THIN(G)KING OUTSIDE OF THE BOX: HOW PERSON-THING ORIENTATION AFFECTS CATEGORIZATION PROCESSES

by

Regina R. Henares

A Thesis

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Master of Science

Department of Psychological Sciences

West Lafayette, Indiana

August 2020

THE PURDUE UNIVERSITY GRADUATE SCHOOL
STATEMENT OF COMMITTEE APPROVAL

Dr. William G. Graziano, Chair
Department of Psychological Sciences

Dr. Kipling D. Williams
Department of Psychological Sciences

Dr. Janice R. Kelly
Department of Psychological Sciences

Dr. Sebastien Hélie
Department of Psychological Sciences

Approved by:
Dr. Margo J. Monteith

ACKNOWLEDGMENTS

I would like to express my deepest appreciation and gratitude to my committee chair and academic advisor, Dr. William G. Graziano, for his undoubting support and mentorship during this process. Even during the times that my confidence in this project wavered as a result of the corona pandemic, Dr. Graziano remained steadfast in his belief in me and my ability to complete this research. Without his guidance and persistence, this thesis would not have been possible.

I would also like to thank my committee members, Dr. Janice Kelly, Dr. Kip Williams, and Dr. Sébastien Hélie. The input they provided from the proposal to the defense challenged and pushed me to develop my ideas further, think of innovative ways to solve problems, and perform more in-depth analyses. I would also like to thank my committee for their patience and cooperation when I had to make last minute changes to my initial proposal due to COVID-19.

Finally, I would like to thank my family and friends for their continuous encouragement throughout this whole process. I would not be the person I am doing the research I am doing without them. Thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Person-thing orientation (PTO) describes how interests in people (person orientation; PO) and things (thing orientation; TO) motivate behavior. These orientations have been shown to be predictive of important outcomes, but little is known about *how* these orientations work as motivational systems for behavior. The current paper explored whether different levels of PO and TO among participants affect individual categorizations of stimuli as "person-like" or "thing-like." Participants (N = 170) were asked to rate how person-like and thing-like they perceived 100 individual stimulus items to be, and their PO and TO scores were measured. I hypothesized that TO would predict higher ratings of stimuli as thing-like, especially when PO levels were lower, and that PO would predict higher ratings of stimuli as person-like, especially when TO levels were lower. I predicted that this pattern of results would be stronger among stimuli categorized as ambiguous than among stimuli categorized as an unambiguous person or thing. The findings did not support the main hypotheses. Instead, the person category stimuli showed the hypothesized pattern of results. Among these stimuli, PO predicted person ratings and TO predicted thing ratings (but in the negative direction). The results and implications of these findings were discussed.

INTRODUCTION

Person-thing orientation (PTO) is a motivational mechanism that describes how people orient themselves and attend to different aspects of the environment (Graziano, Habashi, Evangelou, & Ngambeki, 2012). PTO research suggests that there are two main orthogonal orientations—person orientation (PO) and thing orientation (TO)—and that these are motivational systems that have been shown to influence individual interests and ultimately, behaviors. Individuals high in PO tend to pay attention to the social aspects of their environments, whereas individuals high on TO tend pay attention to the physical aspects, but how do these individuals categorize the aspects in their environments as social or physical? Do individuals categorize these aspects in their environment differently or similarly to the other people around them? Recent research in PTO has worked to validate the constructs of PO and TO (Graziano, Habashi, Evangelou, & Ngambeki, 2012), establish their orthogonality (Graziano, Habashi, & Woodcock, 2011), and identify their important predictive outcomes (Branch, Woodcock, & Graziano, 2015; Woodcock et al., 2012). However, nothing is known about the mechanisms behind *how* interests in people and/or things may affect the processes of categorizing the stimuli in their environment as people or things. This is an important question to answer as it would allow us to better understand differences in how people may view and subsequently interact with their environments.

In the current paper, I proposed that there are differences in how people categorize the stimuli in their environment and that these differences in categorizations are associated with their individual levels of PO and TO. Specifically, this research explored whether individuals who are more people-oriented are more likely to categorize ambiguous stimuli as “people,” and whether individuals who are more thing-oriented are more likely to categorize these same stimuli as “things.”

Person-Thing Orientation

More than a century ago, Thorndike (1911) suggested that there were individual differences in how people attended to their environment based on whether they paid attention to the social or physical aspects around them. Almost half a century later, Cattell and Drevdahl (1955) explored these differences empirically and found that there was a negative association between attending to the physical and the social aspects of the environment, suggesting that they were bipolar opposites on a unidimensional scale. Indeed, up to today, orienting oneself to the social versus the physical aspects of the environment is still conceptualized as unidimensional in measures such as Holland's (1997) Hexagonal Model of Vocational Interests on the Realistic-Social dimension, which has been used extensively and continues to be used in research on occupational choice and interest.

In 1968, however, Little conceptualized these social-physical ways of how we orient ourselves in our environments as existing on two separate dimensions. He developed a scale that measured the two orientations on orthogonal continua. He further explored how these orientations may work as motivational mechanisms for behavior and coined the terms *person orientation* and *thing orientation*. Graziano et al. (2011) found support for Little's orthogonal conceptualization of PO and TO and refined his measure from 24 items to 13 items. This 13-item scale has become the standard in PO-TO research with outcomes that have been shown to predict college students' pursual of STEM majors (Ngambeki, Habashi, Evangelou, Graziano, Sakka, & Corapci, 2012), interest in engineering research (Branch, Woodcock, & Graziano, 2015), and post-college career plans (Woodcock, Graziano, Branch, Ngambeki, & Evangelou, 2012).

Another line of work in the PTO literature has explored the gender differences associated with these orientations; specifically, research has shown that men tend to be more thing-oriented and women tend to be more person-oriented. In a meta-analysis of sex differences in vocational interests, Su, Rounds, and Armstrong (2009) found that men prefer working with things and women prefer working with people—a finding that produced a sizeable effect size (d = .93). Woodcock and colleagues (2012) found similarly large effect sizes in their review of gender differences in the PTO literature. Across 7,450 participants in 15 samples, they found that women consistently scored higher than men in PO (mean d = .49) and that men consistently scored higher than women on TO (mean d = .99). They also found this similar pattern of gender differences in PO and TO cross-culturally (among U.S., Greek, and Turkish samples) and intergenerationally (among third graders, sixth graders, high school students, and college students).

Due to the relative novelty of empirical PTO research, much of the research in this field has focused on validating the constructs of PO and TO, and establishing their orthogonality. Therefore, little is known about the potential cognitive processes behind how and why interests in people or things may act as a motivational mechanism for behavior. McIntyre and Graziano (2016) were the first to develop and explore a potential conceptual process model to explicate the relationships between PTO, motivation, selective attention, and affective responses. Their model describes how interests in people and/or things may motivate behavior through selectively attending to person-related and/or thing-related stimuli. Selectively attending to certain stimuli that is congruent with interest may lead to positive affect which may then reinforce further interest and motivate future interest-related behavior. McIntyre and Graziano's (2016) model presents a novel mechanism within the PTO literature that explicates how personality may affect cognition, but this link between individual differences and cognition is not new. Past research has supported other integrative models of personality and cognition.

Individual Differences and Cognition

One topic of study that has integrated personality and cognition is intelligence. Ackerman (1996) proposed an integrative theory of adult intelligence called the PPIK model that captures four major components: intelligence-as-process, personality, interests, and intelligence-as-knowledge. Whereas in prior research, there were few instances where personality was indirectly implicated in the construct and development of intelligence, Ackerman (1996) explicitly proposed to add personality and interests as "critically related to the development of adult intelligence" (p. 237). He suggested that the five-factor personality dimension of Openness and the Realistic dimension of Holland's (1997) Hexagonal Model of Vocational Interests, the dimension from which TO developed, are both linked to intelligence (Ackerman, 1996; Ackerman & Heggestad, 1997). Ackerman's (1996) model sets a precedence for linking not only personality to cognition, but also, interests to cognition.

More recently, Ziegler, Danay, Heene, Asendorpf, and Bühner (2012) expanded on Ackerman's (1996) PPIK model and developed the Openness-Fluid-Crystallized-Intelligence (OFCI) model. The OFCI model states that openness fosters the development of fluid intelligence through the process of environmental enrichment where individuals who are higher on openness are more likely to experience new opportunities to learn. Simultaneously, fluid intelligence can positively affect the development of openness through environmental success where those higher in fluid intelligence have a higher probability of solving new problems and therefore, are more open to new experiences. Over time, fluid intelligence leads to crystallized intelligence and openness can also lead to the development of more crystallized intelligence through the mediating process of fluid intelligence. Rather than suggesting a cyclical process, this model suggests that personality and cognition can have direct effects on one another simultaneously (Trapp, Blömeke, & Ziegler, 2019). Building upon the OFCI model, Simon, Lee, and Stern (2020) explored the causal link between the Big Five personality traits (Goldberg, 1999) and various cognitive abilities over the adult lifespan and found robust evidence for personality-cognition associations. Taken together, this research suggests that personality can give rise to cognitive processes.

Further evidence for individual differences in cognition, specifically in categorization processes, can be derived from the cross-cultural literature in cognitive psychology. Nisbett and Miyamoto (2005) reviewed the literature on cultural differences in categorizations. They highlighted evidence that suggests that Western cultures are more likely to process their environments analytically and focus on salient objects whereas Eastern cultures are more likely to process their environments holistically and take into account the relationships between objects. They suggest that one explanation for these differences in categorizations may be due to exposure to "particular cultural practices and environments that encourage culturally specific patterns of attention" (pp. 471). This suggests that lived experiences may affect how individuals selectively attend to different stimuli which may then affect later categorization processes. Taken together with the McIntyre and Graziano (2016) study, these findings may suggest that one's interest in people and/or things could operate similarly to differences in culture in that it affects how one may experience and view the world. This in turn may then lead them to attend selectively to certain stimuli and subsequently to cause differences in categorization processes.

