1 to T2 in Group 2. In G2-T1, the descriptor terms appear similar to those of the previous analyzed groups with ‘woman’ clustering in a distinct class with feminine terms and ‘man’ clustered in its own class with masculine terms (See Figure 11). Using the equation to calculate distance for G2-T1, the relational distance between ‘woman’ and ‘man’ was $Rd = 1.47$. Between the descriptor terms, ‘nonbinary person’ and ‘man,’ the distanced was $Rd = 1.52$, and in G2-T1 the distance between ‘nonbinary person’ and ‘woman’ was calculated at $Rd = 0.85$. Compared to G2-T2, the two-dimensional space did not depict different classes after the brief defusion task and replicates the geospace depicted in G2-T1 (See Figure 12). The distance between gender identity stimuli were calculated for ‘woman’ and ‘man’ ($Rd = 1.45$), ‘nonbinary person’ and ‘man’ ($Rd = 1.44$), and ‘nonbinary person’ and ‘woman’ ($Rd = .82$). The relational distance between gender identities obtained in G2-T2 are not significantly dissimilar from G2-T1.

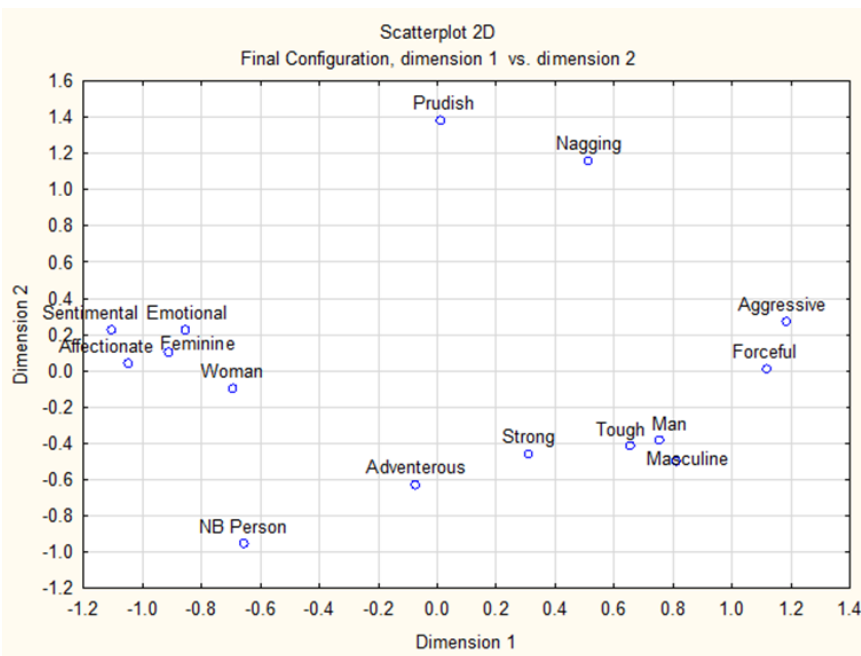


Figure 11. Two-dimensional scale Group-1 Time-2.

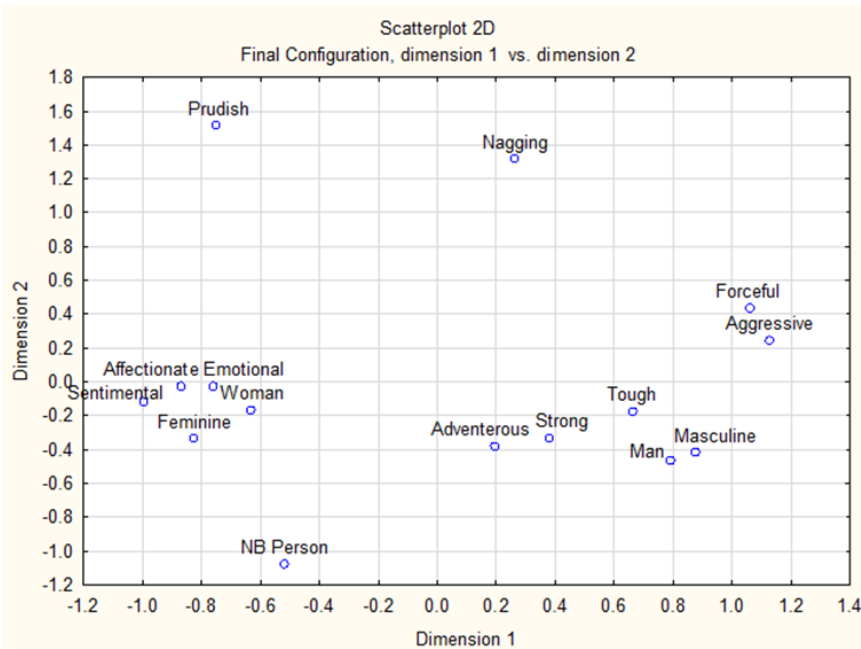


Figure 12. Two-dimensional scale for Group-2 Time-2.

To examine the relational distances further, G1-T2 and G2-T2 were compared. As previously stated in G1-T2 the relational distances were as follows: 'woman' and 'man' ($R_d = 1.91$), 'nonbinary person' and 'man' ($R_d = 1.71$), and 'nonbinary person' and 'woman' ($R_d = 1.17$). The relational distances for G2-T2 were as follows: 'woman' and 'man' ($R_d = 1.45$), 'nonbinary person' and 'man' ($R_d = 1.45$), and 'nonbinary person' and 'woman' ($R_d = .92$). When comparing the two groups and times all these gendered terms are closer together in G2-T2 compared to in G1-T2. There is a difference of .46 between 'woman' and 'man', a difference of .26 between 'nonbinary person' and 'man,' and a difference of .25 between 'nonbinary person' and 'woman' subtracting G2-T2 from G1-T2.

