CONTEXT-DEPENDENT TOP-DOWN INFLUENCES SUPERSEDE OBJECT LOCATION IN VISUAL ATTENTION

by

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DEDICATION

For my husband, my equal partner in life—Wesley Alan Wiswell. You bring me great joy, a balance in perspective, warmth, compassion, unwavering support and belief in me, and steady footing on a spinning world. With all of my being, I love you.

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LIST OF ABBREVIATIONS

Abbreviation	Description
IRB	Institutional Review Board
IRI	Interpersonal Reactivity Index
mPFC	Medial-Prefrontal Cortex
ms	Milliseconds
PAM	Perception-Action Model
RT(s)	Response Time(s)
STS	Superior Temporal Sulcus
ToM	Theory of Mind
TPJ	Temporal-Parietal Junction

ABSTRACT

Previous studies using the dot perspective task repeatedly demonstration adult humans were slower when reporting the number of dots they could see in a picture when a human figure (e.g. avatar) was present and could “see” a different number of dots. This “self-consistency effect” is believed to occur when ascribing properties of mind to non-sentient objects (avatar). Two competing theories—domain-specific processing and domain-general processing—attempt to explain this phenomenon during task performance. Domain-specific regards these findings as highly specialized and independent of other functions. Conversely, domain-general proposes a combination of functions, such as working memory and directionality of the avatar’s location in relation to dot location, as an explanation. Though studies show higher-order processing influences our expectations about what we see through the use of context, investigation into latency effects of contextual manipulation are diminutive. In this study, an examination into the contextual effect of an avatar’s proposed sightedness on response latency was conducted using a dot perspective task. Participants (N = 65) made quick/accurate judgments based on three factors: perspective (self-perspective, other-perspective), consistency-level (consistent, inconsistent), and avatar’s sightedness (blind with bandana over avatar’s eyes, sighted with bandana on top of avatar’s head). This study validated the hypothesis that higher-order processes (context) overrides saliency during the dot perspective task. Though saliency of inconsistent dot locations produced response delays, it was the context of the avatar’s sightedness that produced significantly

longer delays. This study produced results consistent with the theory of context modulating visual attention and the observed self-consistency effect.

CHAPTER I

LITERATURE REVIEW

In our growing digital age, where avatars are often used in virtual worlds to represent a person, an interesting phenomenon occurs. Ascribing properties of mind to non-sentient representations of humans (e.g. avatars) has been documented (Heyes, 2014; McCleery, Surtees, Graham, Richards, & Apperly, 2011; Santiesteban, Catmur, Hopkins, Bird, & Heyes, 2014). Lecky (1945) coined the term *self-consistency effect* to describe the phenomenon of ascribing properties of mind to non-sentient objects. Essentially, the self-consistency effect represents the human motivation to protect the self-concept from alterations (Lecky, 1945). Thus, the motive for consistency of *self* leads humans to seek information consistent with self-beliefs; avoiding or rejecting information inconsistent with their beliefs. Self-consistency occurs during behavioral tasks, such as the dot perspective task, when a participant sees an object that is located behind an avatar stimuli; due to the directionality of the object in relation to the avatar, response time (RT) is slowed when asked whether the participant can "see" the object, as opposed to the faster RTs when the object is in front of the avatar (Heyes, 2014; McCleery et al., 2011; Santiesteban et al., 2014).

Mentalizing has been a proposed explanation for the self-consistency effect when a stimulus possesses agentive features, such as the avatar, suggesting that the effect is due to social cognitive processes (Heyes, 2014). This assumption was based on the understanding of social interactions in terms of behavior rules (Low & Watts, 2013), and takes into account the discrepancies between what a person sees and what they believe someone else sees. When the avatar was replaced with an arrow stimuli, pointing in the same direction the avatar had previously been facing, the self-consistency effect was also found (Santiesteban et al., 2014). Though the non-agentive arrow in the Santiesteban study (2014) *pointed* toward, or away from, dots in the perspective task, a perspective-taking model of empathy could explain some aspects of the self-consistency effect that are attributed to the resulting top-down processing of visual information, specifically the visuospatial ability of imagining a spatial transformation of the self (Baron-Cohen & Wheelwright, 2004; Gronholm, Flynn, Edmonds, & Gardner, 2012; Sulpizio et al., 2015; Wraga & Shepard, 2005; Zacks & Michelon, 2005).

According to the perception-action model (PAM) of empathy, the neural representations of the participant (subject) automatically and unconsciously activate to a similar state of those perceived within the object (avatar or arrow), where the subject takes the spatial perspective of the object (Decety & Chaminade, 2003; Preston, 2007; Preston & de Waal, 2002). In this case, mentalizing the state of the object is referred to as *cognitive empathy* (Povinelli, Nelson, & Boysen, 1992; Preston & de Waal, 2002). Cognitive empathy and perspective-taking are often used interchangeably, as "perspective-taking is a higher-order concept that includes both emotional and non-emotional forms of transitioning into the situation of another (Preston et al., 2007, p. 255)." Since cognitive empathy contributes to the ability of taking the perspective of the "other," an acceleration in RTs during other-perspective trials may be accomplished through strengthening mental representations and flexibility (Decety, 2010; Preston & de Waal, 2002). This can be achieved by giving the perceiver explicit instructions beforehand about the context of the avatar's sightedness (blind or sighted). A solution to gain a better understanding of what underlying mechanisms influence visual perspective-taking is to examine the two major competing theories proposed in previous studies—domain-specific processing and domain-general processing.

Domain-Specific Processing

In the early 17th century, French philosopher, René Descartes, grappled with the mind-body problem of *dualism*, which examined the relationship between mind and matter, particularly the relationship between consciousness (abstract) and the brain (concrete; Robinson, 2011). Dualism states that the abstract and concrete function independently of one another, leading to what is referred to as the problem of *other minds*. Subsequently, this epistemological dilemma urges the query, "Given that I can only observe the behavior of others, how can I know that others have minds (Hyslop, 2014)?"

In modern philosophy, the issue of other minds is best represented through the study of theory of mind, and often represented through the investigation of *mentalizing*. Mentalizing is thought to play a pivotal role in human social interaction and communication (Heyes, 2014), while implicit mentalizing is an automatic cognitive process that is said to allow humans to predict, explain, mold, and manipulate the desires, beliefs, and intentions of others in relation to self. Previous investigators propose mentalizing is comprised of the theory of mind (ToM) domain-specific brain regions, such as medial-prefrontal cortex (mPFC; Amodio & Frith, 2006; Denny, Kober, Wager, & Ochsner, 2012; Frith & Frith, 2003; Mitchell, Banaji, & Macrae, 2005; Mitchell, Macrae, & Banaji, 2006; Ochsner et al., 2005; Saxe, 2006), temporal poles and posterior superior temporal sulcus (STS; Frith & Frith, 2003), and temporal-parietal junction (TPJ; Corbetta, Patel, & Shulman, 2008; Saxe & Kanwisher, 2003; Saxe & Powell, 2006; Saxe, Whitfield-Gabrieli, Scholz, & Pelphrey, 2009). However, during tasks unrelated to ToM reasoning, recruitment of TPJ has been observed; thus, violating the specificity criterion (Sabbagh, 2001). Furthermore, the right TPJ has been documented as mediating stimulus-driven attentional orienting (Mitchell, 2008; Shomstein, Lee, & Behrmann, 2010) and recruited during focused attention in target detection tasks (Geng & Mangun, 2011; Geng & Vossel, 2013; Kubit & Jack, 2014).

Major issues arose when self-consistency was solely attributed to mentalizing. Mentalizing neglects to explain why stimuli with non-agentive directional features (e.g. arrows), in addition to stimuli with agentive features (e.g. avatars), invoke applied mental properties to non-sentient objects. An alternative explanation to the agentive features of stimuli activating the self-consistency effect is the directional features of stimuli. Therefore, if the directional features of the stimuli are the cause of the self-consistency effect, then the effect is attributed to domain-general processing, also referred to as general-sensory perceptual processing.

Domain-General Processing

Heyes (2014) suggests the term *submentalizing* be introduced as an alternative to the phrase “domain-general cognitive processes.” Contrary to mentalizing, submentalizing does not involve thinking about mental states; however, in social contexts it can produce behavior that appears as though it is controlled by thinking about mental states. The self-consistency effect was originally thought to be found only in stimuli with agentive features; nonetheless, this theory was not supported as a complete explanation.

Santiesteban et al. (2014) tested the implicit mentalizing hypothesis against the directional account hypothesis. Two separate experiments using the dot perspective task were conducted. The factors manipulated were consistency (consistent, inconsistent) and perspective (self, other). Part of the first experiment included an avatar. During the consistent trials, all of the dots on the screen were located in front of the avatar. During the inconsistent trials, some of the dots on the screen were located in front of the avatar, while at least one dot was located behind the avatar. During the other-perspective conditions, participants were asked to report how many dots on the screen the avatar could "see." During the self-perspective conditions, participants were asked to report how many dots on the screen they, the participant, could see. As expected, during the self-perspective conditions participant RTs were slower during the inconsistent trials when compared to consistent trials, indicating a self-consistency effect during the inconsistent trials. This result is consistent with supporting the implicit mentalizing theory. In other parts of the first experiment, an arrow replaced the avatar. A self-consistency effect with comparable magnitude to the avatar trials was observed under the same conditions (Santiesteban et al., 2014). This is consistent with other past findings (McCleery et al., 2011; Samson, Apperly, Braithwaite, Andrews, & Bodly Scott, 2010).