Indeed, a more recent paper by McIntyre and Graziano (2019), exploring how PTO manifests itself in everyday life, suggests that individuals with different levels of PO and TO view and experience the world differently. When participants were asked to photograph "anything, anyone, or any place" that was important in their life, the researchers found that individuals higher on TO took more photos of thing-related content. They also found that participants higher on PO took more photos of different types of media (e.g. books, movies, etc.) and photos expressing religious identity, which are examples of content relevant to social environments. This study suggests that PO and TO may influence how individuals may view the world around them. It is plausible that these differences in experience and perception may then affect how individuals categorize stimuli, especially when the stimulus is not clearly a person or a thing.

Ambiguous Stimuli

The use of ambiguous stimuli to interpret and measure individual differences dates back to the early years of social and personality psychology. The Rorschach inkblot task was developed by Swiss psychiatrist, Hermann Rorschach, in 1921 (Searls, 2017). Since then, it has become a controversial, if not polarizing, measure of personality and psychopathy due to issues debating the reliability, validity, and utility of the instrument (Meyer, 1999). The theory behind the Rorschach test is that the inkblots provide suggestive, rather than obvious, shapes that individuals perceive and interpret. Due to the ambiguity of the task, the interpretations of the inkblots inevitably differ between individuals and can theoretically reflect personal characteristics (Meyer, 2017).

Although Rorschach's inkblot measure itself may be questionable, the theory behind the use of ambiguous stimuli to create a setting in which individual differences can be apparent has been used in other measures. For example, the Thematic Apperception Test (TAT; Atkinson & McClelland, 1948) assesses an individual's underlying needs through their descriptive responses of ambiguous images. Individuals are thought to "project" their underlying motives on these ambiguous stimuli, therefore analyzing the responses to these stimuli can give insight into individual drives. In one of their preliminary studies on this projective process, McClelland and Atkinson (1948) found that participants' responses of ambiguous smudged images as objects related to eating (e.g. forks, plates, and knives) were positively related to their degree of hunger. In a subsequent study, Atkinson and McClelland (1948) showed participants pictures suggesting eating in varying degrees and then asked them to write a story about those pictures using guiding questions. The researchers found that participants deprived of food for the greatest number of hours more frequently mentioned food in their stories. What these studies suggest is that ambiguous stimuli, by the nature of their ambiguity, give room for interpretation by the individual, thereby providing a weak situation through which individual differences can arise.

It can be theorized that there are naturally occurring ambiguous stimuli in our environments which are made "ambiguous" by differences in how individuals interact with these stimuli. Perhaps among these types of ambiguous stimuli, perceptions of how person-like or thing-like these stimuli are can be predicted by individual differences in interest, such as PO and TO.

Animals as People; Animals as Things

Animals are often portrayed in the media and literature as being either thing-like or person-like. For example, *Animal Farm* by George Orwell (1945) tells the story of animals on a farm rising up against farmers and starting a revolution. In the novel, not only are the animals able to communicate, think, and feel for themselves like people, but they are intelligent and cognizant enough even to overthrow the humans. On the other hand, the character of Hedwig in the *Harry Potter* series (Rowling, 1999) is thing-like in how Hedwig's main role is to deliver Harry mail. The owl does represent some social support for Harry, but Hedwig is portrayed as lacking in any uniquely human abilities and whose main purpose is instrumental rather than emotional. Such depictions illustrate two prevailing and distinct viewpoints for how animals are perceived and categorized: as people or as things. Furthermore, the domestication of animals and the increasingly common treatment of animals as family members—sometimes to the extent that pet owners would choose to give a scarce drug to their pet over a human stranger (Cohen, 2002)—could further blur the line between person and animal.

Hills (1989) explored the relationship between PTO and perceptions of animals and found that individuals higher on PO were more oriented towards animals and were more likely to assign them person-related characteristics, whereas individuals higher on TO were less oriented towards animals and were more likely to assign them thing-related characteristics. Furthermore, research done by Jensen-Campbell and colleagues (2019) found that pet owners who were high in PO were more likely to report being attached to their dogs while pet owners high in TO were less attached to their dogs, even after controlling for Big Five personality differences. Similar to Hills' (1989) findings, the Jensen-Campbell et al. (2019) research suggests that higher attachment to pets for people high on PO may originate from viewing and categorizing their pets as people, whereas individuals high on TO may be less attached due to viewing their pets as things. Taken together, this research suggests that when stimuli, such as animals, are ambiguous and not clearly a person or a thing, individuals may be more likely to categorize these stimuli as people versus things depending on whether they are higher on PO versus TO.

Cellphones and Social Networks

Technology in general has allowed individuals to stay constantly connected to their social networks. This is especially true for cellphones, as its portable quality and wide-ranging abilities allow people to strengthen bonds and facilitate symbolic proximity to others (Wei & Hwei Lo, 2006). Recently, researchers have been identifying feelings of panic and anxiety among cellphone users when separated from their devices (Aoki & Downes, 2003; Clayton, Leshner, & Almond, 2015) and an increased sense of emotional reliance to their phones (Carter, 2015; Vincent, 2006). One study highlighted that the cellphone has "moved from being a mere 'technological object' to a key 'social object'" (pp. 111; Srivastava, 2005) and, indeed, cellphones have even come to be viewed as "friends" by some users (Harkin, 2003). In this way, cellphones can be considered ambiguous objects because of its blurred functions as both a technological tool and an essential medium for people to connect to their whole social network. In sum, there may be individual differences in how people categorize their cellphones and perhaps other types of social technology due to the ambiguity of its functions.

The Present Study

The present study explored how PO and TO would affect how individuals perceive and subsequently categorize their environments, predicting that higher levels of each orientation will predict higher ratings of stimuli as person-like and thing-like, respectively. Another aim of the study was to establish whether an ambiguous categorization exists, to quantify and operationally define ambiguity, and to test whether there are between-subject differences in how people categorize ambiguous stimuli.

Therefore, my main hypotheses were as follows:

1. TO will significantly predict higher ratings of stimuli as thing-like, above and beyond other personality factors, especially when PO levels are lower.
2. PO will significantly predict higher ratings of stimuli as person-like, above and beyond other personality factors, especially when TO levels are lower.

3. This effect of PO and TO on person and thing ratings, respectively, will be stronger among the stimuli in the ambiguous category than in the unambiguous person and thing categories.

In addition to exploring my main hypothesis, I also sought to answer the following exploratory research questions:

1. How will gender affect the relationships between PO and person ratings, and TO and thing ratings?
2. What will the pattern of results look like for the theorized ambiguous stimuli of pets, animals, technology, and other potentially ambiguous groups?

METHOD

Participants

Participants were recruited from the PSY120 Introduction to Psychology course at Purdue University. They received course credit for their participation in the study. An *a priori* power analysis revealed that a total sample size of 82 participants would be sufficient in obtaining 80% power with a small effect size (ρ = .09). However, due to a shortage of studies available for the subject pool participants to complete, researchers at my current institution were encouraged to collect more data than needed during the time that I was collecting data. As a result, I recruited 199 participants.

Of these 199 participants, 24 did not show up to participate; therefore, I collected data from 175 participants. I removed five participants because three of them indicated that they were below 18 years of age, and two of them gave the same response for every question (including those that were reverse scored) indicating that they were not paying attention. I included a quality check question at the end of the survey asking participants to indicate how accurate their responses to the questionnaire were from 1 to 3 (1 indicating that “my responses to this questionnaire were accurate,” 2 indicating that “my responses to this questionnaire were not entirely accurate,” and 3, indicating that “my responses to this questionnaire were completely false”). One hundred and fifty-seven participants rated 1, 13 participants rated 2, and no participants rated 3. After scrutinizing the responses of the 13 individuals that rated 2, I decided to still include them in my analyses as they passed most of my attention check indicators. This meant that my total sample size was left at 170 participants. A *post hoc* power analysis revealed that my sample (N = 170) gave an observed power of 90% (partial R^2 = .08).

Participants were between 18-25 years old with most participants (42.9%, M = 18.93) being 18 years old. In terms of gender, most participants identified as Male (50.6%), followed by Female (48.8%), and Gender Non-Conforming (.6%). In terms of race/ethnicity, most participants identified as Caucasian/white (68.8%), followed by Asian (22.9%), Hispanic (3.5%), Latinx/a/o (2.9%), African American/Black (.6%), Middle Eastern (.6%), or Other (.6%).

Measures and Materials

Person-Thing Orientation Scale

Thirteen items were used to measure level of PO and TO (Graziano et al., 2011). Participants were asked to rate “how much would you enjoy being in the following situations” on a scale from 1, “not at all,” to 5, “extremely.” The PTO scale is made up of 8 PO items ($\alpha = .70$) describing people-related situations (e.g. “listen in on a conversation between two people in a crowd,” “strike up a conversation with a homeless person on a street,” “notice the habits and quirks of people around you”) and 5 TO items ($\alpha = .89$) describing thing-related situations (e.g. “take apart and try to reassemble a desktop computer,” “Stop to watch a machine working on the street”). The order in which the participants were presented with these items was randomized.

Photo Stimuli

Participants were presented with 100 different photo stimuli. Photos of different targets were chosen from different photo databases, supplemented with images from Google Image. All the photos were standardized with the target stimulus centered in the frame with white backgrounds. Images of living and non-living stimuli were chosen from a database developed by Moreno-Martínez & Montoro (2012). Images of non-living stimuli were chosen from a database developed by Brodeur, Dionne-Dostie, Montreuil, and Lepage (2010). Images of the theorized ambiguous stimuli, such as animals and cellphones, were selected from Google Images, as well as pictures of people.

As exploratory stimuli, I included images of optical illusions that may show a person or thing depending on how it is viewed. Additionally, I explored how people view other living things that are not animals, such as trees, plants, and vegetables, and other technological items that are not cellphones, such as computers, tablets, and robots.