There were no significant changes in comparing relational distances when examining the distances with the groups combined at T1 or when examining G1-T2 to G2-T2. In the combined groups at T1 the distances between 'man' and 'woman' were the same as the distances between

‘nonbinary’ and ‘man’ with both ($R_d = 1.62$). The gendered terms ‘nonbinary’ and ‘woman’ in the combined groups at T1 were relationally closer ($R_d = .82$) (See Table 2).

Table 2. Calculated relational distance for combined groups at Time 1.

Gender Identity	SQRT
Man-Woman	1.62
Nonbinary-Man	1.62
Nonbinary-Woman	.82

Similarly, there were little differences observed in the relational distances between G1 and G2 at T1 compared to T2. The gendered terms ‘man’ and ‘woman’ had a difference in relational distance from T1 to T2 in G1 of a difference of +0.02, and for G2 the relational distance difference were calculated as -0.02. The difference between relational distances from T1 to T2 for G1 for the terms ‘nonbinary’ and ‘man’ were -0.02, and for G2 the difference was -0.07. Finally, the difference from T1 to T2 for G1 for the terms ‘nonbinary’ and ‘woman’ were +0.20 and for G2 they were +0.60 (See Table 3).

Table 3. Change in relational distances for Group 1 and Group 2 from Time 1 to Time 2.

Gender Identity	Group 1	Group 2
Man-Woman	+0.02	-0.02
Nonbinary-Man	-0.02	-0.07
Nonbinary-Woman	+0.20	+0.06

DISCUSSION

The present study sought to evaluate potential bias related to binary and nonbinary gender identities using Relational Density Theory (RDT), a measure of relational responding that expands upon Relational Frame Theory (RFT) (Belisle & Dixon, 2020). Furthermore, observing the effect of an Acceptance and Commitment Therapy-based (ACT) technique employing a defusion-based task on the density of those relations is a key component of the current study. The current investigation provides an early contribution the empirical narrative of the relationship of nonbinary gender identities to binary gender stereotypes. Other RDT studies have examined gender stereotypes regarding binary gender identities (Sickman et al., 2022) and have examined sexism in the believability of sexual assault claims based on a women's appearance (Paliliunas & Frizell, 2021). The examination of the nonbinary gender identity, defined in this study as a gender identity that is neither entirely male nor female, but somewhere on the spectrum, has not been accomplished using RDT before now. As stated by Richards et al. (2016), binary gender classification systems are not sufficient for the inclusion of individuals who do not use the terms male or female to describe their gender identities and do not leave room for inclusion. With the population of individuals identifying their gender as nonbinary at 1.2 million in the U.S. (Dowd, 2021), there is a need for empirical investigation.

Interpretation

The results of this study indicated that when responses on the first MDS procedure (T1) for all participants were combined, a clear split of the two-dimensional space was observed. The geospace illustrated dense clusters anchored on opposites sides of the geometric space, with the

gender identity ‘woman’ and feminine descriptor terms on the left side and the gender identity ‘man’ on the right side densely clustered with masculine descriptors. This suggests that stereotypical relations regarding binary gender identities have a strong relationship, although two descriptors (‘prudish’ and ‘nagging’) formed a separate class distinct from any gender identities. The relational distances among ‘man,’ ‘woman,’ ($R_d = 1.62$) and ‘nonbinary person’ ($R_d = 1.62$) were similar between all three genders within the geospace, with ‘woman’ and ‘nonbinary person’ being closer in relation ($R_d = .082$) than the other gender identities examined together. These findings suggested that, for this sample, the term ‘nonbinary’ as a gender identity fell at some point on the spectrum from ‘man’ to ‘woman’ in a separate class. As well, visual analysis of the geospace suggests that the stimulus ‘nonbinary person’ was more closely related to the stimulus ‘woman’ than the feminine descriptor stimuli, however, was more closely related to the masculine descriptor stimuli ‘adventurous,’ ‘strong,’ and ‘tough’ than the stimulus ‘man.’ These findings extend previous explorations of binary gender and relational bias (Sickman et al., 2022) by including the gender identity ‘nonbinary’ in the analysis.

Additional analyses regarding each group at pre (T1) and post (T2) experimental task were conducted. Group 1 (Control) MDS procedure data were compared before and after the control task of reading an arbitrary article regarding sea turtles and answering comprehension questions that follow. These two-dimensional configurations were mapped out onto geometric spaces that were similar to the combined groups at T1 of the analysis. ‘woman’ as feminine and ‘man’ as masculine emerged in two distinct classes with no relational change between T1 and T2 observed, as was predicted. ‘nonbinary’ gender identity emerged as its own class between ‘man’ and ‘woman’ with similar distances between all gendered words, although a denser relation between ‘woman’ and ‘nonbinary person’ was observed. No changes were observed for the

nonbinary gender identity. Group 2 (the experimental group with the defusion task) data were examined pre- and post-language task to determine if a brief intervention would affect these dense stereotypical relational networks. Data from the Group 2 pre-MDS procedure and post-MDS procedure were constructed into a two-dimensional geometric space to analyze the relational networks that developed. At T1, the two-dimensional geospace depicted a narrative similar to those that proceeded it in analysis. Binary gender identities and their stereotypical descriptors clustered densely around them with nonbinary gender identity in a separate class from the binary gender identities, but still relationally closer to ‘woman’ than ‘man,’ or ‘man’ to ‘nonbinary’, and ‘woman’ to ‘man.’ Lastly, the data from G2 at T2 were compared to T1 with no significant relational change between classes and no significant changes in coherence among gender identity classes. These results asserted that stereotypical relational responding regarding binary gender identities is resistant to change given a brief language task meant to alter relational responding, such as defusion. The density of these classes is not easily altered using brief intervention in the present study.

The findings concerning binary gender identities replicated findings of a previous RDT study measuring binary gender bias (Sickman et al., 2022). This suggests binary gender relations may be high in relational density (R_p) and high in relational mass (R_m). It also suggests that these relational networks may be consistent across multiple contexts. The current study replicated the descriptor terms ‘prudish’ and ‘nagging’ as separate from ‘man’ and ‘woman,’ neither term related closely related to any of the three included gender identities. Further, the current findings expanded our understanding of nonbinary gender identity in terms of relatability to gendered.