Heyes (2014) asserts that what appears as an emulation of the self-consistency effect during the arrow stimulus, is not actually automatic thinking about mental states. Heyes (2014) proposes the self-consistency effect during the arrow conditions is due to submentalizing; the domain-general cognitive mechanisms that include the processes known to mediate involuntary attentional orienting to the directionality of the avatar and arrow stimuli (Guzzon, Brignani, Miniussu, & Marzi, 2010). Yet, if the first condition (avatar) implied mentalizing, "thinking" about mental states, then the subsequent condition (arrow) could contain a context effect. Moreover, the repeated-measures design (avatar versus arrow) conducted by Santiesteban et al. (2014) would invoke “thinking about mental states” in participants in comparison across both stimuli type, not exclusively the avatar with agentive features. Unintentionally, this may have implicitly invoked participants to think about the mental states of the arrow, a non-agentive object. An alternative explanation is the overtraining in human society to use arrows to convey directional information, invoking involuntarily shifts of attention to the directionality of arrow stimuli (Guzzon et al., 2010). In this case, directional account would be an appropriate theory.

In the second experiment, using different participants, an asymmetrical rectangle with non-directional information replaced the avatar/arrow stimuli. No self-consistency effect was observed during the second experiment, as the RTs were not significantly slowed when the non-directional rectangle stimulus was utilized. This would suggest the cognitive mechanisms that mediate the self-consistency effect are domain-general, and self-consistency is due to directional rather than agentive features of a stimulus.

Two Systems of Processing

Though the self-consistency effect during an arrow stimulus has been credited to domain-general processing, domain-specific processing is also necessary for making whole assumptions about the external world and during social interactions (Apperly, 2011; Apperly & Butterfill, 2009; Butterfill & Apperly, 2013; Heyes, 2014; Low & Watts, 2013). Proponents of the domain-specificity theory argue that such competencies, as associative learning in infants, are too sophisticated to have been acquired through a domain-general process. Domain-specific theorists contend human minds are evolutionarily equipped with specific adaptions of a single learning system designed to overcome persistent problems in the environment (i.e., language acquisition faculty, object recognition module, face recognition module, visual system, etc.; Baron-Cohen, 1995; Chomsky, 1988; Cosmides & Tooby, 1994; Fodor, 1983; Gelman & Baillargeon, 1983; Pinker, 1994; Spelke, 1994; Spelke & Kinzler, 2007; Wellman & Gelman, 1997). Yet, as evidenced above, domain-specificity alone does not comprise a complete explanation for how humans process information.

Lower-level processing. Low and Watts (2013) propose a dual processing system combining low- and high-level processes for tracking and representing beliefs, allowing for more precise predictions of how others navigate the social world, which incorporates both fast, automatic calculations (e.g., object recognition), and flexible, controlled mental representations (e.g., perspective-taking). The efficient system is an inflexible lower-level cognitive process which allows humans to make fast calculations due to naturally occurring blind spots in perceptual input processing (Apperly & Butterfill, 2009; Low & Watts, 2013). In the efficient system, information input is implicit and automatic, avoiding the use of executive functions (Apperly 2011; Low, 2010; Low & Watts, 2013; Wang, Low, Jing, & Qinghua, 2012). When tracking and representing beliefs about an agentive stimulus, an automatic looking response occurs (Low & Watts, 2013). For example, when viewing a complex scene, infants are able to follow with their eyes the goal-directed actions of an object's location; however, their eye movements are automatic and appear to be unconscious (Apperly, 2011; Frith & Frith, 2003; Low, 2010; Low & Watts, 2013; Onishi & Baillargeon, 2005; Sodian & Thoermer, 2004; Wang et al., 2012; Zaki, Hennigan, Weber, & Ochsner, 2010). Automatic looking responses are minimally mentalistic; therefore, a system of higher efficiency (higher-level processing) is required to make predictions about an agentive stimuli's intensions, or belief-like states (Apperly & Butterfill, 2009; Low & Watts, 2013).

Higher-level processing. The flexible system is a higher-level cognitive process that utilizes executive functioning, such as in top-down processing during problem solving (Zelazo, Carter, Reznick, & Frye, 1997). Whether in working memory or other aspects of executive function, the capacity to construct mental representations with a certain level of complexity are required when reasoning about false beliefs (Andrews, Halford, Bunch, Bowden, & Jones, 2003; Frye, Zelazo, & Palfai, 1995; Russell, 1996). Though flexible, making inferences utilizing higher-level processing is cognitively taxing. This is why adults do not automatically make inferences about actors' beliefs in high-level perspective-taking tasks without being asked to do so (e.g., Surtees, Butterfill, & Apperly, 2012; Qureshi, Apperly, & Samson, 2010). It is proposed that the flexible system is based on an understanding of social interactions in terms of behavior rules (Apperly & Butterfill, 2009; Low & Watts, 2013), and is equipped to help humans with sophisticated perspective-taking in cognitively demanding situations (Apperly & Butterfill, 2009; Apperly, Samson, & Humphreys, 2009). For example, during a soccer match, a goalkeeper must be able to make fast calculations about the beliefs and intentions of an opponent who has possession of the ball. Quick and accurate judgments are necessary for predicting where the opponent intends to kick the ball, allowing the goalkeeper to effectively block the ball from going into the goal (lower-level processing). Yet, the soccer player can fake a pass, which requires the goalkeeper to utilize a higher-level of processing to understand the mentality of said soccer player. Thus, a combination of low-level and high-level cognitive processing is necessary to develop a deeper understanding into the perspective and mindset of the soccer player.

Influences on Visual Attention

Attentional orienting. Working memory holds and manipulates multiple pieces of transitory information in the mind, and is related to contextual comprehension. In previous studies, attentional guidance effects were driven not simply by visual priming of low-level salient features of an object, but by working memory (Dowd & Mitroff, 2013; Olivers, Meijer, & Theeuwes, 2006; Olivers, Peters, Houtkamp, & Roelfsema, 2011; Soto, Heinke, Humphreys, & Blanco, 2005; Soto, Hodsoll, Rotshtein, & Humphreys, 2008). According to Lin (2013), space-insensitive selection, such as object-centered suppression, indicates that working memory operates at a relatively higher-level of processing. Object-centered suppression is a novel effect that occurs after voluntary spatial attention has been distracted to a different location from the original object location cue (Lin, 2013). Simply put, RTs were slower when an object was spatially relocated in the picture (e.g., dot locations during inconsistent/incongruent trials), indicating the perceiver was accessing higher-order thought to make a judgment before responding. Therefore, as the perceiver voluntarily relocated their attention orientation, they accessed top-down driven, or endogenous, attentional processing (Wascher & Beste, 2010).

Conversely, space-sensitive selection operates using lower-level processes, such as in visual perception, indicating less need for evaluation, and therefore, less time needed to respond to the visual cue (Lin, 2013). For instance, when viewing the avatar and arrow stimuli, the incoming information of the directional cueing from both stimuli are salient (James, 1890), and the self-consistency effect that emerges is probably a product of overtraining (Guzzon et al., 2010). The perceiver reflexively oriented their attention to the directional information displayed by the avatar and arrow stimuli, accessing bottom-up driven, or exogenous, attentional processing (Washcer & Beste, 2010). James (1890) proposed that some combination of the two levels of processing occur in our daily lives, in all human concrete attentional acts.

Contextual modulation. Wurm, Cramon, and Schubotz (2012) investigated the triadic relationship of context, object, and manipulation information during action recognition. The contextual effects in the absence of a visual context suggested stronger associations between contextually related versus unrelated objects and manipulations. Yet, manipulation and object information were linked by contextual associations. In a study conducted by Wurm et al. (2012), participants were slower in naming pictures of objects when distracter words with related meanings were presented than when the distracter words had unrelated meanings. This contextual compatibility effect reflects a suppression/activation conflict, which was stronger when to-be-suppressed and to-be-activated information belonged to the same versus different contextual categories (Wurm et al., 2012). This has implications for attentional orienting studies, as contextual information provides an essential shortcut for efficient object detection systems (Oliva, Torralba, Castelhano, & Henderson, 2003). Oliva et al. (2003), propose that the top-down information from the context of a visual stimulus modulates the saliency (contrast, color, orientation, texture, motion), while bottom-down information is overlooked (not consciously perceived) when competing visual stimulation exists in neighboring regions that tend to attract more attention (Itti, Koch, & Niebur, 1998; Wolfe, 1994). If the same object appeared in a series of images, eventually the perceiver would develop an automatic blind spot for that old object if new and more detailed objects were placed beside it in varying trials.