As I was interested in exploring individual differences in categorizations, I selected more images that would potentially produce more variability in responses, i.e. those that may be ambiguously categorized such as, animals and technological items. I also included stimuli that probably would not produce many individual differences in categorizations, such as people, everyday tools, and furniture.

Big Five Inventory - 2 (BFI-2)

Sixty items were used to measure the Big Five traits of openness (α = .82), conscientiousness (α = .85), extraversion (α = .89), agreeableness (α = .76), and neuroticism (α = .87), with 12 items measuring each trait (Soto & John, 2017). Participants were asked to indicate the extent to which they agree or disagree with different personality statements from 1, "disagree strongly," to 5, "agree strongly."

Demographic Information

Participants were asked to identify their gender(s), race(s) and ethnicity/ethnicities, age, year in school, and English fluency.

Procedure

The whole study was administered on the computer via the online survey platform, Qualtrics. Once participants read and signed the consent form, they were directed to an introductory page on the Qualtrics survey explaining the details and instructions of the study. Participants completed the PTO scale and the BFI and also did an image categorizing task. The order in which the participants completed the questionnaires and the image categorizing task was randomized. For the image categorization task, participants were presented with 100 photo stimuli one at a time, and then asked to indicate for each stimulus "how *person-like* they perceive the stimulus to be," from 0, not at all, to 10, completely, and "how *thing-like* they perceive the stimulus to be," from 0, not at all, to 10, completely. The photo stimuli were presented to participants in a randomized order and the order in which participants rated how person-like or thing-like the stimulus they perceived the images to be was also randomized. Finally, the participants completed the demographics questionnaire and were debriefed, concluding the study.

RESULTS

Analyzing Variability (Ambiguity) of Stimuli

In order to categorize the stimuli into categories of unambiguous person, unambiguous, thing, and ambiguous stimuli, I first needed to operationally define ambiguity. Ambiguity can be operationally defined as having more variability in between-participant responses and a classic way to assess variability of responses is by examining standard deviations (*SD*; Howell, 2012). Therefore, I treated each item as a case and calculated their *SD*s for the person ratings and thing ratings (see Table 1 for *SD*s of each stimulus item). The average *SD* for all the person ratings ($M = 2.51$) of all the items was slightly lower than that of the thing ratings ($M = 2.69$), which suggests that perhaps there was less variability among the person ratings than the thing ratings. The minimum and maximum *SD* values of the person ratings (min = 1.03, max = 3.35) were also lower than those of the thing ratings (min = 1.56, max = 3.44), again suggesting that there was less between-participant ambiguity for rating items as person-like than thing-like. In other words, participants may have been more likely to agree and rate the items in a similar way when evaluating how person-like an item is, however, there may have been more disagreement in rating the items on how thing-like they perceived them to be.

Upon examination of the individual *SD*s of each item, it seems that the *SD* values correspond to what would be theoretically characterized as ambiguous and non-ambiguous. The item description for the stimulus that had the lowest person rating *SD* was a “man (white young)” ($SD = 1.03$), while item description for the stimulus with the highest person rating *SD* was a “cross” ($SD = 3.35$). Descriptively, this suggests that the most unambiguously person-like stimulus was a white man, and the most ambiguously person-like stimulus was a religious cross. For the thing ratings, the item description for the stimulus with the lowest *SD* was an “arm chair” ($SD = 1.56$), while the item with the highest *SD* was a “basset hound” ($SD = 3.44$). This suggests that the most unambiguously thing-like item was an arm chair and the most ambiguously thing-like item was a basset hound dog. Furthermore, both the person and thing *SD*s were negatively correlated with their respective person and thing ratings. This suggests that higher ratings for both person and thing indicate less ambiguous stimuli and ratings closer to zero indicate more ambiguity.

Table 1. Means, Standard Deviations, and Difference Between Means for Person and Thing Ratings for Each Stimulus

		Person Rating (P-Rating)		Thing Rating (T-Rating)		Difference Between Mean
	Item Description	*M*	*SD*	*M*	*SD*	P-Rating and T-Rating
1	aloe	2.96	2.40	8.88	2.57	-5.92
2	android phone	2.30	2.24	10.20	1.82	-7.90
3	angel statue	6.66	3.01	8.01	2.72	-1.34
4	apple	2.37	2.23	9.17	2.68	-6.80
5	arm	8.74	2.61	4.51	3.17	4.23
6	arm chair	2.13	2.15	10.34	1.56	-8.21
7	avocado	2.28	2.40	9.51	2.38	-7.22
8	bat	3.83	2.55	7.16	3.08	-3.32
9	bone	5.81	3.24	7.47	3.05	-1.66
10	book	2.40	2.45	10.08	1.92	-7.67
11	brain	8.12	2.96	5.79	3.43	2.33
12	buffalo skull	2.65	2.32	9.02	2.56	-6.36
13	bunny	4.84	2.91	6.55	3.22	-1.71
14	butterfly	3.69	2.76	7.38	3.09	-3.69
15	cactus	2.74	2.31	8.98	2.48	-6.24
16	camera	2.35	2.32	10.18	1.78	-7.84
17	car	2.26	2.33	10.34	1.62	-8.09
18	kitten	5.20	3.03	6.43	3.27	-1.23
19	black cat	5.34	3.06	6.12	3.34	-0.78
20	grey cat	4.94	2.87	6.39	3.20	-1.45
21	tabby cat	5.18	2.97	6.41	3.36	-1.23
22	kitten clawing	5.32	2.99	6.16	3.31	-0.84
23	cedar	2.83	2.41	8.86	2.78	-6.03
24	chair	1.64	1.58	10.43	1.82	-8.80
25	cheetah	4.24	2.74	6.95	3.16	-2.72
26	cow	4.61	2.87	6.75	3.20	-2.14
27	crocodile	3.89	2.70	7.13	3.22	-3.24
28	cross	3.67	3.35	9.16	2.85	-5.49
29	computer	2.57	2.70	9.91	2.30	-7.34
30	basset hound	5.70	3.04	6.05	3.44	-0.35

Table 1 continues

	Item Description	Person Rating (P-Rating)		Thing Rating (T-Rating)		Difference Between Mean P-Rating and T-Rating
		M	*SD*	*M*	*SD*	
31	chihuahua	5.48	3.18	5.99	3.21	-0.51
32	labrador adult	5.97	3.17	5.67	3.44	0.29
33	pit bull	5.45	3.04	6.07	3.31	-0.62
34	labrador puppy	5.71	3.22	6.01	3.43	-0.31
35	doll	5.19	2.87	8.81	2.65	-3.62
36	dolphin	5.42	3.09	6.19	3.28	-0.77
37	camel	4.41	2.86	6.73	3.24	-2.32
38	ear	8.33	2.78	4.97	3.32	3.36
39	elephant	4.98	3.02	6.46	3.21	-1.47
40	eye	9.10	2.43	4.38	3.08	4.72
41	finger	8.52	2.72	4.46	3.15	4.06
42	goldfish	3.87	2.67	7.20	3.13	-3.32
43	fish	3.74	2.66	7.03	3.20	-3.29
44	fly	2.90	2.44	7.87	3.34	-4.97
45	foot	8.49	2.84	4.57	3.13	3.92
46	frying pan	1.52	1.40	10.38	1.89	-8.86
47	grand piano	2.35	2.40	10.11	1.91	-7.76
48	guinea pig	4.37	2.78	6.62	3.24	-2.25
49	hammer	1.67	1.66	10.38	1.82	-8.71
50	hand	8.83	2.55	4.23	3.05	4.60
51	hedgehog	4.60	2.82	6.80	3.21	-2.20
52	hen	4.09	2.72	7.10	3.16	-3.01
53	house phone	2.06	1.87	10.24	1.76	-8.18
54	horse	4.64	2.91	6.71	3.27	-2.07
55	optical illusion 1	5.17	2.89	8.01	2.52	-2.84
56	optical illusion 2	4.03	2.79	8.01	2.95	-3.98
57	optical illusion 3	5.45	2.70	7.84	2.60	-2.39
58	optical illusion 4	6.47	2.69	7.23	2.64	-0.76
59	optical illusion 5	7.24	2.59	6.92	2.65	0.32
60	ipad	2.53	2.53	10.15	1.73	-7.62

Table 1 continues

	Item Description	Person Rating (P-Rating) *M*	*SD*	Thing Rating (T-Rating) *M*	*SD*	Difference Between Mean P-Rating and T-Rating
61	iphone	2.75	2.75	10.17	1.76	-7.42
62	ladybug	3.09	2.28	7.62	3.13	-4.53
63	lamp	1.59	1.62	10.35	1.84	-8.77
64	laptop	2.45	2.40	10.14	1.85	-7.69
65	leg	8.72	2.65	4.31	3.00	4.41
66	lemon	2.34	2.23	9.38	2.50	-7.04
67	lobster	3.60	2.46	7.25	3.24	-3.65
68	man (south asian)	10.65	1.54	1.67	1.87	8.98
69	man (white old businessman)	10.70	1.45	1.75	2.13	8.95
70	man (racially ambiguous)	10.76	1.11	1.66	1.97	9.09
71	man (asian)	10.58	1.72	1.77	2.18	8.81
72	man (white young)	10.81	1.03	1.69	2.06	9.12
73	lips	8.76	2.54	4.35	3.03	4.42
74	mug	1.88	1.90	10.31	1.83	-8.42
75	pigeon	4.00	2.67	7.07	3.08	-3.07
76	house plant 1	2.94	2.37	8.91	2.68	-5.98
77	house plant 2	2.96	2.48	8.72	2.84	-5.76
78	house plant 3	2.94	2.37	8.58	2.83	-5.65
79	platypus	4.09	2.70	7.01	3.15	-2.91
80	tennis racquet	1.91	2.06	10.30	1.90	-8.39
81	rhino	4.18	2.80	6.68	3.26	-2.49
82	robot man	6.04	2.93	8.23	2.63	-2.18
83	robot woman	6.45	2.92	7.82	2.90	-1.36
84	starship	3.49	2.56	9.62	1.89	-6.13
85	robot child	4.66	2.87	8.94	2.45	-4.28
86	roomba	2.42	2.16	10.17	1.60	-7.75
87	shark	3.79	2.72	7.27	3.21	-3.48
88	human skull	7.90	2.92	6.45	3.34	1.46
89	snake	3.80	2.70	7.28	3.18	-3.48
90	teddy bear	2.84	2.41	9.92	1.82	-7.08
91	sunflower	2.90	2.44	8.79	2.78	-5.90