Implications

The present study provides additional evidence regarding gender bias and stereotypical relations being deeply ingrained in how we relate to the world around us regarding gender identities. We closely and consistently relate women as being affectionate, emotional, sentimental, and feminine, whereas we do not for men. If a man were to present in a way inconsistent to their gender stereotypes, they may be responded to in a way that shows prejudice or discrimination. Men are closely and consistently related as being strong, aggressive, forceful, tough, and masculine. If a woman were to act consistent to these stereotypical male terms, then they experience the same. When women act consistently or inconsistently with their stereotypes, it is known that they experience prejudice and discrimination, even in female-dominating fields such as Applied Behavior Analysis (ABA) (Baires & Koch, 2020). It is known that gender discrimination exists and that those experiences have real implications for the individuals impacted by those actions. There has been exploratory evidence to support that stereotypical relations and gender bias for binary genders are dense networks within our language and it is further evident through the results of this study. Though little has yet been accomplished to change these stereotypical relations that cause so much suffering, and it is evident that a brief intervention to target these relations is rendered ineffective in the context of this study; it is clear that more must be done to explore this issue. This study only explored nonbinary gender identity in relation to binary gender and binary gender bias and may only be considered exploratory in nature at this time. As individuals that identify their gender as nonbinary may experience discrimination and prejudice related to this distinct class, further exploration of this population should be considered to the relations surrounding them.

Limitations

Limitations specific to this study include errors in procedures, the use of a convenience sample, and the limitations regarding the intervention utilized within the study. A procedural error was detected midway between data collection in the defusion task. The error detected was discovered in two questions that requested participants to repeatedly say covertly and type overtly the words in a text box provided. These questions would auto-advance after a minute of repetition, and it was discovered that these two questions were automatically advancing before the minute concluded. The error was caught and corrected. Due to the nature of the error and participant responding regarding questions following this task, it is assumed that this error did not greatly affect participant responding. Another limitation observed in this study is the generalizability to the public. The sample collected for this study was a convenience sample from a mid-sized Midwestern University, consistently of predominately white and predominantly female undergraduate students. This sample is not representative of the larger population and generalizability may be limited. Lastly, the ACT-based language intervention utilized in this study was provided in a small dose and a brief duration. Although defusion tasks have been observed to have utility in changing relations previously, it was not observed in this study. A 10-minute defusion exercise is not sufficient in changing a lifetime of forming relational networks related to gender. This suggests that longer and more intense intervention may be better at addressing these stereotypical relations to target change. Future research may examine not only interventions designed to mitigate these biases but approaches to preventing the development of such biased relational responding among the general population. Future directions based on these limitations are discussed.

Future Directions

Future research to address the limitations of this study and the general methodologies of the current study led to a variety of possibilities. This study did expand upon previous research using RDT as a measure of gender bias, however, empirical research in this specific area is limited and more stereotypical relations are yet to be discovered. More specifically, there is little empirical exploration into stereotypes related to nonbinary gender identity and no previous research measuring nonbinary gender identity utilizing RDT. As well, representative samples of individuals who identify across the gender spectrum are needed to accurately evaluate both the existence of biased relations and the effects of these biases on one's behavior and experience. Expanding the literature and knowledge of gender bias for this population should be explored further for a more inclusive and representative account of relations regarding this population. The future of employing RDT to measure these complex cognitions and relational responding is needed to expand our knowledge on a multitude of important topics, but gender specifically. This study has shown that there is replication and illustrates the utility of RDT and MDS procedures as a measure of relational responding. Future investigations regarding the development of interventions to address gender bias should employ a longer and more intensive defusion task, with other elements to promote psychological flexibility. A measure of psychological flexibility may also be another element to add in order to examine relationship between psychological flexibility and the resistance of relational responding to change.

Conclusion

The present study provides additional support for the existence, persistence, and density of stereotypical relation regarding binary gender identities. It further provides an initial

exploration into nonbinary gender identity in relation to binary genders discussed. Provided the role gender stereotyping and gender bias play in gender-related inequality (Glick & Fiske, 2001), empirical efforts seeking to better understand and better measure these relations is of great significance. Future examination of nonbinary gender stereotypes as a separate class and further examination of intervention for changing binary gender stereotypes and gender bias are of empirical importance and should be considered. Future investigations in this area are important not only to increase our understanding of complex relational responding, but to provide empirical contributions that support social justice and representation in science.

REFERENCES

- Baires, N. A., & Koch, D. S. (2020). The future is female (and behavior analysis): A behavioral account of sexism and how behavior analysis is simultaneously part of the problem and solution. *Behavior Analysis in Practice*, 13(1), 253–262. <https://doi.org/10.1007/s40617-019-00394-x>
- Barnes-Holmes, Y., Power, P., Hayden, E., Milne, R., & Stewart, I. (2006). Barnes-Holmes, D., Barnes Do you really know what you believe? Developing the Implicit Relational Assessment Procedure (IRAP) as a direct measure of implicit beliefs. *The Irish Psychologist*, 32(7), 169–177.
- Belisle, J., & Clayton, M. (2021). Coherence and the merging of relational classes in self-organizing networks: Extending Relational Density Theory. *Journal of Contextual Behavioral Science*, 20, 118-128. <https://doi.org/10.1016/j.jcbs.2021.03.008>
- Belisle, J., & Dixon, M. R. (2020). An exploratory analysis of Relational Density Theory: Relational resistance and gravity. *Journal of Contextual Behavioral Science*, 16, 80–95. <https://doi.org/10.1016/j.jcbs.2020.01.013>
- Belisle, J., & Dixon, M. R. (2022). Relational behavior and ACT: A dynamic relationship. *Behavior Analysis in Practice*, 15(1), 71–82. <https://doi.org/10.1007/s40617-021-00599-z>
- Belisle, J., Paliliunas, D., Dixon, M. R., & Speelman, R. C. (2019). Decreasing influence of arbitrarily applicable verbal relations of recreational gamblers: A randomized controlled trial. *Journal of Applied Behavior Analysis*, 52(1), 60–72. <https://doi.org/10.1002/jaba.511>
- Belisle, J. Sickman, E., Sellers, B., & Hutchison, L. (2022). Relational density theory: An expanding account of relational behavior. Presented for SuperLAB with the Association for Contextual Behavioral Science.
- Cartwright, A., Hussey, I., Roche, B., Dunne, J., & Muphy, C. (2017). An investigation into the relationship between the gender binary and occupational discrimination using the implicit relational assessment procedure. *The Psychological Record*, 67(1), 121–130. <https://doi.org/10.1007/s40732-016-0212-1>
- Chaxel, A.S. (2015). How Do Stereotypes Influence Choice? *Psychological Science*, 26(5), 641–645. <http://www.jstor.org/stable/24544014>