Cognitive Empathy and Perspective-Taking

Top-down processing influences expectations about what is consciously perceived (i.e., seen) through the use of context (Decety, 2010; Preston & de Waal, 2002; Wurm et al., 2012), stored knowledge in working memory (Apperly, 2011; Lin, 2013; Wang et al., 2012), and saliency of a stimulus (Itti et al., 1998; Oliva et al., 2003; Wolfe, 1994). As opposed to the lower-level processing of bottom-up, top-down utilizes extrapolations from past experiences in similar situations (Damasio, 1994; Damasio, 2003; Preston & de Waal, 2002). Hence, a capacity to comprehend and resonate with another's experience is necessary for a more precise understanding of the other's individual belief, goals, and intentions (perspective-taking; Purves et al., 2013). In a social context, mental flexibility—the cognitive ability to flexibly adopt the perspective of another individual or object—plays a crucial role in social perception and smoothness of social interaction (Decety, 2010). If we cannot relate to the experience of the other, either having no experience of the situation or lacking any frame of experiential reference, we tend to project our own representations onto others when trying to cognitively assess their perspective (Allport, 1937; Buchheimer, 1963; Goldie, 1999; Preston & de Waal, 2002; Preston et al., 2007; Smith, 1989). Thus, by giving participants explicit instructions to take the perspective of another—while informing them of the situation beforehand (e.g., avatar with bandana over eyes is blind; avatar with bandana on top of head is sighted)—cognitive perspective-taking is primed and more quickly taken. To evaluate whether applied context and mental flexibility in perspective-taking are impacted by cognitive empathy, a self-report scale should be used.

The Interpersonal Reactivity Index (IRI; Davis, 1983) was developed to access participant self-reports on empathetic view, in which participants indicate the extent of their agreement with 28 statements about perspective-taking using a 5-point Likert rating. The IRI is a multi-dimensional approach to measuring individual differences in empathy. The IRI is comprised of four subscales: perspective-taking (the tendency to spontaneously adopt the psychological point of view of others); fantasy (respondent's tendencies to transpose themselves imaginatively into the feelings and actions of fictitious characters in books, movies, and plays); empathetic concern ("other-oriented" feelings of sympathy and concern for unfortunate others); and personal distress ("self-oriented" feelings of personal anxiety and unease in tense interpersonal settings). Higher scores on the IRI indicate a higher capacity for empathy (stronger ability to view perspective of the other), with lower scores indicating the converse (weaker ability to view perspective of the other). If participants who score higher on the IRI perspective-taking subscale also display faster RTs during the other-inconsistent trials, this would fit with the cognitive empathy theory, indicating a higher level of cognitive flexibility enables a person to take the perspective of another expeditiously.

Pilot Study

In a pilot study (Stanfield, Ginsburg, & Tooley, 2015), the contextual manipulation of an avatar's proposed sightedness (whether the avatar was sighted, with nothing over her eyes; whether the avatar was blind, with a bandana over her eyes) was investigated. The purpose of the pilot was to determine if the higher-level process of working memory would have a more pronounced consequence on participant RTs than the lower-level process of the avatar's directional features. As opposed to earlier self-consistency effect explanation, results yielded an object-centered suppression effect. Participants in the study were given explicit instruction that a pink bandana would obstruct the avatar's vision rendering her blind, so long as the bandana was placed over her eyes. In accordance with the study by Wurm et al. (2012), it was predicted the contextual compatibility effect would occur in relation to visual priming cues commenting on the avatar's sightedness. If Lin (2013) and Wurm et al. (2012) are correct, RTs should differ according to the avatar's sightedness. In accordance with their assumption, a prediction was be made for slower RTs during the other-inconsistent-sighted trials, when compared to trials where participants are asked to comment on the perspective of the blind avatar (other) and where the dots are inconsistent (in front of and behind the avatar). Though results in the pilot study did not yield a significant effect for avatar sightedness, it did reveal a trend toward slower RTs during the other-inconsistent-sighted trials (p = .175 for three-way interaction between sightedness, consistency, and perspective). The small sample size of the pilot study (N = 23) limited strength of results.

In the pilot study, the use of the bandana (blinded avatar) versus no bandana (sighted avatar) resulted in a change of design for the current study. An argument for the object-centered suppression effect could not be made concretely, as it was later assumed participants may have focused on whether or not the pink bandana was present in the picture, as opposed to a visual priming cue from the instructed context of the avatar's sightedness. The pilot study intended to clarify response latency differences between automatic looking invoked by lower-level directional account of the stimuli versus the controlled looking mediated by high-order contextual knowledge of the avatar's proposed sightedness.

CHAPTER II

PURPOSE AND HYPOTHESES OF THE CURRENT STUDY

Purpose of Study

While a growing number of articles have been published addressing the social and theory of mind aspects of visual attention in perspective-taking, few have addressed psychological factors associated with cognitive influences of explicit contextual manipulation during perspective-taking tasks. Additionally, few previous investigators have addressed the influence of top-down control to investigate visual attention during perspective switching. Past research focused on empathy as a driving mechanism behind the ability to take quick perspective of another. Other past research focusing on mentalizing versus submentalizing proved too vague an explanation for the differences in participant RTs during dot perspective tasks. This study addressed these concerns, to include the influence of context on the ability to switch between perspectives, empathy as a mechanism behind flexibility of perspective switching, and to develop a clearer explanation for response latency differences during the dot perspective task.

In the current study, a methodological design was created to appropriately measure the response latency differences that occur when explicit contextual knowledge is used during a perspective switching task, such as the dot perspective task. The presence of the pink bandana in every picture trial—either covering the avatar's eyes (blinded) or on top of the avatar's head (sighted)—is paramount to address the impact of higher-order contextual manipulation on response latency differences. The design change from the pilot study to the current study was intended to clarify a distinction between higher-level (top-down) processing of visual information for perspective-taking and switching, while reducing lower-level (bottom-up) influences that fail to answer questions concerning the domain activation during such behavioral tasks.

This study intends to investigate the two main competing theories—domain-specific processing and domain-general processing—and enhance the understanding of underlying mechanisms that contribute to visual attention during perspective-taking tasks. This study proposes to refute the one-system, independent functioning aspect of domain-specificity theory, and instead support the use of a two-system model of interconnected domain-general processes for higher-level information processing.

Hypotheses

In the current study, it was predicted that RTs would be faster during self-trials compared to other-trials (main effect for perspective), to include a two-way interaction between perspective and consistency. Such an observation would be a replication of past findings for the proposed self-consistency effect (McCleery et al., 2011; Santiesteban et al., 2014; Stanfield et al., 2015), fitting the theory of directional account. Additionally, it was predicted that a three-way interaction between sightedness, consistency, and perspective would be observed, where the critical two-way interaction is modulated by the sightedness factor (faster responses during blind avatar trials compared to sighted avatar trials). Specifically, it was predicted that RTs would be significantly faster during other-consistent-sighted compared to other-inconsistent-sighted trials, indicating a self-consistency effect. Furthermore, it was predicted that RTs would be significantly faster during other-blind compared to other-sighted trials, suggesting the consistency effect is modulated by the sightedness manipulation. Observation of the latter effect would indicate stored knowledge about the context of the avatar's sightedness enhances cognitive flexibility (perspective-taking). This would be indicative of top-down processing, as extrapolations made from past knowledge (bandana is over the avatar's eyes means she cannot "see") result in less need to acquire additional information from the visual scene before making a judgment. Furthermore, supporting past investigations into stored knowledge in working memory as major influences into expectations about what is consciously perceived (Apperly, 2011; Lin, 2013; Wang et al., 2012).

In the current study, the theory that higher levels of cognitive empathy perspective-taking promotes the ability to take faster perspectives of others was investigated. If the theory is valid, RT differences between self RT means and other RT means would be negatively correlated with higher IRI perspective-taking subscale scores; such that as perspective-taking scores increase, RTs modulated for perspective would decrease. If this effect is observed, it would indicate more expeditious cognitive flexibility to take the perspective of the other in individuals who score higher on perspective-taking. This would support the theory that perspective-taking (cognitive empathy) is easily explained as a higher-order concept, allowing for more expeditious cognitive flexibility in participants with faster RTs.

CHAPTER III

METHOD

For this study, sixty-five participants (17 male, 48 female) were recruited from students at Texas State University-San Marcos, Department of Psychology through an online subject pool management system (Sona). The data from two additional participants, with error rates greater than 40%, were excluded from the analysis. Participant RTs at or exceeding 10,000 milliseconds (ms) were excluded from the analysis, as were RTs three or more standard deviations above the mean. Practice trials were not included in the analysis, only experimental trials were included. Students received course credit as compensation for their participation. All participants were instructed in American English. All participants reported normal or corrected-to-normal visual acuity. This experimental protocol was approved by the Institutional Review Board (IRB) at Texas State University.

Design

A 2(perspective) X 2(consistency) X 2(sightedness) within-subjects factorial design was used. All three independent variables were included in each trial, each containing two levels: perspective (self, other), consistency (consistent, inconsistent), and avatar sightedness (sighted, blind). Each factor contained 20 trials per level; 160 experimental trials total.

During the consistent conditions, all of the red dots on the screen appeared in front of the avatar. During the inconsistent conditions, some of the red dots on the screen appeared in front of the avatar, with at least one red dot behind the avatar (Figure 1). During the sighted avatar conditions, the avatar wore a pink bandana upon her head;

indicating the avatar is incapable of "seeing" any of the red dots on the screen. During the blind avatar conditions, the avatar wore a pink bandana upon her eyes; indicating the avatar is not be able to "see" any of the red dots on the screen, regardless of spatial orientation. Fifty percent of the trials showed the avatar wearing the bandana upon her head (sighted), with the other fifty percent showed the avatar wearing the bandana over her eyes (blind).