Table 1 continues

	Item Description	Person Rating (P-Rating) *M*	*SD*	Thing Rating (T-Rating) *M*	*SD*	Difference Between Mean P-Rating and T-Rating
92	tiger	4.79	3.04	6.55	3.33	-1.76
93	tongue	8.01	3.13	5.10	3.32	2.91
94	turtle	4.49	2.95	6.55	3.24	-2.06
95	optical illusion 6	7.24	2.75	6.11	3.01	1.13
96	woman (latina/white)	10.75	1.21	1.71	2.01	9.04
97	woman (black old)	10.71	1.44	1.66	1.86	9.05
98	woman (muslim hijab)	10.61	1.71	1.80	2.26	8.80
99	woman (asian business)	10.63	1.71	1.67	2.07	8.96
100	woman (white)	10.80	1.06	1.62	1.91	9.18

Examining the *SD*s allowed for descriptive inferences to be made; however, as I had two theorized unambiguous categories of people and things, analyzing *SD*s would not allow me to differentiate between an unambiguous person and an unambiguous thing. Therefore, I used the difference between the means of person ratings and thing ratings for each stimulus to produce a continuous score, from -11 to 11, that could allow me to quantify ambiguity and differentiate between unambiguous person and unambiguous thing. To do this, I subtracted the thing ratings from the person ratings; therefore, scores closer to -11 indicate more unambiguous thing ratings, scores closer to 11 indicate more unambiguous person ratings, and scores around 0 indicate more ambiguous ratings (see Table 1 for means and difference in means for person and thing ratings of each stimulus item).

Cluster Analysis

To create different categories of person, thing, and ambiguous, I performed a cluster analysis of the stimuli using a randomized subset of 50 participants. Cluster analyses are used to sort variables based on their similarities on one or more dimensions by maximizing within-group, and minimizing between-group, similarities (Henry, Tolan, & Gorman-Smith, 2005). Kaufman and Rousseeuw (2009) defined cluster analysis as "the art of finding groups in data" (pp. 1) and described the process as a way to classify similar objects into groups based on specific parameters.

I selected the mean difference scores between person and thing ratings as the clustering variable. I then conducted a k-means cluster analysis using SPSS, specifying a three-cluster solution to represent the three groups of unambiguous person, unambiguous thing, and ambiguous stimuli. Cluster 1 had a total of 34 stimuli in the grouping and included stimuli such as "frying pan," "chair," "lamp," and "hammer." Cluster 2 had 47 items and included stimuli such as "robot woman," "angel statue," "black cat," and "basset hound dog." Cluster 3 had 19 total stimuli and included all the photos of people and various person body parts, such as "eye," "finger," and "leg." The content of these clusters suggests that Cluster 1 contains the unambiguous thing stimuli, Cluster 2 contains the ambiguous stimuli, and Cluster 3 contains the unambiguous person stimuli (see Table 2 for stimuli descriptions of each cluster), but these cluster groups needed to be validated with the whole sample first before any concrete categories could be made.

Table 2. Item Descriptions of Stimuli in Clusters 1, 2, and 3

Cluster		
1	2	3
aloe	angel statue	arm
android phone	basset hound	ear
apple	bat	eye
arm chair	black cat	finger
avocado	bone	foot
book	brain	hand
buffalo skull	bunny	leg
cactus	butterfly	lips
camera	camel	tongue
car	cheetah	man (asian)
cedar	chihuahua	man (racially ambiguous)
chair	cow	man (south asian)
computer	crocodile	man (white old businessman)
cross	doll	man (white young)
fly	dolphin	woman (asian business)
frying pan	elephant	woman (black old)
grand piano	fish	woman (latina/white)
hammer	goldfish	woman (muslim hijab)
house phone	grey cat	woman (white)
house plant 1	guinea pig	
house plant 2	hedgehog	
house plant 3	hen	
ipad	horse	
iphone	human skull	
ladybug	kitten	
lamp	kitten clawing	

Table 2 continues

Cluster		
1	2	3
laptop	labrador adult	
lemon	labrador puppy	
mug	lobster	
roomba	optical illusion 1	
starship	optical illusion 2	
sunflower	optical illusion 3	
teddy bear	optical illusion 4	
tennis racquet	optical illusion 5	
	optical illusion 6	
	pigeon	
	pit bull	
	platypus	
	rhino	
	robot child	
	robot man	
	robot woman	
	shark	
	snake	
	tabby cat	
	tiger	
	turtle	

Validating Cluster Groups

To validate the three cluster groups, I ran a one-way repeated measures ANOVA comparing the mean difference of person and thing ratings across the three clusters, using the full dataset (N = 170). I found that there was a significant difference in the difference in mean person and thing ratings across the three clusters, $F(2, 338) = 1228.50$, $MSE = 6.71$, $p < .001$, $\eta^2 = .88$ (see Figure 1). Post hoc tests using the Bonferroni correction revealed that Cluster 1 (M = -7.14, SD = 2.60) had significantly lower differences in mean ratings than both Cluster 2 (M = -1.86, SD = 3.34; $p < .001$) and Cluster 3 (M = 6.65, SD = 2.55; $p < .001$). Cluster 2 also had a difference in mean ratings that was significantly lower than Cluster 3 ($p < .001$).

The same pattern of results emerged where there was a significant difference in the ratings between the clusters when analyzing just the person ratings as the dependent variable, $F(2, 338) = 1241.74$, $MSE = 1.83$, $p < .001$, $\eta^2 = .88$, and thing ratings, $F(2, 338) = 858.11$, $MSE = 2.16$, $p < .001$, $\eta^2 = .84$. Post hoc tests using the Bonferroni correction also revealed that all the ratings in the cluster groups were significantly different to one another at the $p < .001$ level (see Figure 1 for a graph of the results).

Based on the content of these clusters and the person ratings, thing ratings, and the difference between the person-thing ratings of each group, I could conclude that cluster 1 contained the unambiguous thing stimuli, cluster 2 contained the ambiguous stimuli, and cluster 3 contained the unambiguous person items.

Main Hypotheses

To analyze my main hypotheses, I ran multiple linear regressions using the PROCESS Macro V3.5 for SPSS (Hayes, 2017). There were two main models that I tested using different categories of stimuli. The two models were: 1) TO predicting thing ratings, moderated by PO, and 2) PO predicting person ratings, moderated by TO. Both regression models had the 5 dimensions of the BFI, extraversion, neuroticism, openness, agreeableness, and conscientiousness, as covariates in order to control for individual personality characteristics (refer to Table 3 for a correlation table of the predictors and covariates; refer to Table 4 for a summary of all the regression model statistics).

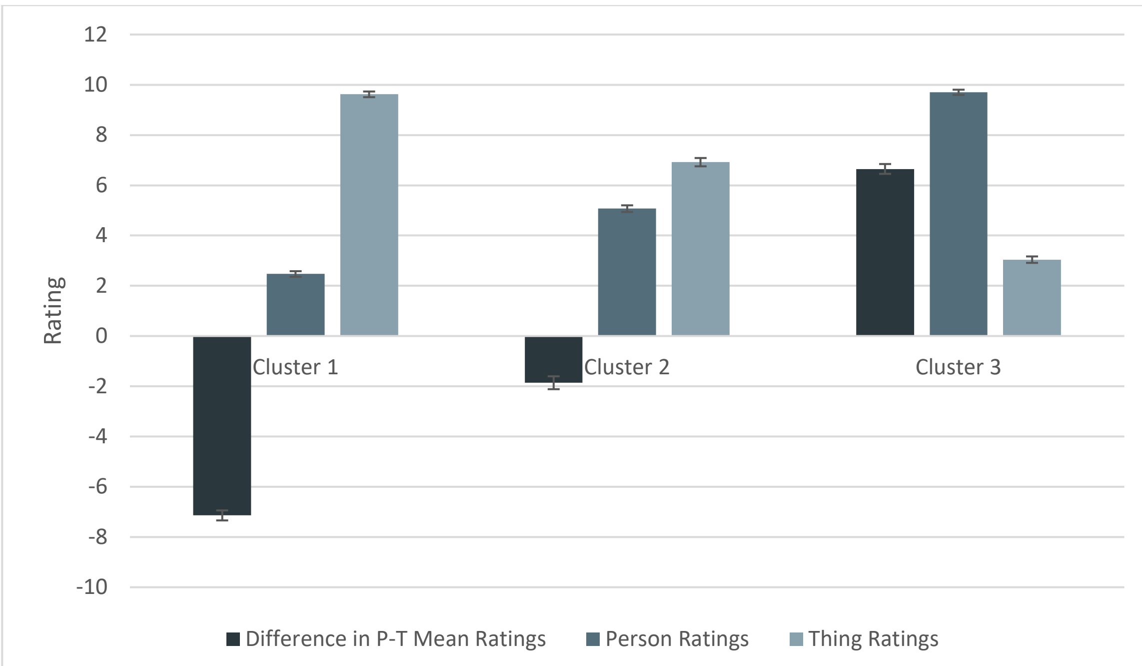

Figure 1. Graph showing the difference in ratings between the three cluster groups for the Difference in Person and Thing (P-T) Ratings, Person Ratings, and Thing Ratings.