- Cicero E.C., Reisner S.L., Merwin E.I., Humphreys J.C., Silva S.G. (2020) The health status of transgender and gender nonbinary adults in the United States. *PLoS ONE*, 15(2), 1-20. <https://doi.org/10.1371/journal.pone.0228765>
- Daumeyer, N. M., Onyeador, I. N., & Richeson, J. A. (2020). Does shared gender group membership mitigate the effect of implicit bias attributions on accountability for gender-based discrimination? *Personality and Social Psychology Bulletin*, 47(9), 1343–1357. <https://doi.org/10.1177/0146167220965306>
- Dowd, R. (2021, June 22). 1.2 million LGBTQ adults in the US identify as nonbinary. UCLA School of Law Williams Institute. <https://williamsinstitute.law.ucla.edu/press/lgbtq-nonbinary-press-release/>
- Drake, C.E., Primeaux, S. & Thomas, J. (2018). Comparing implicit gender stereotypes between women and men with the Implicit Relational Assessment Procedure. *Gender Issues*, 35, 3–20 (2018). <https://doi.org/10.1007/s12147-017-9189-6>
- Elias, N., & Colvin, R. (2019): A Third Option: Understanding and assessing nonbinary gender policies in the United States. *Administrative Theory & Praxis*, 42(2), 191-211. <https://doi.org/10.1080/10841806.2019.1659046>
- Errasti, J., Martinez, H., Rodriguez, C., Marquez, J., Maldonado, A., & Menendez, A. (2019). Social context in a collective IRAP application about gender stereotypes: Mixed versus single gender groups. *The Psychological Record*, 69(1), 39–48. <https://doi.org/10.1007/s40732-018-0320-1>
- Finn, M., Barnes-Holmes, D., & McEnteggart, C. (2018). Exploring the single-trial-type-dominance-effect in the IRAP: Developing a differential arbitrarily applicable relational responding effects (DAARRE) model. *The Psychological Record*, 68(1), 11–25. <https://doi.org/10.1007/s40732-017-0262-z>.
- Frizell, C.B., & Paliliunas, D. (2021). Sexual harassment and Relational Density Theory (RDT): Detecting sexist relations [Manuscript in preparation]. Department of Psychology, Missouri State University.
- Glick, P., & Fiske, S. T. (2001). An ambivalent alliance: hostile and benevolent sexism as complementary justifications of gender inequality. *American Psychologist*, 56, 109–118.

- Hayes, S. C. (2016). Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior Therapy*, 47(6), 869–885. <https://doi.org/10.1016/j.beth.2016.11.006>
- Hayes, S. C. Barnes-Holmes, H. D., & Roche, B. (2001). Relational frame theory: A post-Skinnerian account of human language and cognition. Kluwer Academic/Plenum Publishers. [https://doi.org/10.1016/S0065-2407\(02\)80063-5](https://doi.org/10.1016/S0065-2407(02)80063-5)
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2012). Acceptance and commitment therapy: The process and practice of mindful change, 2nd ed. Guilford Press.
- Healy, H.-A., Barnes-Holmes, Y., Barnes-Holmes, D., Keogh, C., Luciano, C., & Wilson, K. (2008). An experimental test of a cognitive defusion exercise: Coping with negative and positive self-statements. *The Psychological Record*, 58(4), 623–640.
- Hehman, E., Calanchini, J., Flake, J. K., & Leitner, J. B. (2019). Establishing construct validity evidence for regional measures of explicit and implicit racial bias. *Journal of Experimental Psychology: General*, 148, 1022–1040. <https://doi.org/10.1037/xge0000623.suppl>
- Luoma, J. B., Hayes, S. C., & Walser, R. D. (2017). Learning ACT: An acceptance and commitment therapy skills-training manual for therapists. New Harbinger Publications.
- Merriam-Webster. (n.d). Nonbinary. In Merriam-Webster.com dictionary. Retrieved January 25, 2022, from <https://www.merriam-webster.com/dictionary/nonbinary>
- Paliliunas, D., & Frizell, C. B. (2021). Evaluation of college students' implicit biases toward believability of claims of sexual harassment using the Implicit Relational Assessment Procedure (IRAP). *Behavior and Social Issues*, 30(1), 733–748. <https://doi.org/10.1007/s42822-021-00061-3>
- Qualtrics software, Version [April 2022] of Qualtrics. Copyright © [2022] Qualtrics. Qualtrics and all other Qualtrics product or service names are registered trademarks or trademarks of Qualtrics, Provo, UT, USA. <https://www.qualtrics.com>
- Richards, C., Bouman, W. P., Seal, L., Barker, M. J., Nieder, T. O., & T'Sjoen, G. (2016). Nonbinary or genderqueer genders. *International Review of Psychiatry*, 28(1), 95–102. <https://doi.org/10.3109/09540261.2015.1106446>

Sea Turtle Conservancy. (1996). *Information about sea turtles: An introduction*.
<https://conserveturtles.org/information-about-sea-turtles-an-introduction/>

Sickman, E., Hutchinson, L., Belisle, D., Payne, A., & Travis, E. (2022). An exploratory analysis of gender stereotyping using the theoretical framework of Relational Density Theory [Manuscript submitted for publication]. Department of Psychology, Missouri State University.