Each trial contained 8 conditions total: perspective cue ("You" versus "Her), probe digit ("0", "2," or "3"), dot spatial consistency (consistent versus inconsistent), and response options ("yes" versus "no"). To maintain a within-subjects balance of all 8 conditions across participants, each of the 8 conditions contained 3 trials during the practice trial series. Therefore, a total of 24 practice trials occurred before the 160 experimental trials – presenting a total of 184 trials per each participant. Each participant received the same 184 trials. Trial order was randomized for each participant and a balancing formula was used to ensure all levels of factors and conditions were delivered to each participant equally and randomly throughout participation. Response time and accuracy were measured.

To strengthen the methodology, the use of 0 as a digit probe is important for overcoming issues related to response bias. In addition, the use of the bandana in all picture trials is important for overcoming confounds that could muddle and confuse the effect of higher-order contextual manipulation on response latency differences.

Procedure

Participants were asked to read and sign a consent form beforehand (see Appendix A). Participants were given a single one-hour session to complete the entire study. Participants used a basic QWERTY keyboard to input answers. A dot perspective task was completed in SuperLab 5 priming software. A questionnaire was completed on an electronic research database management system (Qualtrics).

Instructions. Participants were instructed to sit comfortably, yet upright, in a chair at a desk while facing a computer monitor. Before beginning the dot perspective task, participants were given clear verbal instructions. It was explicitly communicated to each participant that the avatar is capable of seeing the red dots in front of her while she is wearing a bandana upon her head, but when the avatar is wearing the bandana over her eyes she is incapable of seeing any red dots. Next, each participant began the dot perspective task with 24 practice trials. Once the practice trials were completed, the 160 experimental trials automatically began. Therefore, participants seamlessly transitioned from the practice trials to the experimental trials during the course of completing the dot perspective task. The entire process of receiving verbal instruction, completing 24 practice trials, and completing 160 experimental trials took approximately 30 minutes. During each trial, a neutral cue stimulus (fixation point) was first presented, indicating to the participant that a new trial was about to begin. After the fixation point was presented on the computer screen for 500 ms, a perspective cueing word was presented on the screen for 500 ms ("You" or "Her"). If "You" was presented, it indicated the participant was being asked to view the trial from their own perspective (self). If "Her" was presented, it indicated the participant was being asked to view the trial from the avatar's perspective (other). Next, regardless of the perspective being cued, a digital number was presented on the screen for 500 ms, either the digital number 2 or 3. The last image of the trial was a blue room with an avatar standing in the middle and facing toward the left side of the screen, with two or three red dots on the wall(s) of the room (consistent or inconsistent). During the other perspective conditions ("Her" perspective cue), the participant recorded whether the avatar could "see" the number of red dots in the room that correspond with the digital number (2 or 3). For example, in Trial 1 the word "Her" appeared after the fixation point, then was replaced by the probe digit 2 (Figure 2a). If the participant believed the avatar could see exactly two red dots, then the participant was instructed to press the *1* key for "yes." If the participant did not believe the avatar could see exactly two red dots, then the participant was instructed to press the *2* key for "no." Participants were instructed to press their answer key as quickly and as accurately as possible. Once an answer had been inputted, the next trial began automatically. Another example would be if the word "You" appeared after the fixation point, then followed immediately by the probe digit 2 (Figure 2b). In this example, the participant was being asked if they (self-perspective) could see exactly two red dots on the screen. Again, they were instructed to record their answer rapidly and as accurately as possible according to whether they believed they could see exactly two red dots or not.

To maintain balance between conditions, an equal number of red dots appeared on the screen throughout the experiment; fifty percent of the time two dots appeared, while the other fifty percent three dots appeared. In addition, trials with correct "yes" responses were presented fifty percent of the time, while the other fifty percent were trials with correct "no" responses. To balance correct "yes" and "no" responses during the other-blind trials (both consistent and inconsistent) ("Her"), probe digit 0 appeared on the screen fifty percent of the time. This indicated that the goal was to seek no dots on the screen. Since the avatar is blind, she cannot see; therefore, the correct response would be "yes" if asked to take the perspective of the blinded avatar.

Materials

After completing the dot perspective task, participants completed the Interpersonal Reactivity Index (IRI) (Davis, 1983), in which participants indicated the extent of their agreement with 28 statements about perspective-taking using a 5-point Likert rating with choices ranging from 0 (*does not describe me well*) to 4 (*describes me very well*). Items 3, 8, 11, 15, 21, 25, and 28 comprise the Perspective-Taking subscale (the tendency to spontaneously adopt the psychological point of view of others). Items 1, 5, 7, 12, 16, 23, and 26 comprise the Fantasy subscale (respondent's tendencies to transpose themselves imaginatively into the feelings and actions of fictitious characters in books, movies, and plays). Items 2, 4, 9, 14, 18, 20, and 22 comprise the Empathetic Concern subscale ("other-oriented" feelings of sympathy and concern for unfortunate others). Items 6, 10, 13, 17, 19, 24, and 27 comprise the Personal Distress subscale ("self-oriented" feelings of personal anxiety and unease in tense interpersonal settings). Higher scores indicate a higher capacity for empathy (stronger ability to view perspective of the *other*), with lower scores indicating the converse (weaker ability to view perspective of the *other*). An example of one of the statements is "I try to look at everybody's side of a disagreement before I make a decision." The full scale can be found in Appendix B.

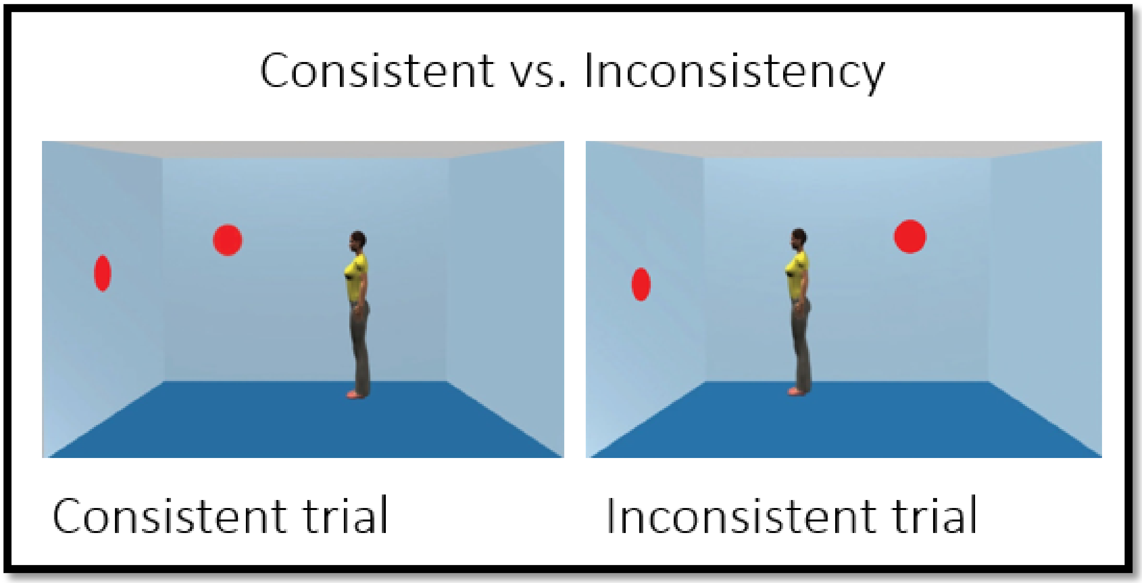

Figure 1. Consistent versus Inconsistent Trials. Consistent trials are characterized by all dots being spatially located in front of the avatar. Inconsistent trials are characterized by a combination of dots being spatially located both behind and in front of the avatar. Adapted from "Avatars and Arrows: Implicit Mentalizing or Domain-General Processing?" by I. Santiesteban, C. Catmur, S. C. Hopkins, G. Bird, and C. Heyes, 2014, *Journal of Experimental Psychology: Human Perception and Performance*, *40*, p. 930. Copyright 2013 by the American Psychological Association.