Table 3. Means, Standard Deviations, and Correlations With Confidence Intervals of Main Predictors and Covariates

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. TO	2.39	1.07							
2. PO	3.15	0.61	-.06						
			[-.21, .09]						
3. Gender	0.51	0.50	.50**	-.17*					
			[.37, .60]	[-.31, -.02]					
4. Extraversion	3.27	0.76	-.08	.37**	-.22**				
			[-.23, .07]	[.24, .50]	[-.36, -.07]				
5. Agreeableness	3.81	0.52	-.21**	.18*	-.25**	.14			
			[-.35, -.07]	[.03, .32]	[-.38, -.10]	[-.02, .28]			
6. Conscientiousness	3.52	0.64	-.18*	.16*	-.18*	.25**	.36**		
			[-.32, -.03]	[.00, .30]	[-.32, -.03]	[.10, .39]	[.22, .48]		
7. Neuroticism	2.73	0.72	-.05	-.10	-.11	-.36**	-.31**	-.27**	
			[-.20, .10]	[-.25, .05]	[-.26, .04]	[-.48, -.22]	[-.44, -.17]	[-.40, -.12]	
8. Openness	3.70	0.61	.12	.31**	-.16*	.17*	.26**	.11	-.05
			[-.03, .27]	[.16, .44]	[-.30, -.01]	[.02, .31]	[.11, .39]	[-.04, .25]	[-.20, .10]

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014).

* indicates $p < .05$. ** indicates $p < .01$.

Table 4. Statistics for Each Multiple Linear Regression Models

	Stimulus Category	Dependent Variable	Predictor	Moderator	*F*	P value	R-squared
Hypothesis 1	All Stimuli	Thing Ratings	TO	PO	1.20	0.30^{NS}	0.05
Hypothesis 2	All Stimuli	Person Ratings	PO	TO	0.41	0.91^{NS}	0.02
Hypothesis 3	Thing	Thing Ratings	TO	PO	2.25	0.02*	0.10
		Person Ratings	PO	TO	1.73	0.09^{NS}	0.07
	Ambiguous	Thing Ratings	TO	PO	1.20	0.30^{NS}	0.06
		Person Ratings	PO	TO	0.39	0.92^{NS}	0.02
	Person	Thing Ratings	TO	PO	1.36	0.22^{NS*}	0.06
		Person Ratings	PO	TO	1.94	0.06^{MS*}	0.08
Exploratory Analyses	Person (controlling for gender)	Thing Ratings	TO	PO	1.54	0.14^{NS*}	0.08
		Person Ratings	PO	TO	1.82	0.06^{MS*}	0.09
	Pets	Thing Ratings	TO	PO	1.37	0.22^{NS}	0.06
		Person Ratings	PO	TO	0.69	0.70^{NS}	0.03

Table 4 continues

Stimulus Category	Dependent Variable	Predictor	Moderator	*F*	P value	R-squared
Animals (including pets)	Thing Ratings	TO	PO	1.32	0.24^{NS}	0.06
	Person Ratings	PO	TO	0.48	0.86^{NS}	0.02
Technology	Thing Ratings	TO	PO	1.28	0.26^{NS}	0.06
	Person Ratings	PO	TO	0.84	0.57^{NS}	0.04
Optical Illusions	Thing Ratings	TO	PO	1.35	0.22^{NS}	0.06
	Person Ratings	PO	TO	0.71	0.69^{NS}	0.03

All models have all 5 BFI dimensions as covariates.

* = significant at $p < .05$, ^{NS}* = model not significant but individual predictors are, ^{MS}* = marginally significant; *df*(8, 161)

Hypothesis 1

I predicted that overall TO would significantly predict higher ratings of stimuli as thing-like, above and beyond other personality factors, especially when PO levels are lower. To test this hypothesis, I ran a multiple linear regression with TO as the predictor, thing ratings as the dependent variable, and PO as the moderator. I also added the personality dimensions of the BFI, extraversion, conscientiousness, neuroticism, openness, and agreeableness, as covariates to control for any individual personality differences. The model was not significant, $F(8, 161) = 1.20$, $p = .30$, $R^2 = .05$, therefore this hypothesis was not supported.

Hypothesis 2

I predicted that overall PO will significantly predict higher ratings of stimuli as person-like, above and beyond other personality factors, especially when TO levels are lower. I ran another multiple linear regression with PO as the predictor, person ratings as the dependent variable, TO as the moderator, and the five BFI dimensions as covariates. This model was also not significant, $F(8, 161) = .41$, $p = .911$, $R^2 = .02$, therefore this hypothesis was not supported.

Hypothesis 3

I predicted that the effect of PO on person ratings and TO on thing ratings would be stronger among the stimuli in the ambiguous category than in the unambiguous person and thing categories. Therefore, I ran the same analyses for hypotheses 1 and 2 with the stimuli in the thing category (Cluster 1), and the ambiguous category (Cluster 2), and the person category (Cluster 3).

Thing category stimuli. As with hypothesis 1, I ran a multiple linear regression with TO as the predictor, thing ratings as the dependent variable, PO as the moderator, and the BFI as covariates. Although the model was significant, $F(8, 161) = 2.25$, $p < .05$, $R^2 = .10$, the individual predictors of TO ($B = .34$, $t(169) = .68$, $p = .50$), PO ($B = .71$, $t(169) = 1.60$, $p = .11$), and the interaction term ($B = -.14$, $t(169) = -.89$, $p = .37$), were all not significant. A second multiple linear regression with PO as the predictor, person ratings as the dependent variable, TO as the moderator, and the five BFI dimensions as covariates was not significant, $F(8, 161) = 1.73$, $p = .09$, $R^2 = .07$. Therefore, among the stimuli categorized as things, there was no evidence to support TO predicting higher ratings of stimuli as things when moderated by PO, and PO predicting higher ratings of stimuli as people when moderated by TO.

Ambiguous category stimuli. A multiple linear regression with TO as the predictor, thing ratings as the dependent variable, PO as the moderator, and the five BFI dimensions as covariates for the ambiguous category stimuli was not significant, $F(8, 161) = 1.20$, $p = .30$, $R^2 = .06$. Another multiple linear regression with PO as the predictor, person ratings as the dependent variable, TO as the moderator, and the five BFI dimensions as covariates was also not significant, $F(8, 161) = .39$, $p = .92$, $R^2 = .02$. Therefore, among the stimuli categorized as ambiguous, there was no evidence to support my hypothesis that TO would predict higher ratings of stimuli as things when moderated by PO, and PO would predict higher ratings of stimuli as people when moderated by TO.

Person category stimuli. A multiple linear regression with TO as the predictor, thing ratings as the dependent variable, PO as the moderator, and the five BFI dimensions as covariates, revealed that the overall model was not significant, $F(8, 161) = 1.36$, $p = .22$, $R^2 = .06$. However, the individual predictors were significant or marginally significant. TO scores significantly predicted lower ratings of the stimuli as thing-like among the person category stimuli ($B = -1.32$, $t(169) = -2.27$, $p < .05$). PO scores were marginally significant in predicting lower ratings of the stimuli in the person category as thing-like ($B = -.10$, $t(169) = -1.94$, $p = .054$). Finally, the interaction term was significant ($B = .37$, $t(169) = 2.07$, $p < .05$). A simple slopes analysis of the interaction term found that low levels of PO (1 *SD* below) had a significant negative relationship with ratings of stimuli in the person category as thing-like ($B = -.37$, $t(169) = -2.19$, $p < .05$). However, high levels of PO (1 *SD* above the mean) did not significantly predict ratings of stimuli in the person category as thing-like ($B = .08$, $t(169) = .50$, $p = .62$; see Figure 2 for graph of simple slopes analysis).

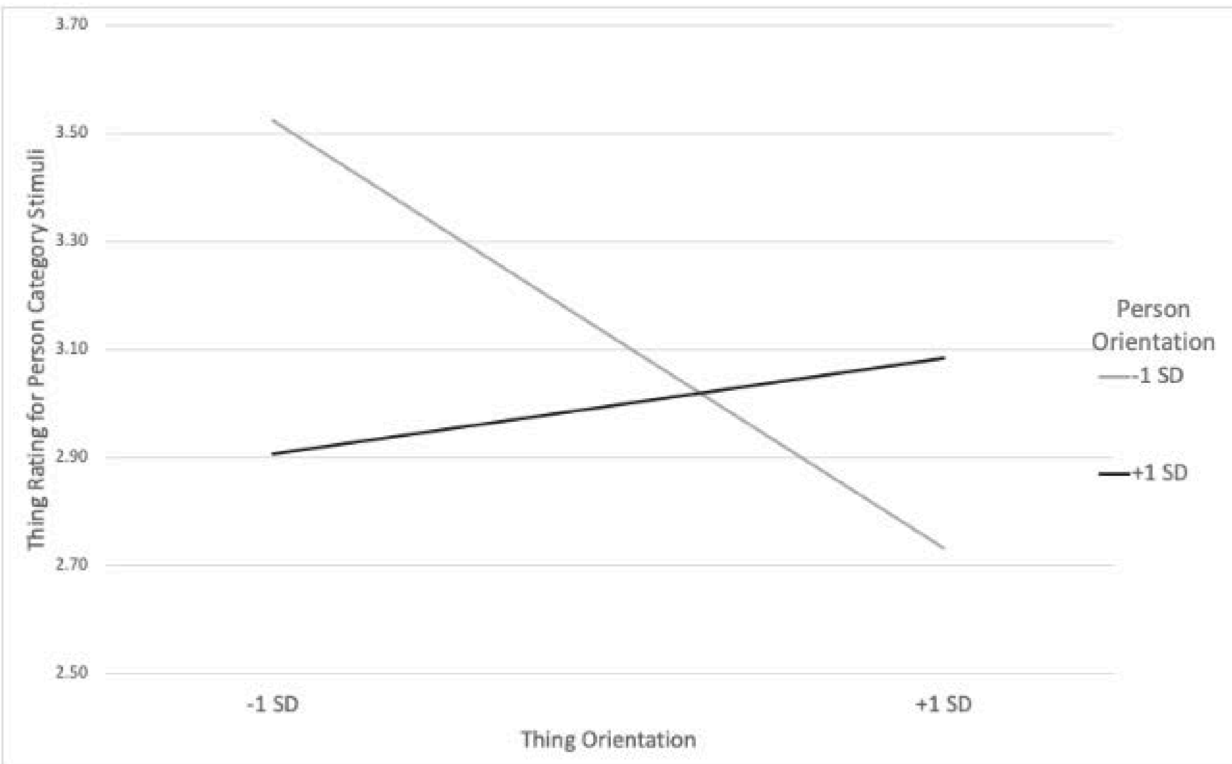

Figure 2. Graph showing relationship between thing orientation and thing ratings for person category stimuli, moderated by person orientation.