APPENDICES

Appendix A. Institutional Review Board Approval



To:

Dana Paliliunas
Psychology

RE: Notice of IRB Approval

Submission Type: Initial

Study #: IRB-FY2022-214

Study Title: Measuring Gender-Related Biases and Exploring Methods to Diminish Bias by Targeting Relations for Defusion

Decision: Approved

Approval Date: February 28, 2022

This submission has been approved by the Missouri State University Institutional Review Board (IRB). You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented. Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB.

This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.

Researchers Associated with this Project:

PI: Dana Paliliunas

Co-PI:

Primary Contact: Chynna Frizell

Other Investigators: Breanna Lee, Madeline Caughron

Appendix B. Demographics

Start of Block: Demographics Information

Gender (select all that apply)

☐

Male

☐

Female

☐

Transgender

☐

Non-binary

☐

Other _____

Ethnic Group (select all that apply)

☐

Anglo/White/Non-Hispanic

☐

Black/Non-hispanic

☐

Hispanic

☐

Asian/Pacific Islander

☐

Native American

☐

Biracial _____

☐

Ethnicity unknown

☐

Other _____

Age

Student Classification

☐ Freshman

☐ Sophomore

☐ Junior

☐ Senior

☐ Other

Please indicated the class you were recruited from or indicate "Sona" if you were not recruited from a class:

Initials (for extra credit purposes)

End of Block: Demographics Information

Appendix C. Exemplar MDS Procedure Phase 1

Start of Block: Introduction

The following is a definition from of the adjective “nonbinary” describing gender. Please read the definition carefully prior to completing the next task.

Nonbinary Gender: Being a person who identifies with or expresses a gender identity that is neither entirely male nor entirely female.

Page Break

During this phase of the study you will be judging how closely related or unrelated words are to one another. Because people judge things in different ways, there are no right or wrong answers. We are interested in finding out how you as an individual compare these words/stimuli. You will be shown two words and a sliding scale. Using the sliding scale, you will rate how closely the two items are related. 1 indicates the words are not at all related. 10 indicates the words are the same.

You will rate the relatedness of all pairs presented on the screen as fast as you can. You will have no more than 5 seconds to answer each question. Work as fast as you can and use the scale to rate as many pairs as possible. You will be automatically advanced to the next section after 10 minutes.

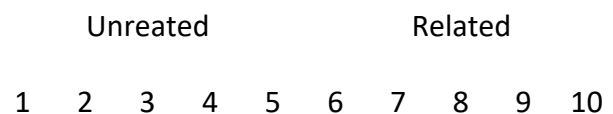
End of Block: Introduction

Start of Block: Ranking part I

Woman and Woman

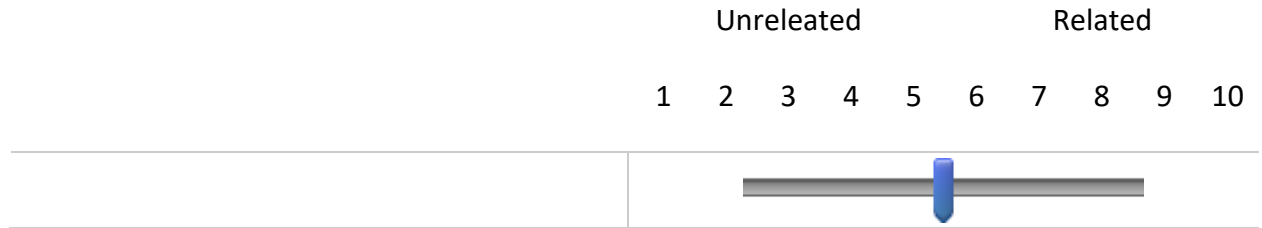


Woman and Man





Woman and Nonbinary Person



Woman and Masculine



Man and Aggressive



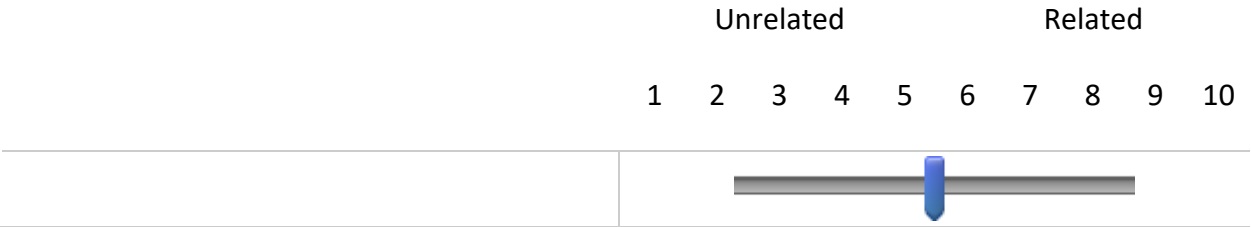
Man and Strong



Man and Tough



Nonbinary Person and Affectionate



Nonbinary Person and Sentimental



Nonbinary Person and Emotional



Nonbinary Person and Nagging



Nonbinary Person and Prudish



Emotional and Emotional



Emotional and Nagging



Emotional and Prudish



Nagging and Nagging



Nagging and Prudish



End of Block: Ranking part I

Appendix D. Experimental Group Defusion Task

Start of Block: Defusion Task

We are going to talk about and complete some language exercises. As humans, our language abilities allow us to plan, problem-solve, and find meaning in our lives. However, just as umbrellas are not useful in all weather, neither is language. Science has found that our language may create illusions that trick us into having thoughts that often are not accurate. This happens when we make comparisons between events or items based upon perceived relations to other events or items. This becomes a problem when we experience events based upon our evaluations rather than the experiences themselves. Let's play a few games to demonstrate this.