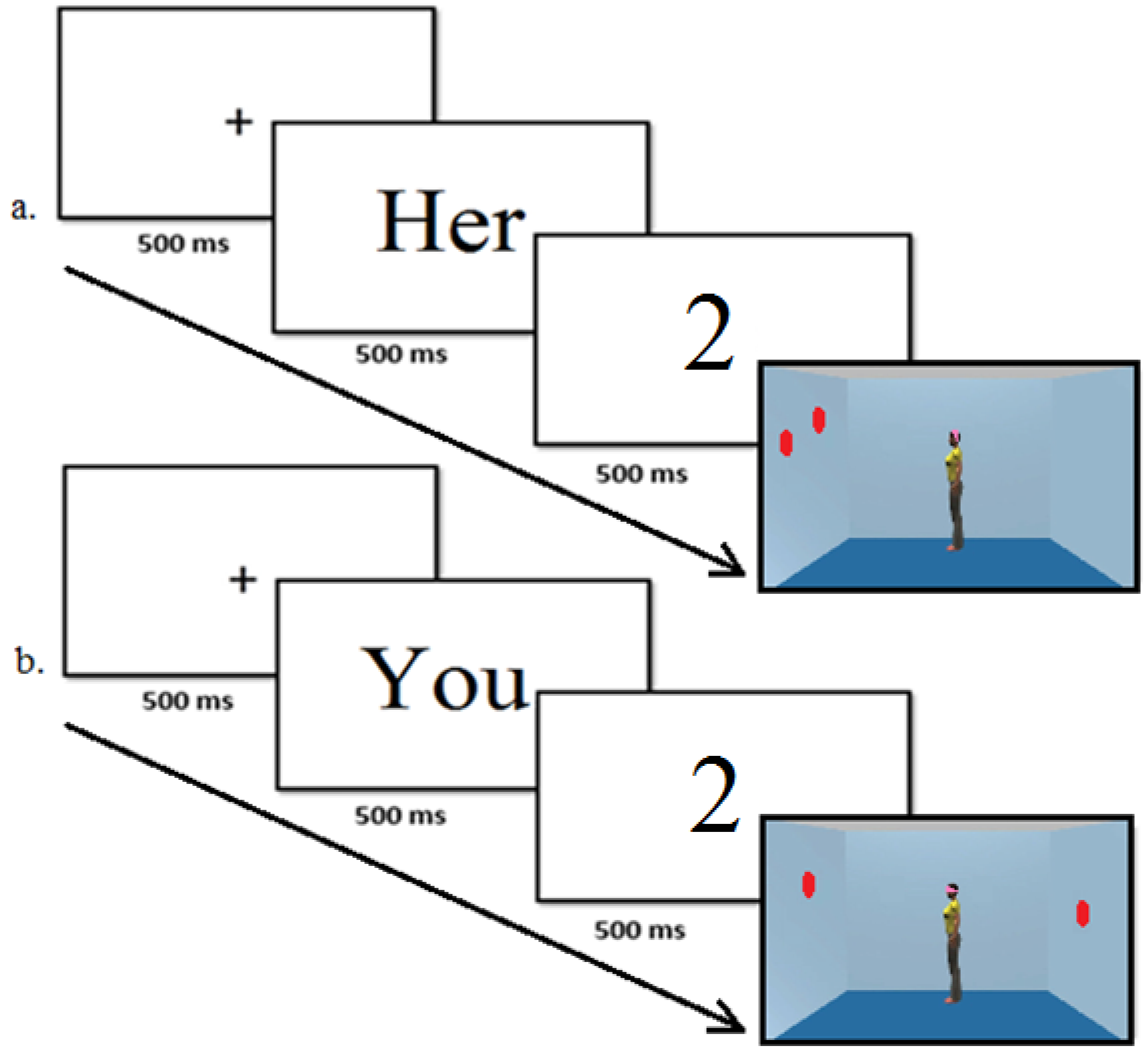

Figure 2. Schematic of Trial Presentation Order. Each trial began with a fixation point (500 ms), then a perspective cue word (“Her” or “You”; 500 ms), followed by the probe digit (“2”; 500 ms), ending with a picture consisting of an avatar and a series of red dots. Other-consistent-sighted trial example (a) and (b) self-inconsistent-blind trial example.

CHAPTER IV

RESULTS

Descriptive statistics for all eight condition can be found in Table 1. Based on the within subjects design, a three-way repeated measures ANOVA was conducted to predict RTs based on perspective, consistency, and avatar sightedness. As predicted, a three-way interaction was observed for perspective, consistency, and sightedness, $F(1,64) = 7.716$, $p = .01$, $\eta^2 = .108$ (Figure 3). Significantly faster RTs during other-consistent-sighted ($M = 2522.80$, $SD = 244.82$) compared to other-inconsistent-sighted ($M = 2612.98$, $SD = 251.98$) trials were observed, $t(64) = -5.347$, $p = .001$. Also as predicted, both the perspective, $F(1,64) = 24.681$, $p = .001$, $\eta^2 = .278$,and the avatar sightedness, $F(1,64) = 5.644$, $p < .05$, $\eta^2 = .081$, main effects were significant. A significant main effect for consistency was also observed, $F(1,64) = 11.80$, $p < .001$, $\eta^2 = .156$. A line graph summarizing these results can be found in Figure 4. No homogeneity of variance was required when testing the repeated measures design, as each factor contains only two levels; therefore, sphericity is already met, and unnecessary to evaluate. (Hinton, Brownlow, McMurray, & Cozens, 2004).

A two-way interaction was observed for perspective and sightedness, $F(1,64) = 38.051$, $p = .001$, $\eta^2 = .373$; RTs were significantly faster during self-sighted ($M = 2466.96$, $SD = 213.27$) compared to self-blind trials ($M = 2496.29$, $SD = 227.99$) [$t(64) = -2.884$, $p = .01$], and significantly faster during other-blind ($M = 2496.06$, $SD = 225.35$) compared to other-sighted trials ($M = 2567.89$, $SD = 238.94$) [$t(64) = 5.197$, $p = .001$]. Plotted means for perspective and sightedness conditions can be found in Figure 5.

In addition, a two-way interaction was observed for consistency and sightedness, *F*(1,64) = 9.379, $p = .01$, $\eta^2 = .097$; RTs were not significantly faster during consistent-sighted compared to consistent-blind trials [$t(64) = -.254$, $p > .05$], yet RTs during inconsistent-blind (*M* = 2499.86, *SD* = 216.62) were significantly faster than during inconsistent-sighted trials (*M* = 2545.78, *SD* = 222.75) [$t(64) = 3.682$, $p = .001$]. Plotted means for consistency and sightedness conditions can be found in Figure 6.

When controlled for perspective, significantly faster RTs during self-consistent trials (*M* = 2471.54, *SD* = 242.19) were observed when compared to other-inconsistent trials (*M* = 2553.92, *SD* = 234.19) [$t(64) = -5.774$, $p = .001$]. Though trending, no two-way interaction for perspective and consistency was observed, $F(1,64) = 1.966$, $p > .166$, $\eta^2 = .030$.

Paired samples *t*-tests were conducted to compare RT differences between the levels of each factor. A significant difference between self and other trials was observed, $t(64) = -4.968$, $p = .001$; RTs were faster during self (*M* = 2481.63, *SD* = 216.91) compared to other (*M* = 2531.97, *SD* = 225.46). A significant difference between consistent and inconsistent trials was observed, $t(64) = -3.435$, $p = .001$; RTs were faster during consistent (*M* = 2490.78, *SD* = 227.22) compared to inconsistent (*M* = 2522.82, *SD* = 213.87). A significant difference between blind and sighted avatar trials was observed, $t(64) = 2.376$, $p < .05$; RTs were faster during blind (*M* = 2496.18, *SD* = 220.02) compared to sighted (*M* = 2517.43, *SD* = 220.76).

A paired samples *t*-test was conducted to compare RT differences between self-sighted and self-blind trials, and a significant difference was observed, $t(64) = -2.884$, $p < .05$; whereas RTs were faster during self-sighted (*M* = 2466.96, *SD* = 213.27) compared to self-blind (*M* = 2496.29, *SD* = 227.99). A paired samples *t*-test was conducted to compared RT differences between self-consistent and self-inconsistent, yielding no significant differences, $t(64) = -1.512$, $p > .05$.

When controlled for perspective, a paired samples *t*-test showed a significant difference between self-inconsistent and other-inconsistent trials, $t(64) = -5.232$, $p = .001$, with RTs faster during self-inconsistent ($M = 2491.72$, $SD = 203.06$) compared to other-inconsistent ($M = 2553.92$, $SD = 234.19$). However, there was no significant RT differences between self-inconsistent and other-consistent trials, $t(64)$ -1.381, $p > .05$.

A Pearson correlation was conducted to assess the relationship between perspective RT differences (self RT means minus other RT means) based on the IRI perspective-taking subscale scores. A Pearson correlation was conducted to assess the relationship between perspective RT differences based on total IRI scores. There was no significant correlation between the two variables, $r(58) = .049$, $p > .05$ (Table 2). However, there was a positive weak significant correlation between the two variables, $r(62) = .247$, $p = .05$. As perspective-taking ability scores increased, response latency also increased. Based on this study, 6.1% of variance in response latency differences is attributed to the IRI perspective-taking subscale score (Table 2). A scatterplot summarizing these results can be found in Figure 7.

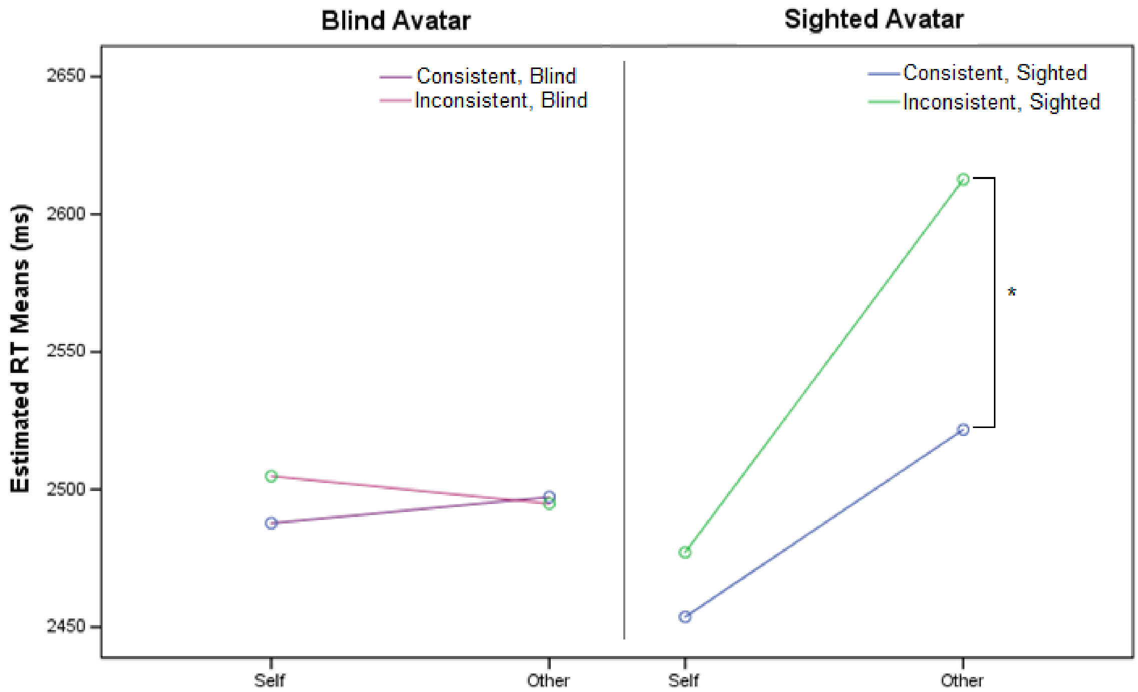

Figure 3. Plotted Means for All Factors. Three-way interaction between perspective, consistency, and sightedness. Response times significantly faster during other-consistent-sighted compared to other-inconsistent-sighted trials; self-consistency effect. Response times significantly faster during other-blind compared to other-sighted trials; suggests the consistency effect is modulated by the sightedness manipulation.