A multiple linear regression with PO as the predictor, person ratings as the dependent variable, TO as the moderator, and the five BFI dimensions as covariates revealed that the model was marginally significant, $F(8, 161) = 1.94$, $p = .056$, $R^2 = .08$. Upon examination of the individual predictors, I found that PO significantly predicted higher ratings of the person category stimuli as people-like ($B = 1.08$, $t(169) = 2.60$, $p < .05$). TO also significantly predicted higher ratings of the person category stimuli as people-like ($B = 1.00$, $t(169) = 2.15$, $p < .05$). Finally, the interaction term was also significant ($B = -.31$, $t(169) = -2.12$, $p < .05$). A simple slope analysis of the interaction term revealed that low levels of TO (1 SD below the mean) significantly predicted higher ratings of stimuli in the person category as person-like ($B = .67$, $t(169) = 2.59$, $p < .05$). However, high levels of TO (1 SD above the mean) did not significantly predict ratings of stimuli in the person category as person-like ($B = .02$, $t(169) = .07$, $p = .94$; see Figure 3 for graph of simple slopes analysis).

Overall, my results show that hypothesis 3 was not supported as the regression model with the ambiguous stimuli was not significant. However, the analyses did show an unexpected significant finding among the person category stimuli. These findings will be addressed in the discussion section.

Exploratory Analyses

This section of the results will report on exploratory analyses. As the nature of these analyses was exploratory, I had no *a priori* hypotheses for the following results.

Gender Differences

Past research has identified large gender differences in PO and TO, therefore, there may be a plausible alternative explanation that gender could account for the differences in the categorization processes observed. In order to rule out this alternative explanation, I ran further analyses to account for gender. The results from the main hypotheses show that both PO and TO predict person ratings and thing ratings among the person category stimuli. Therefore, I analyzed whether the gender of the participant affected these findings within the person category stimuli.

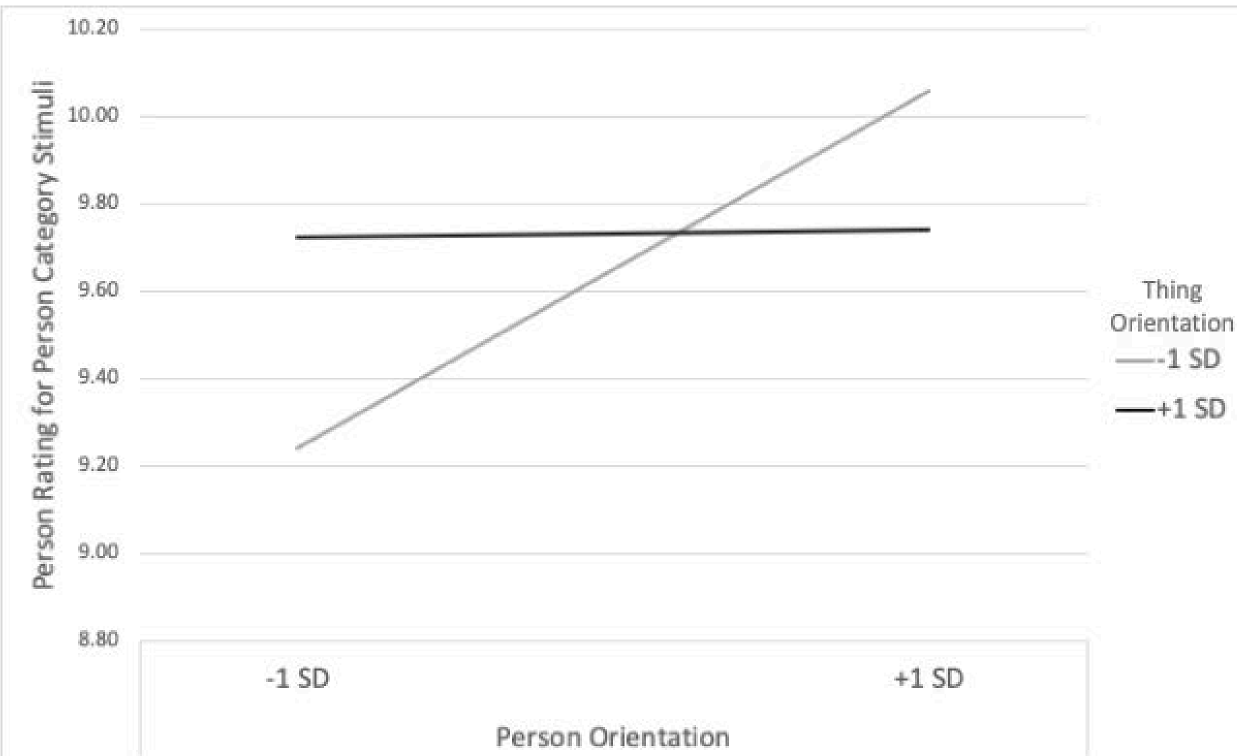

Figure 3. Graph showing relationship between person orientation and person ratings for person category stimuli, moderated by thing orientation

First, I analyzed whether there were any significant differences in PO and TO scores of men and women. An independent samples t-test revealed that there was a significant difference between the TO scores of men and women, $t(167) = -7.37$, $p < .001$, such that men on average (M = 2.91, SD = 1.04) had significantly higher TO scores than women (M = 1.85, SD = .81). There was also a significant difference in PO scores between men and women, $t(167) = 2.23$, $p < .05$, such that women on average (M = 3.25, SD = .60) had significantly higher PO scores than men (M = 3.05, SD = .61).

Second, I checked whether controlling for gender would change the significance of the regressions. For the ratings within the person category stimuli, I ran the same multiple linear regression with TO as the predictor, thing ratings as the dependent variable, PO as the moderator, and the five BFI dimensions as covariates, but added gender as another covariate. This analysis revealed the same pattern of results as the model that did not control for gender where the model was not significant, $F(9, 159) = 1.54$, $p = .14$, $R^2 = .08$., but the individual indicators of TO (B = -1.30, $p < .05$), PO (B = -1.07, $p < .05$), and the interaction term (B = .40, $p < .05$) were all significant. I then ran the same multiple linear regression as before with PO as the predictor, person ratings as the dependent variable, TO as the moderator, the BFI as covariates, and gender as an added covariate, and received a similar pattern of results to the model without gender as a covariate. The model was marginally significant, $F(9, 159) = 1.82$, $p = .06$, $R^2 = .09$, and the individual terms were significant and trending in the same direction (PO: B = 1.11, $p < .05$; TO: B = 1.00, $p < .05$; interaction term: B = -.32, $p < .05$). These analyses show that gender does not explain PO and TO predicting person and thing ratings because the results are still significant after controlling for gender.

Third, I analyzed the pattern of results again using a split file function on SPSS by gender to see gender differences between men (N = 86) and women (N = 83). I ran the same model to analyze the relationship between PO and person ratings for the person category stimuli (see Figure 4. in Appendix B for graph of results). For women, I found that, although the model overall was not significant, $F(8, 74) = 1.74$, $p = .10$, $R^2 = .15$, PO did significantly predict higher person ratings (B = 1.21, $p < .05$). TO (B = .60, $p = .53$) and the interaction term (B = -.20, $p = .50$) did not significantly predict person ratings. For men, the overall model was not significant, $F(8, 77) = 1.10$, $p = .38$, $R^2 = .10$, and the individual terms were also not significant (PO: B = .06, $p = .93$; TO: B = .38, $p = .56$; interaction term: B = -.11, $p = .61$).

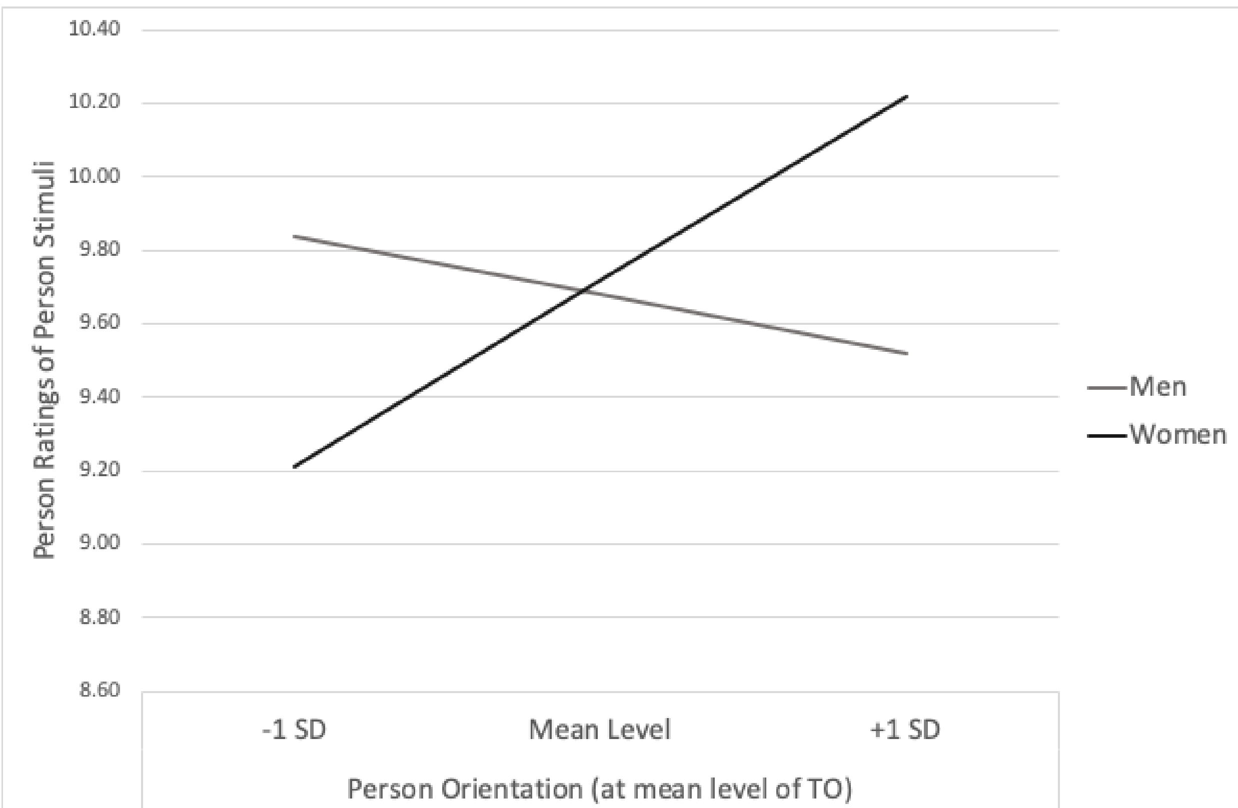

Figure 4. Graph showing relationship between person orientation and person ratings for person category stimuli (at mean level of thing orientation) by gender.