What is the first thing that comes to your mind when you think of women?

Now what if I said that the majority of women all around the world have become the most athletic group of individuals in history? What is the first thing that comes to mind when you think of women now?

If you needed to recruit athletes to your championship team, which group of individuals below would you hope to see at your tryout?

- ☐ Men
- ☐ Women
- ☐ Nonbinary People

Now what if I said that the majority of women all around the world have abandoned athletics and are now the most prolific artists in history. What is the first thing that comes to mind when you think of women now?

If you were at an art museum and saw a new masterpiece on display, who might have been the artist?

- ☐ Man
- ☐ Woman
- ☐ Nonbinary Person

What is the first thing that comes to your mind when you think of men?

Now what if I said that the majority of men all around the world have become the most athletic group of individuals in history? What is the first thing that comes to mind when you think of men now?

If you needed to recruit athletes to your championship team, which group of individuals below would you hope to see at your tryout?

- ☐ Men
- ☐ Women
- ☐ Nonbinary People

Now what if I said that the majority of men all around the world have abandoned athletics and are now the most prolific artists in history. What is the first thing that comes to mind when you think of men now?

If you were at an art museum and saw a new masterpiece on display, who might have been the artist?

- ☐ Man
- ☐ Woman
- ☐ Nonbinary Person

What is the first thing that comes to your mind when you think of nonbinary people?

Now what if I said that the majority of nonbinary people all around the world have become the most athletic group of individuals in history? What is the first thing that comes to mind when you think of nonbinary people now?

If you needed to recruit athletes to your championship team, which group of individuals below would you hope to see at your tryout?

- ☐ Men
- ☐ Women
- ☐ Nonbinary People

Now what if I said that the majority of nonbinary people all around the world have abandoned athletics and are now the most prolific artists in history. What is the first thing that comes to mind when you think of nonbinary people now?

If you were at an art museum and saw a new masterpiece on display, who might have been the artist?

- ☐ Man
- ☐ Woman
- ☐ Nonbinary Person

Did your responses change throughout this exercise when we changed the descriptions of these groups of people?

The purpose of the activity is not to show that any group of individuals are all the same, but that when you hear information, your thoughts and ideas can change and adapt. Sometimes our thoughts and ideas are helpful to us, and other times our thoughts and ideas can get in the way of acting in the way that we want to. Have you ever experienced a time when your thoughts or ideas about something changed over time?

- ☐ Yes
- ☐ No

Have you ever experienced a time when your thoughts or ideas about something affected your actions?

- ☐ Yes
- ☐ No
-

Write three words that are related to each gendered person listed below.

☐ Man _____

☐ Woman _____

☐ Nonbinary Person _____

Then write three words that are related to all three gendered persons (man, woman, nonbinary) in the all groups column.

☐ All groups _____

For 1 minute repeatedly say in your head and type in the box below the words “woman, man, nonbinary” as fast as you can.

This time, for 1 minute repeatedly say in your head and type in the box below the words “nonbinary, woman, man” as fast as you can, then answer the questions that follow.

Do the words look the same after typing them for a minute?

What happens to the meaning of the words when you say or type them repeatedly?

This experience highlights that words are just words. Is there a difference between a word (the letters/sounds) and what it means? Explain:

End of Block: Defusion Task

Appendix E. Control Group Exemplar Language Task

Start of Block: Passage Task

What is the first thing that comes to your mind when you think of sea turtles?

How much do leatherback sea turtle usually weigh?

- ☐ A. 100 pounds
- ☐ B. 450 to 650 pounds
- ☐ C. 650 to 1,300 pounds
- ☐ D. 1,500 pounds

How is the sea turtles sense of smell described?

- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Excellent

How well can sea turtles see under water?

- ☐ Poorly
- ☐ Excellent
- ☐ Good
- ☐ Better than on land

Where do female sea turtles lay their eggs?

- ☐ On land in the sand
- ☐ In the sea in a pouch
- ☐ The males carry them on their backs
- ☐ On land out in a cave

What is the upper part of the sea turtles shell called?

How did this article describe the sea turtle jaw?

For one minute, type everything you know about sea turtles.

End of Block: Passage Task

Appendix F. Exemplar MDS Procedure Phase 2

Start of Block: Intro to RANKING II

Now that you have finished the previous task you will be judging how closely related or unrelated traits are to one another. Because people judge things in different ways, there are no right or wrong answers. We are interested in finding out how you as an individual compare these stimuli. You will be shown two words surrounding a sliding scale. Using the sliding scale, you will rate how closely the words are related. 1 indicates the words are not at all related. 10 indicates the words are the same.

You will rate the relatedness of all pairs presented on the screen as fast as you can. You will have no more than 5 seconds to answer each question. Work as fast as you can and use the scale to rate as many pairs as possible. You will be automatically advanced to the next section after 10 minutes.