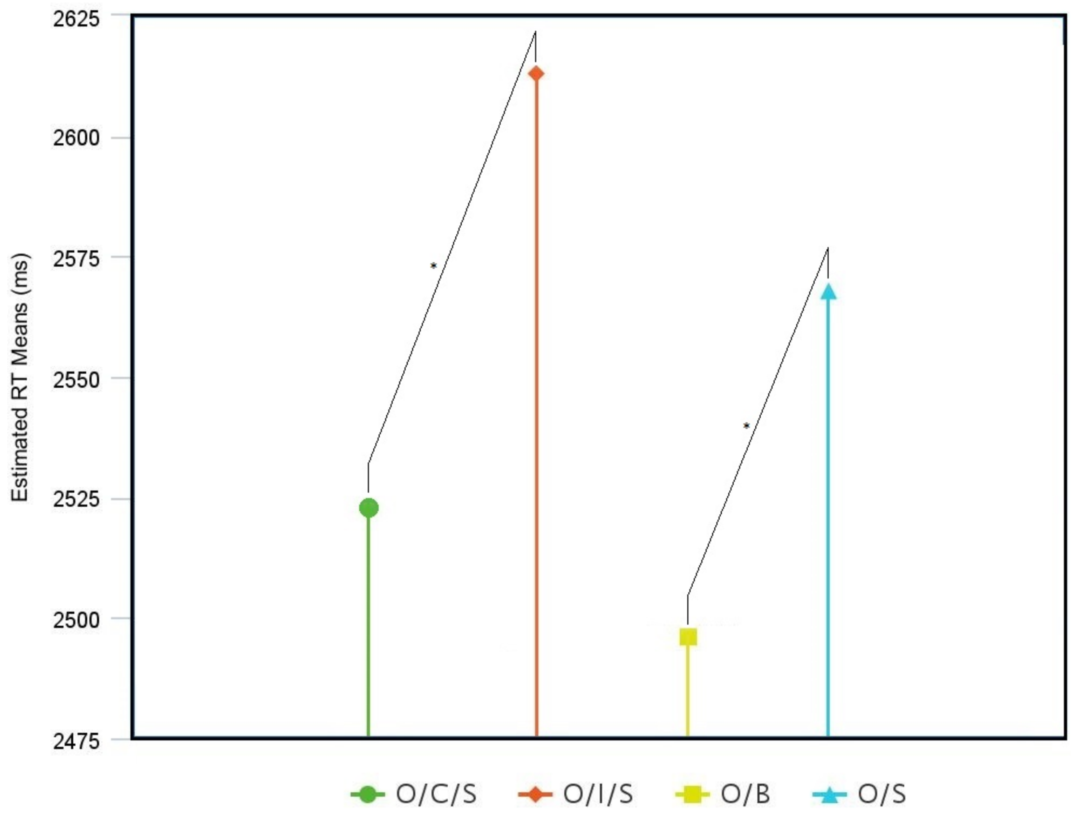

Figure 4. Line Graph of Mean Response Times. Paired-samples t-test comparing response time differences on trial conditions. Significant difference in RTs between O/C/S (other-consistent-sighted) and O/I/S (other-inconsistent-sighted) trials. Significant difference in RTs between O/B (other-blind) and O/S (other-sighted) trials.

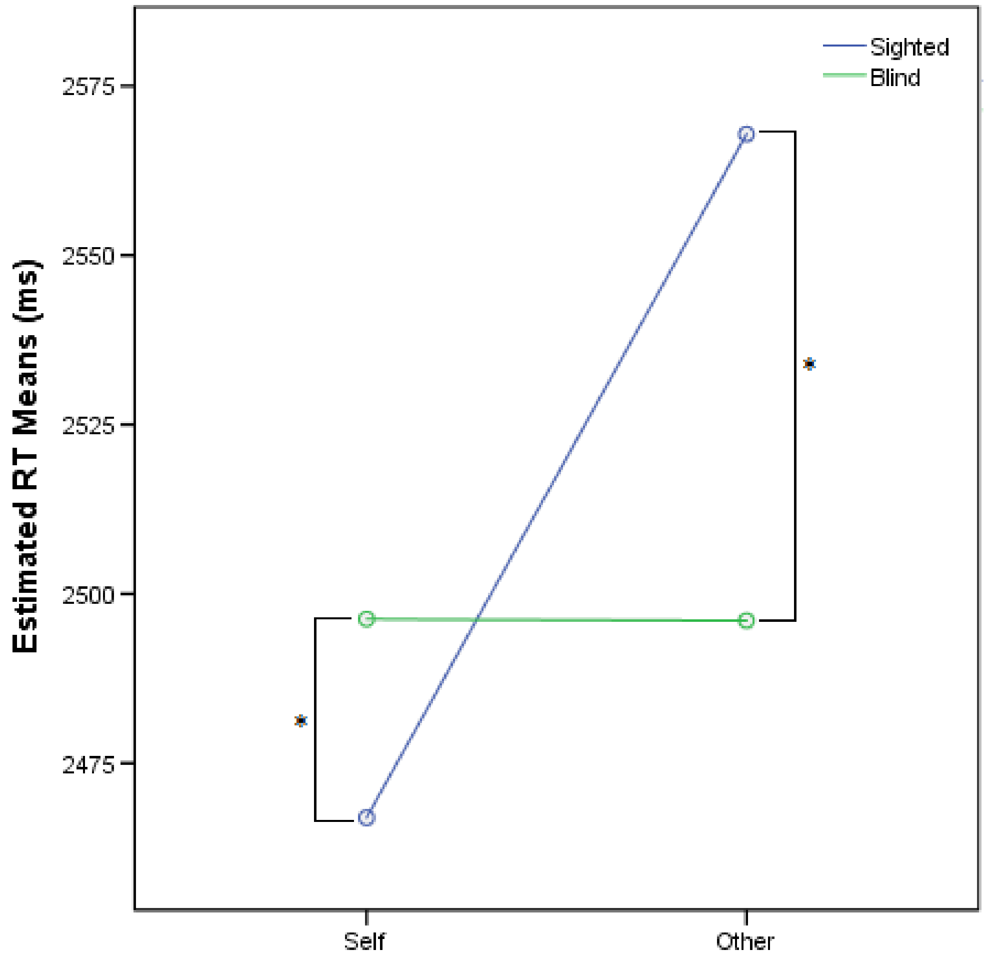

Figure 5. Plotted Means for Perspective and Sightedness Conditions. A two-way interaction was observed for perspective and sightedness; response times were significantly faster during self-sighted compared to self-blind trials, and significantly faster during other-blind compared to other-sighted trials. Main effects for perspective and avatar sightedness were also observed.