I then ran another regression model to analyze the relationship between TO and thing ratings for the person category stimuli. Both the models for women, $F(8, 74) = 1.67$, $p = .12$, $R^2 = .15$, and men, $F(8, 77) = .90$, $p = .52$, $R^2 = .09$, were not significant.

Pets, Animals, Technology, and Optical Illusion Stimuli

I wanted to analyze whether PO and TO would predict the person and thing ratings of the theorized groups of ambiguous stimuli (i.e. pets, animals, technology, and optical illusions). I ran the same regression models as previously where I regressed the person ratings of each stimuli group onto PO with TO as a moderator and the BFI as covariates, and thing ratings of each stimuli group onto TO with PO as a moderator and the BFI as covariates. There were no significant results (see Table 4).

DISCUSSION

Overall, my three main hypotheses were not supported. Across the whole stimulus set, PO did not predict higher ratings of stimuli as person-like, and TO did not predict higher ratings of stimuli as thing-like. When analyzing these hypotheses by stimulus category of person, thing, and ambiguous, I did not find that the ambiguous category produced the most robust findings; instead, I found that the person category produced the only significant effects.

There may be several reasons for this happening. Perhaps there was *too much* variability contributing to more "noise" among the person ratings (*SD* = 1.72) and thing ratings (*SD* = 2.15) for the stimuli in the ambiguous category, which caused the effect of PO and TO to be lost. One way to deal with this in future studies is to control for more variables, but then that raises the issue of, what is actually measured when the variance is partialed out? As for the thing stimulus category, perhaps there was too little variability in the person ratings (*SD* = 1.45) and thing ratings (*SD* = 1.47), therefore, leaving little room for individual differences to show.

Or perhaps my acquired pattern of results was an effect of the nature of the person stimuli. On average, individuals tend to be higher on person orientation than thing orientation. This was evident in the current sample where the mean score for TO was 2.38 (*SD* = 1.07), while the mean score for PO was higher at 3.15 (*SD* = .61). In addition, 18 participants (10.6%) had a mean score of 1 on the TO scale, whereas no participants had a mean score of 1 on the PO scale (the lowest score was 1.25, which was achieved by 1 participant). This suggests that perhaps the participants were overall more interested in the person stimuli and were perhaps paying more attention when those items were presented, leading to more accurate findings. The data were collected from a sample of students taking an Introduction to Psychology class, therefore, it may be likely that they would have taken the class due to an inherent interest in people, producing higher PO scores. Perhaps a future direction of this study could address collecting data from students studying more thing-related content, such as students taking a STEM course, in order to capture individuals with more varied interests.

Despite the data not supporting my overall hypotheses, I can still glean some information by analyzing the significant results I did find from the person category stimuli. Within the person stimulus category, TO significantly predicted ratings of stimuli as thing-like. PO moderated this effect such that at low levels of PO, higher TO significantly predicted lower thing ratings.

Although I did predict that TO would be significantly related to thing ratings when PO was low, I predicted that the relationship would be positive, not negative. Therefore, this finding goes against my hypothesized pattern of results. On the other hand, PO significantly predicted higher ratings of stimuli as person-like, and this effect was strongest when TO was low, which supports the predicted pattern of results.

One explanation for these results could be that those high on TO could tend to give lower person and thing ratings to stimuli. People high in TO tend to major in STEM fields, which would perhaps make them more analytical and less prone to rating the stimuli as unambiguously person or thing (which would be a rating closer to 10). Another explanation that both these findings could suggest is that among person category stimuli, PO has an effect on person ratings and TO has an effect on thing ratings, only when the other orientation is low. This suggests that there may be competing categorization processes for PO and TO where they get in the way of one another and are therefore only effective when there are low levels of the other orientation. However, further studies would need to be done in order to make this conclusion.

Exploratory Analyses

Gender Differences

I was also able to glean insightful information from the exploratory analyses, especially from the analyses related to gender differences. The findings suggested that the effect of PO and TO on person and thing ratings is not simply explained away by gender, as the models were still significant after controlling for gender. However, the results may suggest that women may be driving the effect of PO on person ratings because when the regression models were analyzed by gender, it showed that PO predicted person ratings in women, but not men. Considering that the women in my sample had significantly higher PO scores and significantly lower TO scores than men, this finding may suggest that PO predicts person ratings among those higher in PO and lower on TO, supporting my previous postulation of competing categorization processes. However, I did not find the opposite effect among men (who, on average, were higher in TO and lower in PO) where TO significantly predicted thing ratings. There were no significant results for the effect of TO on thing ratings for neither men nor women. This could suggest that PO is a stronger predictor of person ratings than TO is a predictor of thing ratings.

Pets, Animals, Technology, and Optical Illusion Stimuli

The specific groups of hypothesized ambiguous stimuli did not produce any significant results. Perhaps like the other stimuli in the ambiguous category, there was too much variability that the effect of PO and TO was lost. The SDs for the person and thing ratings of these groups ranged from 1.36 for the thing ratings for the technology stimuli, to 2.98 for the thing ratings for the pet stimuli.

Limitations and Future Directions

There were a few limitations to the design of my study. The biggest limitation was probably related to the method of rating person and things as measured by deliberate and conscious responses from the participants. This meant that participants could take their time to respond after making an evaluation. This is not typically how categorizations are made as the point of category systems is to "provide maximum information with the least cognitive effort" (Rosch, 2002, p. 252). Therefore, quick automatic responses would better reflect real categorization processes. A future study could explore whether more implicit and automatic categorization processes would show the predicted pattern of results, where participants are asked to categorize the stimuli as quickly as possible by pressing keys and then measuring their reaction times, much like an implicit association test (Greenwald, McGhee, & Schwartz, 1998).

Second, the rating scale itself may have been flawed. The participants were presented with the rating scales at the same time, with the scales stacked on top of one another. Though the order in which the scales were presented was randomized for each picture, the nature of clicking the scales on top of one another may have created an anchoring effect, such that the participants may have chosen very similar or very different ratings. The data suggest that the latter effect may have occurred because the person and thing ratings among all the stimulus categories were negatively correlated, with the overall correlation between all the person and thing ratings to be -.38 ($p < .001$). This suggests that perhaps people may have evaluated how person-like and thing-like a stimulus is to be bipolar opposites on a scale, ensuring that both ratings added up to 10. Therefore, this task may have inadvertently added an evaluative component to an otherwise automatic process therefore, the ratings may not accurately reflect how people actually categorize these stimuli. This negative correlation also suggests that perhaps the participants may have been implicitly conceptualizing people as "people" and things as "not people," or conversely, things as "things" and people as "not things." The former conceptualization is more plausible than the latter as the sample was more people-oriented and perhaps more attentive towards people stimuli. Again, a way to solve this issue in a future study would be to measure automatic categorization responses through reaction times to take away the evaluative component of rating something.

Another future direction for this study could be to focus solely on person stimuli and measure how PO and TO could affect the person and thing ratings of different demographics of people. Descriptively, among the person category stimuli, the man and woman images that produced the highest mean person ratings were the white young man (M = 10.81, SD = 1.03) and the white young woman (M = 10.80, SD = 1.06). The man and woman stimuli that produced the lowest mean person ratings were the Asian young man (M = 10.58, SD = 1.72) and the Muslim woman wearing a hijab (M = 10.61, SD = 1.71). The man and woman stimuli that produced the lowest thing ratings were the white woman (M = 1.62, SD = 1.91) and the racially ambiguous man (M = 1.66, SD = 1.97) and the man and woman that produced the highest thing ratings were the Asian young man (M = 1.77, SD = 2.18) and the Muslim woman wearing a hijab (M = 1.80, SD = 2.26). These results, though descriptive, are telling in that the people that received the lowest person rating and highest thing rating were an Asian man and a Muslim woman, two demographics of people who are often stigmatized and dehumanized (Everett et al., 2015; Poon & Ho, 2008). A future study could explore whether PO and TO predict person and thing ratings for different stigmatized demographic groups.

Conclusion

The current study broadens our understanding of the potential mechanisms involved in PO and TO in that they suggest that the two orientations may influence the categorization processes of person stimuli. Furthermore, the findings suggest that PO may be a stronger predictor than TO in predicting interest-congruent ratings. This finding is unique in the PTO literature as TO is usually found to be a stronger predictor than PO of various outcomes, such as career choice and persistence in a STEM major (Woodcock et al., 2012). Overall, the results of the current study provide a good basis of preliminary findings that could influence the development of compelling future studies, even though the main hypotheses were not supported. The significant, as well as the descriptive, findings suggest that there could be promising future directions in other areas of study apart from individual differences in social psychology, such as in the stereotyping and prejudice subfield and in cognitive psychology.