End of Block: Intro to RANKING II

Start of Block: Ranking part II

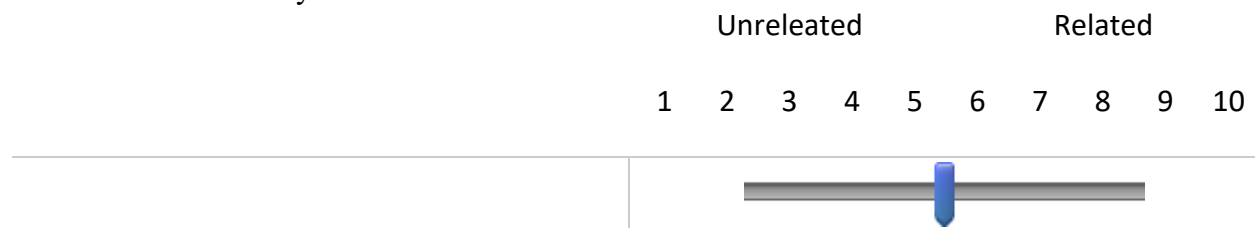
Woman and Woman



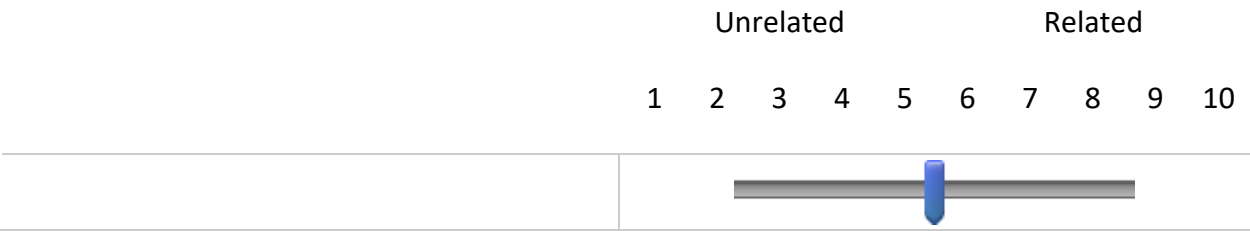
Woman and Man



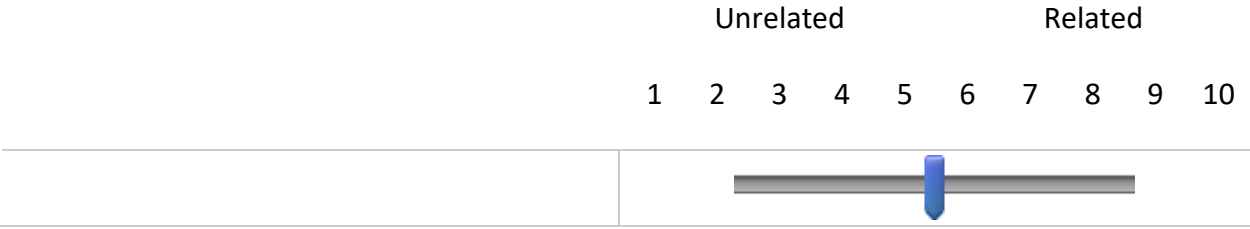
Woman and Nonbinary Person



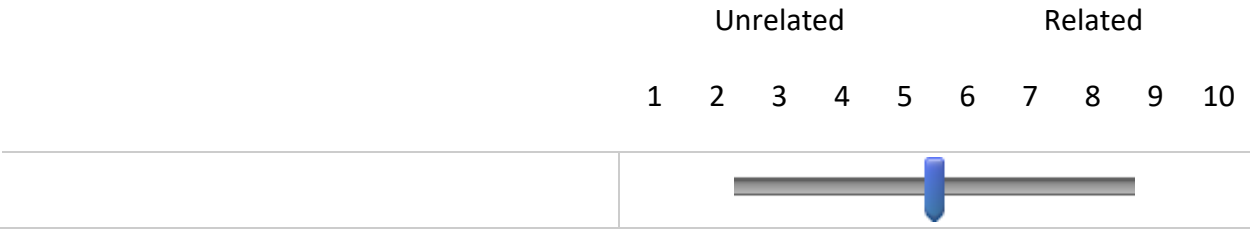
Woman and Masculine



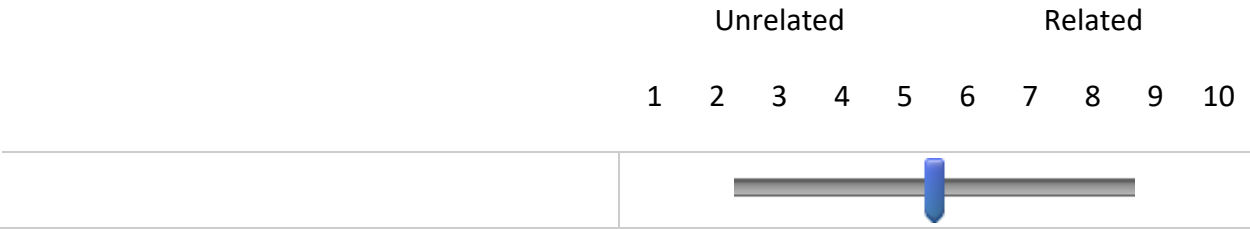
Man and Aggressive



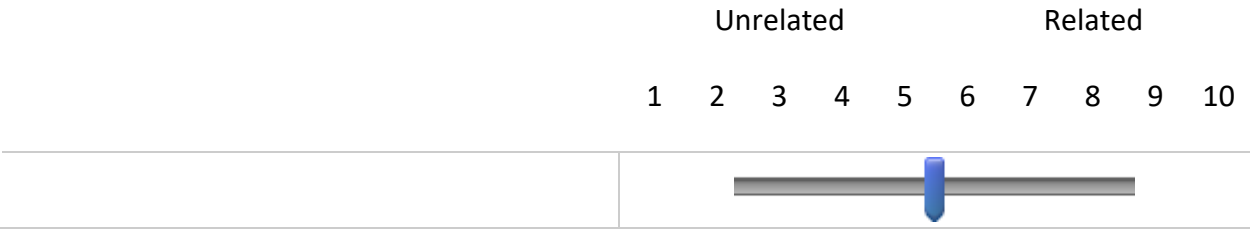
Man and Strong



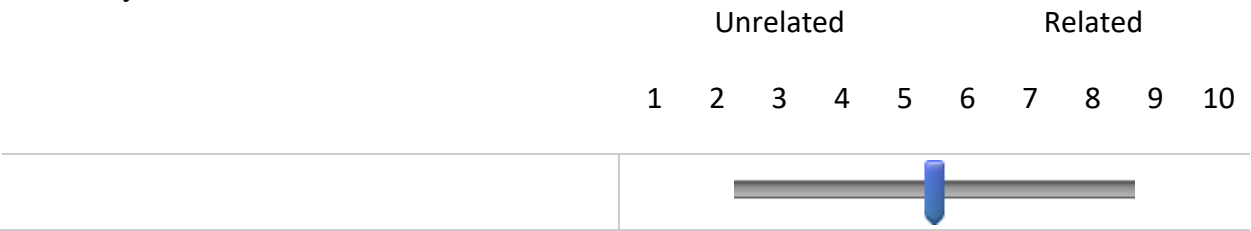
Man and Tough



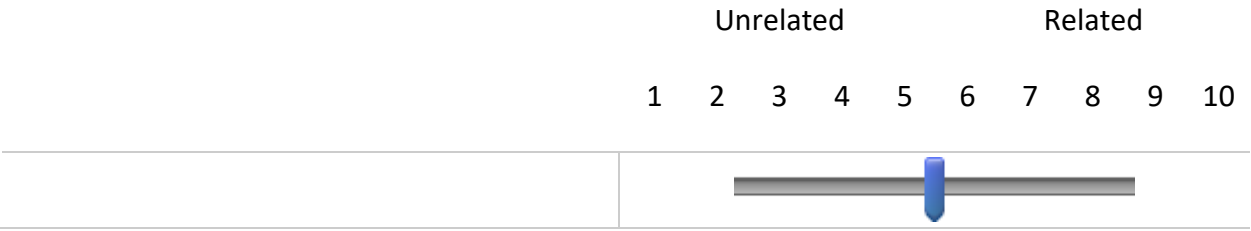