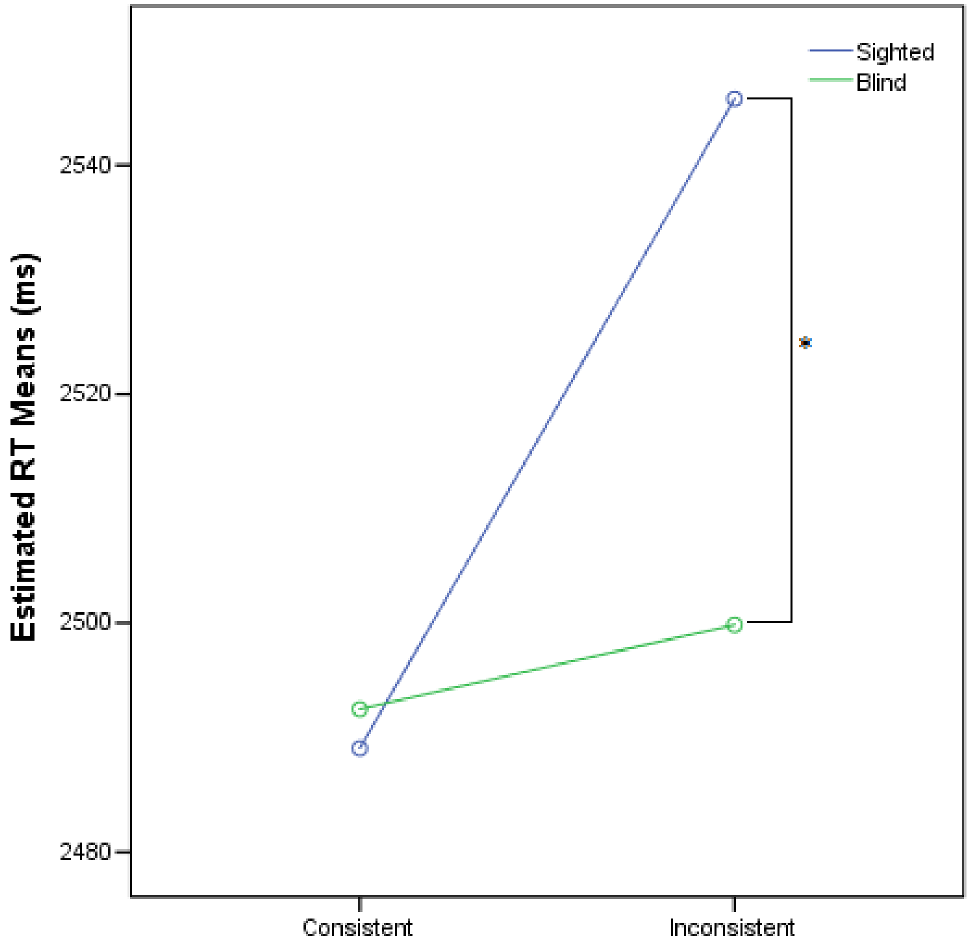

Figure 6. Plotted Means for Consistency and Sightedness Conditions. Two-way interaction between consistency and avatar sightedness; response times were significantly faster during inconsistent-blind compared to inconsistent-sighted trials.

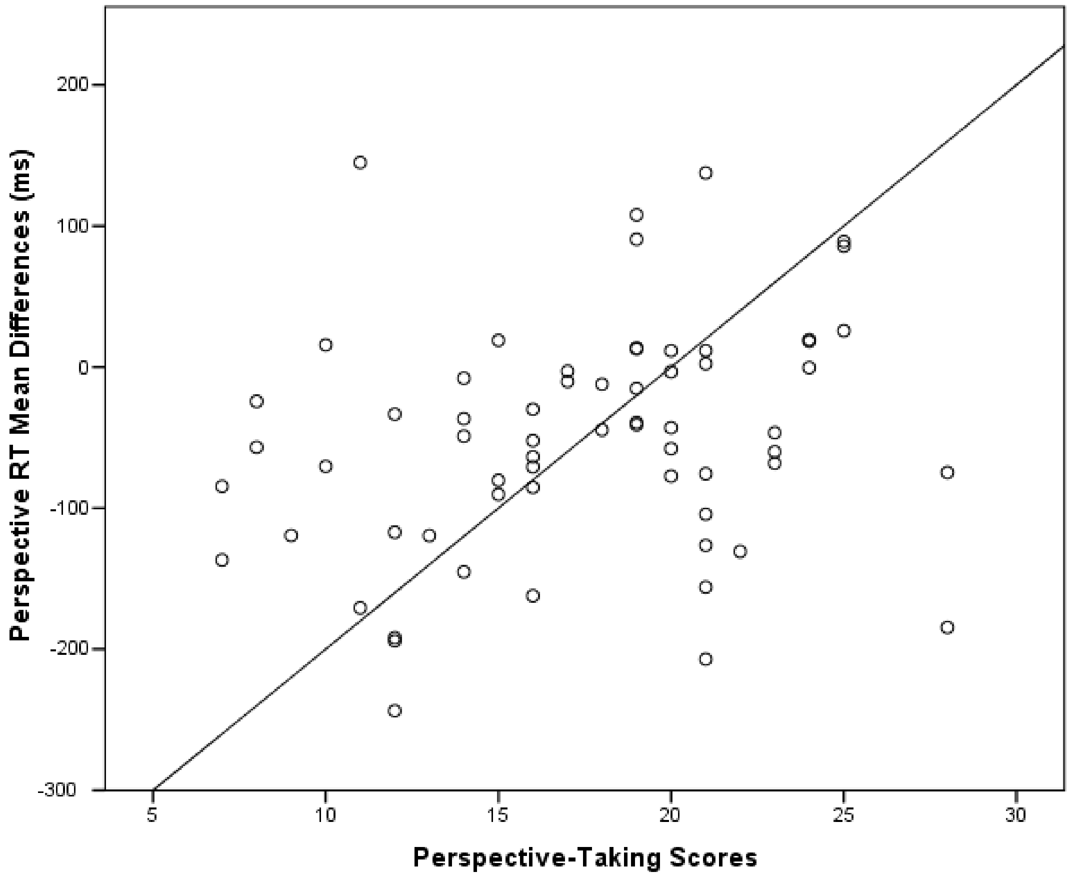

Figure 7. Scatterplot for Pearson Correlation. As perspective-taking ability scores increases, response latency also increases.

Table 1

Descriptive Statistics of Conditions

Condition	Min.	Max.	*M*	*SEM*	*SD*
1: Se/C/B	2029.55	3204.68	1487.74	32.93	265.50
2: O/C/B	2078.45	3243.43	2497.25	29.08	234.48
3: Se/I/B	2119.55	3096.65	2504.85	26.62	214.62
4: O/I/B	2021.25	3178.33	2494.86	29.47	237.59
5: Se/C/S	2047.85	3121.24	2455.33	29.28	236.10
6: O/C/S	2105.90	3192.78	2522.80	30.36	244.82
7: Se/I/S	2099.80	3035.95	2478.59	25.87	208.59
8: O/I/S	2114.20	3263.18	2612.98	31.54	251.98

Note. Se = Self; O = Other; C = Consistent; I = Inconsistent; B = Blind; S = Sighted.

Table 2

Correlations Between Empathy Variables and Response Latency

Measure	1	2	3
1. Interpersonal Reactivity Index	–	.001***	.711
2. Perspective-Taking subscale	.001***	–	.050*
3. Response latency based on perspective	.711	.050*	–

* $p \leq .05$. ** $p < .01$. *** $p < .001$.

CHAPTER V

DISCUSSION

The goal of this study was to replicate past dot perspective task results and to determine if the context of avatar sightedness modulates the self-consistency effect, demonstrating higher-order processes overriding what is visually perceived when taking the perspective of another. Current study results replicated findings from past studies using the dot perspective task, while the use of higher-level context in this study produced some predicted result differences. As predicted, significantly faster RTs during self-trials compared to other-trials was replicated (McCleery et al., 2011; Santiesteban et al., 2014). An interaction between perspective and consistency was also replicated (McCleery et al., 2011; Santiesteban et al., 2014). Significantly faster RTs during self-consistent-sighted compared to self-inconsistent-sighted trials were also observed. These results indicate a self-consistency effect, germane to the circumstance that dot location during sighted avatar trials significantly impacted response latency.

This study produced results consistent with the theory of context modulating visual attention. In addition to the self-consistency effect findings, no significant difference between the self-consistent-blind compared to the self-inconsistent-blind trials was observed. This finding indicates the sightedness manipulation modulated the self-consistency effect. Significantly faster RTs during other-consistent-sighted compared to other-inconsistent-sighted trials were also observed, further demonstrating a contextual modulation. Furthermore, significantly faster RTs during other-blind compared to other-sighted trials were observed, suggesting the self-consistency effect is modulated by the sightedness manipulation. These findings are consistent with past investigations into stored knowledge in working memory influencing expectations about what is consciously perceived (Apperly, 2011; Lin, 2013; Wang et al., 2012).

As proposed by previous investigators (McCleery et al., 2011; Santiesteban et al., 2014; Stanfield et al., 2015), the phenomenon of self-consistency may be a combination of functions, such as working memory and directionality of the avatar's location in relation to dot location (domain-general processing). As predicted, the working memory of the avatar sightedness in this study modulated the self-consistency effect. Overall, results from the current study indicate that attentional orienting is overridden by the top-down contextual knowledge of the avatar's proposed sightedness. This evidence validates the argument for working memory overriding salience cues (Dowd & Mitroff, 2013; Olivers et al., 2006; Olivers et al., 2011; Soto et al., 2005; Soto et al., 2008).

The cognitive empathy theory suggests that those who scored higher on the IRI perspective-taking subscale would be able to more flexibility and more quickly take the perspective of others compared to those who scored lower. However, in consideration of the aforementioned theoretical hypothesis, the opposite effect occurred. Instead of a negative correlation, a positive weak significant correlation was observed; such that as IRI perspective-taking subscale scores increased, RTs modulated for perspective also increased. This suggests that as cognitive empathy increases, latency of dot perspective response also increases, which contradicts previous assumption proposed by Decety (2010) and others (Preston & de Waal, 2002). Perhaps, when taking into account the perspective of another, the cognitive workload increases resulting in a delay in making a response decision.

In summation, this study supported the hypothesis that higher-order processes of context override saliency of inconsistent dot locations during the dot perspective task. The results support the importance of using a two-system model of interconnected domain-general processes for higher-level information processing. Though saliency of the incongruent dots produced response delays, it was the context of the avatar's sightedness that produced the longest response delays, and modulated the observed self-consistency effect. Therefore, latency response is contingent on the explicit context of the avatar's sightedness (top-down), regardless of object location (bottom-up), as had been demonstrated in previous studies (Itti et al., 1998; Oliva et al., 2003; Wolfe, 1994).