LIST OF REFERENCES

Ackerman, P. L. (1996). A theory of adult intellectual development: Process, personality, interests, and knowledge. *Intelligence*, *22,* 227–257.

Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin, 121*, 219–245.

Atkinson, J. W., & McClelland, D. C. (1948). The projective expression of needs. II. The effect of different intensities of the hunger drive on Thematic Apperception. *Journal of Experimental Psychology, 38*, 643–658.

Aoki, K., & Downes, E. J. (2003). An analysis of young people's use of and attitudes toward cell phones. *Telematics and Informatics, 20,* 349-364.

Bernard, P., Gervais, S. J., Allen, J., Campomizzi, S., & Klein, O. (2012). Integrating sexual objectification with object versus person recognition: The sexualized-body-inversion hypothesis. *Psychological Science, 23*, 469-471.

Branch, S. E. , Woodcock, A.. & Graziano, W. G. (2015). Person orientation and encouragement: Predicts interest in engineering research. *Journal of Engineering Education, 104*, 119-138.

Brodeur, M. B., Dionne-Dostie, E., Montreuil, T., & Lepage, M. (2010) The Bank of Standardized Stimuli (BOSS), a new set of 480 normative photos of objects to be used as visual stimuli in cognitive research. *PLOS ONE 5*: e10773 https://doi.org/10.1371/journal.pone.0010773

Carter, M. (2015). Me, my self, and I (T): Conceptualizing information technology identity and its implications. *MIS Quarterly, 39,* 931-957.

Cattell, R. B., & Drevdahl, J. E. (1955). A comparison of personality profile (16 PF) of eminent researchers with that of eminent teachers and administrators, and of the general population. *British Journal of Psychology, 46*, 248-261. doi:10.1111/j.2044- 8295.1955.tb00547.

Clayton, R. B., Leshner, G., & Almond, A. (2015). The extended iSelf: The impact of iPhone separation on cognition, emotion, and physiology. *Journal of Computer-Mediated Communication, 20*, 119-135.

Cohen, S. P. (2002). Can pets function as family members? *Western Journal of Nursing Research, 24*, 621-638.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Everett, J. A., Schellhaas, F. M., Earp, B. D., Ando, V., Memarzia, J., Parise, C. V., .Fell, B., & Hewstone, M. (2015). Covered in stigma? The impact of differing levels of Islamic head-covering on explicit and implicit biases toward Muslim women. *Journal of Applied Social Psychology*, *45,* 90-104.

Farah, M. J., Wilson, K. D., Drain, M., & Tanaka, J. N. (1998). What is" special" about face perception? *Psychological review*, *105*(3), 482-498.

Goldberg, L. R. (1999). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervield, I. J. Deary, F. De Fruyt, & F. Ostendorf (Eds.), Personality psychology in Europe (Vol. 7, pp. 7–28). Tilburg, The Netherlands: Tilburg University Press.

Graziano, W. G., Habashi, M. M., Evangelou, D., & Ngambeki, I. (2012). Orientations and motivations: Are you a “people person,” a “thing person,” or both?. *Motivation and Emotion, 36*, 465-477.

Graziano, W. G., Habashi, M., & Woodcock, A. (2011). Exploring and measuring differences in person-thing orientation. *Personality and Individual Differences, 51*, 28-33.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of Personality and Social Psychology*, *74*(6), 1464-1480.

Harkin, J. (2003). *Mobilisation: The growing public interest in mobile technology*. London, England: Demos.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: The Guilford Press.

Henry, D. B., Tolan, P. H., & Gorman-Smith, D. (2005). Cluster analysis in family psychology research. *Journal of Family Psychology*, *19*(1), 121-132.

Hills, A. M. (1989). The relationship between thing-person orientation and the perception of animals. *Anthrozoös, 3*, 100-110.

Holland, J. L. (1997). Making vocational choices: A theory of vocational personalities and work environments (3rd ed.). xiv. Odessa, FL: Psychological Assessment Resources.

Howell, D. C. (2012). *Statistical methods for psychology.* Boston, MA: Cengage Learning.

Jensen-Campbell, L. A., Hull, K., Heller, A. C., Garza, N. E., Receveur, A., & Graziano, W. G. (2019, March). *You think he's people: Person-thing orientation as a predictor of pet support in dog owners.* Poster session presented at Purdue University conference, West Lafayette, IN.

Kaufman, L., & Rousseeuw, P. J. (2009). *Finding groups in data: an introduction to cluster analysis* (Vol. 344). Hoboken, NJ: John Wiley & Sons.

Little, B. R. (1968). Psychospecialization: Functions of differential interest in persons and things. *Bulletin of the British Psychological Society, 21*, 113.

Maurer, D., Le Grand, R., & Mondloch, C. J. (2002). The many faces of configural processing. *Trends in Cognitive Sciences, 6*, 255-260.

McClelland, D. C., & Atkinson, J. W. (1948). The projective expression of needs: I. The effect of different intensities of the hunger drive on perception. *The Journal of Psychology, 25*, 205-222.

McIntyre, M. M., & Graziano, W. G. (2016). Seeing people, seeing things: Individual differences in selective attention. *Personality and Social Psychology Bulletin, 42*, 1258-1271.

McIntyre, M. M., & Graziano, W. G. (2019). A snapshot of person and thing orientations: How individual differences in interest manifest in everyday life. *Personality and Individual Differences*, *136*, 160-165.

Meyer, G. J. (1999). Introduction to the first Special Section in the Special Series on the utility of the Rorschach for clinical assessment. *Psychological Assessment*, *11*, 235–239.

Meyer, G. J. (2017). What Rorschach performance can add to assessing and understanding personality. *International Journal of Personality Psychology, 3,* 36-49.

Moreno-Martínez, F. J., & Montoro P. R. (2012). An ecological alternative to Snodgrass & Vanderwart: 360 high quality colour images with norms for seven psycholinguistic variables. *PLOS ONE 7*: e37527. https://doi.org/10.1371/journal.pone.0037527

Nisbett, R. E., & Miyamoto, Y. (2005). The influence of culture: Holistic versus analytic perception. *Trends in Cognitive Sciences, 9,* 467-473.

Ngambeki, I., Habashi, M. M., Evangelou, D., Graziano, W. G., Sakka, D., & Corapci, F. (2012). Using profiles of person—Thing orientation to examine the underrepresentation of women in engineering in three cultural contexts. *International Journal of Engineering Education, 38*(3), 621-632.

Orwell, G. (1945) *Animal farm*. New York, NY: Signet Classics.

Poon, M. K. L., & Ho, P. T. T. (2008). Negotiating social stigma among gay Asian men. *Sexualities, 11*, 245-268.

Reed, C. L., Stone, V. E., Bozova, S., & Tanaka, J. (2003). The body-inversion effect. *Psychological Science, 14*, 302-308.

Reed, C. L., Stone, V. E., Grubb, J. D., & McGoldrick, J. E. (2006). Turning configural processing upside down: Part and whole body postures. *Journal of Experimental Psychology: Human Perception and Performance, 32*(1), 73-87.

Righi, G., Peissig, J. J., & Tarr, M. J. (2012). Recognizing disguised faces. *Visual Cognition, 20*, 143-169. doi:10.1080/13506285.2012.654624

Rosch, E. (2002). *Principles of categorization*. In D. J. Levitin (Ed.), *Foundations of cognitive psychology: Core readings* (pp. 251-270). Cambridge, MA: MIT Press.

Rowling, J. K. (1999) *Harry Potter and the sorcerer's stone*. New York, NY: Scholastic.

Searls, D. (2017). The inkblots: Hermann Rorschach, his iconic test, and the power of seeing. Broadway Books.

Simon, S. S., Lee, S., & Stern, Y. (2020). Personality-cognition associations across the adult life span and potential moderators: Results from two cohorts. *Journal of Personality*, 1-15.

Soto, C. J., & John, O. P. (2017). The next Big Five Inventory (BFI-2): Developing and assessing a hierarchical model with 15 facets to enhance bandwidth, fidelity, and predictive power. *Journal of Personality and Social Psychology, 113*, 117-143.

Srivastava, L. (2005). Mobile phones and the evolution of social behaviour. *Behaviour & Information Technology, 24*, 111-129.

Su, R., Rounds, J., & Armstrong, P. I. (2009). Men and things, women and people: A meta-analysis of sex differences in interests. *Psychological Bulletin, 135*, 859-884.

Thorndike, E. L. (1911). *Individuality*. Boston, MA: Houghton Mifflin.

Trapp, S., Blömeke, S., & Ziegler, M. (2019). The openness-fluid-crystallized-intelligence (OFCI) model and the environmental enrichment hypothesis. *Intelligence, 73*, 30-40.

Vincent, J. (2006). Emotional attachment and mobile phones. *Knowledge, Technology & Policy, 19*, 39-44.

Wei, R., & Hwei Lo, V. (2006). Staying connected while on the move: Cell phone use and social connectedness. *New Media & Society, 8*, 53-72. doi: 10.1177/1461444806059870

Woodcock, A., Graziano, W. G., Branch, S. E., Habashi, M. M., Ngambeki, I. & Evangelou, D. (2013). Person and thing orientations: Psychological correlates and predictive utility. *Social Psychological and Personality Sciences, 4*(1), 116-123.

Woodcock, A., Graziano, W. G., Branch, S. E., Ngambeki, I., & Evangelou, D. (2012). Engineering students' beliefs about research: Sex differences, personality, and career plans. *Journal of Engineering Education, 101*, 495-511.

Yin, R. K. (1969). Looking at upside-down faces. *Journal of Experimental Psychology, 81*(1), 141-145.

Ziegler, M., Danay, E., Heene, M., Asendorpf, J., & Bühner, M. (2012). Openness, fluid intelligence, and crystallized intelligence: Toward an integrative model. *Journal of Research in Personality, 46*, 173–183.