Nonbinary Person and Affectionate



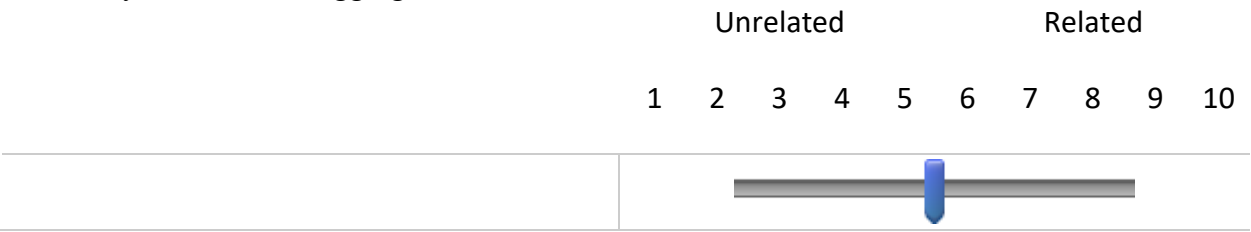
Nonbinary Person and Sentimental



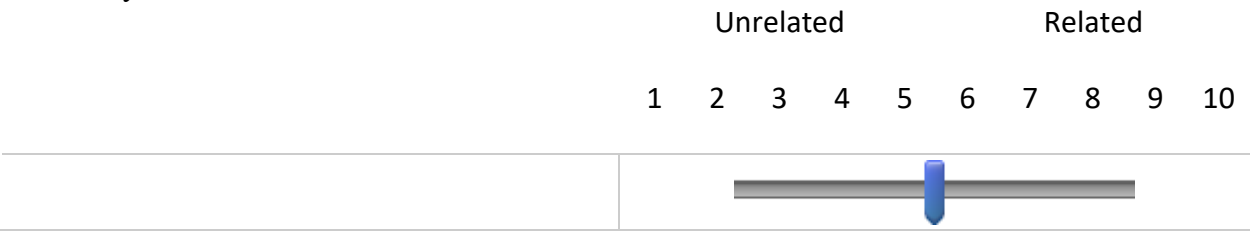
Nonbinary Person and Emotional



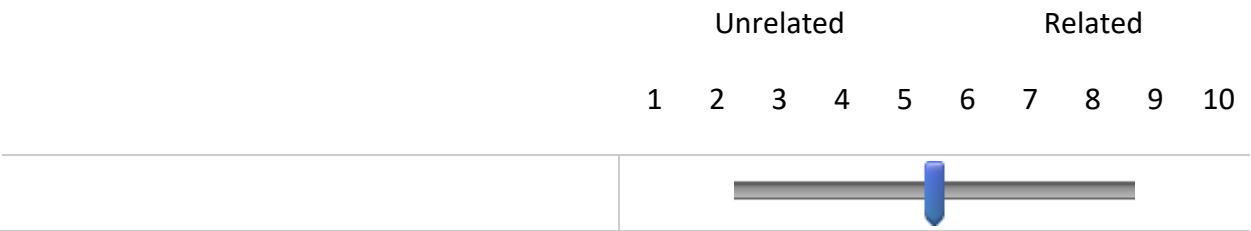
Nonbinary Person and Nagging



Nonbinary Person and Prudish



Emotional and Emotional



Emotional and Nagging

Unrelated Related



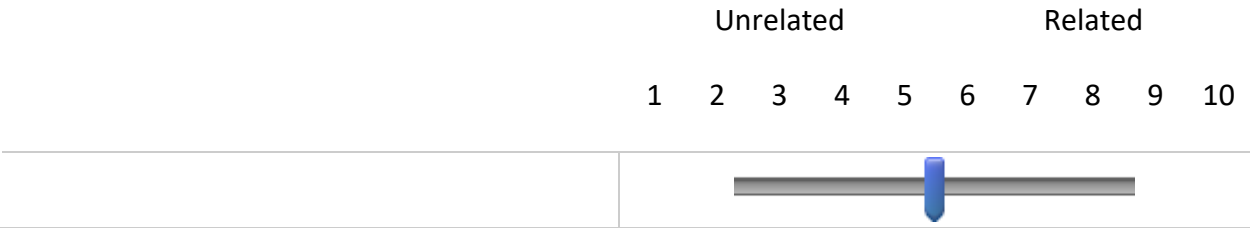
Emotional and Prudish



Nagging and Nagging



Nagging and Prudish



End of Block: Ranking part II