Limitations, Implications and Future Research

Findings from this study contribute to the advancement of understanding what modulates the phenomenon referred to as the self-consistency effect and the cognitive processes that occur in daily life. A limitation for this study was the unavailability of a more extensive cognitive empathy self-report survey. Though significantly correlated, the strength of the relationship between RTs modulated for perspective based on the IRI perspective-taking subscale score was weak.

Future research into this topic should include a more substantial perspective-taking survey that contains more questions that access cognitive empathy abilities. In addition, future research should consider including neuroimaging during performance of the dot perspective task, such as electroencephalography to measure event-related potentials. Utilizing a scientific instrument known for its strength in temporal resolution would allow us to gain a better understanding of how different types of information (perspective, consistency, and context) are processed, to include the ability to see brain activity as it unfolds in real-time, at the level of milliseconds.

Every day we are asked to make quick judgments based on information given or not given. This study replicated findings from other's in the field of psychological science, yet exemplified a unique view into our cognitive processes with the addition of a contextual manipulation. In application, this study could be used to better understand how we process information and how the context of information influences how we learn when developing educational materials, implement new training methods for jobs that rely on visual search, and how we market products to consumers.

APPENDIX SECTION

APPENDIX A: CONSENT FORM

This project **IRB Reference Number 2015Y6246** was approved by the Texas Sate IRB on 8/12/2015. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB Chair, Dr. Jon Lasser (512-245-3413 – lasser@txstate.edu) and to Becky Northcut, Director of Integrity & Compliance (512-245-2314 – bnorthcut@txstate.edu).

Researcher: This research is being conducted by researcher Candice T. Stanfield (M.A. Psychological Research graduate student). This research is being supervised by Dr. Harvey J. Ginsburg (Professor of Psychology). If you have questions about this research, Ms. Stanfield can be reached via email at cts46@txsate.edu. Dr. Ginsburg may be reached via email at hg01@txstate.edu, or by phone at (512) 245-2526.

Purpose of the research: The purpose of this research is to learn something about how people differ in their perspective of a visual scene, either from their perspective (what they see), or the perspective of another (what they think someone else sees). Humans have a unique capacity for analyzing visual scenes, such as pictures or real-time images. Because of this, we ask people such as you to participate in this research in order to gain a better understanding of how people interpret visual information.

What you will do in this study: During this study you may be asked to look at pictures on a computer screen while seated, you may or may not be asked to wear a bandana over your eyes or on top of your head for a brief period, and you may be asked to answer questions and/or make judgments about visual scenes on a screen. During the study session, your responses during the computer-based task may be recorded. It is important that you answer all questions as quickly and as accurately as possible.

Time to complete the study: <u>This study session will last no more than a total of 45 minutes.</u> You will be asked to participate in a computer-based task that will take approximately 20 minutes to complete. Finally, you will be asked to complete a 28-item questionnaire that will take approximately 10 minutes to complete.

Compensation for participation: You will receive 2 course participation credits for participating in this study.

Risks: This study requires that you view visual scenes as you would in normal life (i.e., viewing images, making decisions, answering questions about what you see or what you think someone else might see from their vantage point). Therefore, there are no anticipated risks, beyond those encountered in daily life, associated with participating in this study.

Benefits: We hope that your participation in this study gives you some first-hand knowledge about how psychological research is conducted. The results from this research may also benefit society through an improved understanding of human visual processing. If you are interested in the results of this study, please contact the researcher (listed above) and she will be happy to provide you with a copy (or verbal explanation) of the results.

Voluntary Withdrawal: Your choice to participate in this study is completely voluntary, and you may withdraw from the study at any time without penalty (however, you will only be compensated for the time you have spent participating). You may skip over any questions or procedures, or you may withdraw by informing the research associate that you no longer want to participate (no questions will be asked). Your decision to participate, decline, or withdraw will have no effect on your status at, or relationship with Texas State University.

Confidentiality: Your participation in this study will remain confidential, and your identity will not be stored with your data. Your responses will be assigned a code number that is not linked to your name or other identifying information. We will keep your name only as a record that you were compensated and that you agreed to participate. Additional demographics kept for record will be age, sex, and their current student classification (i.e. undergraduate or graduate student); however, this information will not be linkable in any way to your identity. All responses, consent forms, and receipts will be stored for up to 7 years in a locked cabinet within the psychology research lab that can be accessed only by the Principal Investigator, Candice T. Stanfield, and the Supervising Professor, Dr. Harvey J. Ginsburg. After completion of this study, it is hoped that results will be published in a peer-reviewed scientific journal, and/or presented at a psychological convention/conference through a paper/poster presentation. However, individual recordings of responses will not be made available with the published results.

Funding: This research is not funded by any organizations or institutions outside of Texas State University.

Agreement: The purpose and nature of this research has been adequately explained to me and I agree to participate in this study. I understand that my responses may be recorded, and that I am free to withdraw from the study at any point. I also understand that I will receive a copy of this form to take with me, and if I should want to contact someone about this study, that information is listed on the top of this form.

______________________	______________________	______
Printed Name of Participant	Signature of Participant	Date
______________________	______________________	______
Printed Name of Researcher	Signature of Researcher	Date

APPENDIX B: INTERPERSONAL REACTIVITY INDEX

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multi-dimensional approach. *Journal of Personality and Social Psychology*, *44*, 113-126.

<u>Instructions:</u> The following statements inquire about your thoughts and feelings in a variety of situations. For each item, please indicate how well it describes you, where 0 means the statement does not describe you well, and 4 means that statement describes you very well. Answer as honestly as possible.

0-does not describe me well 4-describes me very well

1. I daydream and fantasize, with some regularity, about things that might happen to me.
   0 1 2 3 4

2. I often have tender, concerned feelings for people less fortunate than me.
   0 1 2 3 4

3. **(REV)** I sometimes find it difficult to see things from the "other guy's" point of view.
   0 1 2 3 4

4. **(REV)** Sometimes I don't feel very sorry for other people when they are having problems.
   0 1 2 3 4

5. I really get involved with the feelings of the characters in a novel.
   0 1 2 3 4

6. In emergency situations, I feel apprehensive and ill-at-ease.
   0 1 2 3 4

7. **(REV)** I am usually objective when I watch a movie or play, and I don't often get completely caught up in it.
   0 1 2 3 4

8. I try to look at everybody's side of a disagreement before I make a decision.
   0 1 2 3 4

9. When I see someone being taken advantage of, I feel kind of protective towards them.
   0 1 2 3 4

10. I sometimes feel helpless when I am in the middle of a very emotional situation.
    0 1 2 3 4

11. I sometimes try to understand my friends better by imagining how things look from their perspective.

0 1 2 3 4

12. **(REV)** Becoming extremely involved in a good book or movie is somewhat rare for me.

0 1 2 3 4

13. **(REV)** When I see someone get hurt, I tend to remain calm.

0 1 2 3 4

14. **(REV)** Other people's misfortunes do not usually disturb me a great deal.

0 1 2 3 4

15. **(REV)** If I'm sure I'm right about something, I don't waste much time listening to other people's arguments.

0 1 2 3 4

16. After seeing a play or movie, I have felt as though I were one of the characters.

0 1 2 3 4

17. Being in a tense emotional situation scares me.

0 1 2 3 4

18. **(REV)** When I see someone being treated unfairly, I sometimes don't feel very much pity for them.

0 1 2 3 4

19. **(REV)** I am usually pretty effective in dealing with emergencies.

0 1 2 3 4

20. I am often quite touched by things that I see happen.

0 1 2 3 4

21. I believe that there are two sides to every question and try to look at them both.

0 1 2 3 4

22. I would describe myself as a pretty soft-hearted person.

0 1 2 3 4

23. When I watch a good movie, I can very easily put myself in the place of a leading character.

0 1 2 3 4

24. I tend to lose control during emergencies.

0 1 2 3 4

25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.

0 1 2 3 4

26. When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me.

0 1 2 3 4

27. When I see someone who badly needs help in an emergency, I go to pieces.

0 1 2 3 4

28. Before criticizing somebody, I try to imagine how I would feel if I were in their place.

0 1 2 3 4

Note: **(REV) = Reverse scored.** Some scale items were reverse-scored so that higher numbers would reflect a stronger motivation to control prejudice. For example, if numbers 3 and 4 were chosen by a participant, they would be changed (reverse scored) to numbers 1 and 2, respectively.

Perspective-Taking: The tendency to spontaneously adopt the psychological point of view of others.
Items 3, 8, 11, 15, 21, 25, 28

Fantasy: Respondent's tendencies to transpose themselves imaginatively into the feelings and actions of fictitious characters in books, movies, and plays.
Items 1, 5, 7, 12, 16, 23, 26

Empathetic Concern: "Other-oriented" feelings of sympathy and concern for unfortunate others.
Items 2, 4, 9, 14, 18, 20, 22

Personal Distress: "Self-oriented" feelings of personal anxiety and unease in tense interpersonal settings.
Items 6, 10, 13, 17, 19, 24, 27

Higher scores indicate higher empathy (stronger ability to take perspective of others).

Lower scores indicate lower empathy (weaker ability to take perspective of others).

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