KEEPING YOUR FRIENDS CLOSE: PERCEIVED DISTANCE AS A FUNCTION OF
PSYCHOLOGICAL CLOSENESS

Thesis
Submitted to
The College of Arts and Sciences of the
UNIVERSITY OF DAYTON

In Partial Fulfillment of the Requirements for
The Degree of
Master of Arts in Psychology

By
Sierra F. Corbin, B.S.

UNIVERSITY OF DAYTON
Dayton, Ohio
August 2017
KEEPING YOUR FRIENDS CLOSE: PERCEIVED DISTANCE AS A FUNCTION OF

PSYCHOLOGICAL CLOSENESS

Name: Corbin, Sierra Fontaine

APPROVED BY:

__________________________
Benjamin R. Kunz, Ph.D.
Committee Chair
Assistant Professor

__________________________
Greg C. Elvers, Ph.D.
Faculty Advisor
Associate Professor

__________________________
Erin M. O’Mara, Ph.D.
Faculty Advisor
Assistant Professor

__________________________
Lee J. Dixon, Ph.D.
Department Chairperson
Associate Professor
ABSTRACT

KEEPING YOUR FRIENDS CLOSE: PERCEIVED DISTANCE AS A FUNCTION OF PSYCHOLOGICAL CLOSENESS

Name: Corbin, Sierra Fontaine
University of Dayton
Advisor: Dr. Benjamin R. Kunz

Traditionally, visual-spatial perception research has focused quite heavily on the visual information necessary to perceive the environment and the locations of objects within that space. Recent research has illustrated that non-visual factors like emotional states, motivations, and physical abilities can affect both perceptions and behaviors within the environment. Social factors may also impact the way we see the space around us. This research investigates whether psychological closeness affects perceived egocentric (self-to-target) distance, an important component of spatial perception. Across two experiments, participants made several estimates of the distance between themselves and another “target” person. This target person represented either someone with whom the participant shared a relationship (his/her best friend), or a stranger (confederate Alex); I hypothesized that individuals’ feelings of psychological closeness to their best friends would lead to judgments of closer visual-spatial proximity to visual representations of their friends than to visual representations of a stranger. Though participants did indeed report feeling significantly greater levels of psychological closeness to their best friends,
there was no evidence that psychological closeness affected subsequent visual-spatial
distance judgments in the form of verbal reports of distance (Experiment 1), visual
matching of the distance (Experiment 2) or blindfolded walking to targets (Experiments 1
and 2). The contribution of these studies to the ongoing debate regarding the robustness
and resilience of non-visual contributions to spatial cognition are discussed in the context
of methodological limitations of the present studies and directions for future research in
this area.
Dedicated to my mom, Cynthia, whose unyielding love, support, and patience helped fuel the completion of this project and kept me grounded throughout this journey. Additionally, I owe much thanks to Dr. John Achee and Dr. Michelle vanDellen for introducing me to the wonderful world of psychology research and analysis and inspiring my continued interests thereof during my time at the University of Georgia.
ACKNOWLEDGMENTS

I owe an enormous thanks to Dr. Benjamin Kunz, my advisor, for lending the time, resources, and insight necessary to assist me in completing this project, and for always being encouraging, patient, and supportive throughout my time at the University of Dayton. I am immensely grateful to have been encouraged and inspired by his knowledge in the areas of sensation, perception, and cognition, allowing me to develop a unique set of research interests that I am excited to pursue moving forward!

I would also like to thank my thesis committee members, Dr. Erin O’Mara and Dr. Greg Elvers, for their insight, guidance, and patience throughout this process. I am beyond grateful for and inspired by the combination of perspectives on my committee and the support I’ve received from everyone involved!

Finally, I must thank the hardworking members of the Visual-Spatial Perception & Action Lab for working tirelessly over the past year to assist me in seeing this project to completion.
# TABLE OF CONTENTS

ABSTRACT ................................................................................................................................. iv
DEDICATION ............................................................................................................................. vi
ACKNOWLEDGMENTS ............................................................................................................. vii
LIST OF TABLES ....................................................................................................................... ix
INTRODUCTION ...................................................................................................................... 1
EXPERIMENT 1: METHOD ....................................................................................................... 13
EXPERIMENT 1: RESULTS ....................................................................................................... 17
EXPERIMENT 2: METHOD ....................................................................................................... 20
EXPERIMENT 2: RESULTS ....................................................................................................... 23
GENERAL DISCUSSION .......................................................................................................... 27
REFERENCES ........................................................................................................................... 34

APPENDICES

A. “My Best Friend & I” Questionnaire .................................................................................. 40
B. “About Alex” Info Sheet ..................................................................................................... 42
C. “Alex & I” Questionnaire .................................................................................................. 43
LIST OF TABLES

Table 1. Descriptive Statistics for Raw & Accuracy Data of Verbally-Reported Distance Estimates by Target Type and Target Distance [Experiment 1]........................18

Table 2: Descriptive Statistics for Raw & Accuracy Data of Blind-walking Distance Estimates by Target Type and Target Distance [Experiment 1]..........................18

Table 3. Descriptive Statistics for Raw & Accuracy Data of Visually-Matched Distance Estimates by Target Type and Target Distance [Experiment 2]......................24

Table 4: Descriptive Statistics for Raw & Accuracy Data of Blind-walking Distance Estimates by Target Type and Target Distance [Experiment 2]...............................24
INTRODUCTION

Spatial perception relies on detecting and processing visual information about the three-dimensional layout of the environment, including the people and objects within it. In particular, spatial awareness requires perceiving the positions of objects around us as well as the distances between us and those objects (egocentric distance). While the visual cues necessary to perceive distance are reasonably well-understood, recent research has focused on the effects of non-visual input on spatial awareness. In fact, there is increasing interest in determining how various factors like bioenergetic states, emotions and motivational factors may affect spatial perception. Current efforts have yet to fully explore the extent to which psycho-social factors affect the way we spatially perceive and interact with stimuli. As a result, the current research seeks to investigate the effects of psychological closeness on visual-spatial distance perception, thus adding to the small but growing knowledge of how non-visual factors scale our perceptual judgments.

Non-visual Determinants of Visual-Spatial Perception

Although the retina is functionally a two-dimensional surface, we perceive a three-dimensional world. Cue integration theory suggests that a combination of ocular-motor information, pictorial depth cues (correlates of depth available from 2-dimensional projections such as relative size and height, texture information, and occlusion), binocular disparity (the difference in the location of the image on each retina as a result of the space between the eyes), and motion parallax (depth information available as a function of
movement), give rise to the perception of depth and distance. Cutting and Vishton (1995) characterized three regions of space that correspond to the utility of these depth cues across egocentric distances: personal space, action space and vista space. Personal space refers to the space that lies within arms’ reach of an individual, usually occurring within two meters. Visual perception in personal space serves actions such as reaching and grasping, including intimate interpersonal interactions such as hugging, shaking hands, or holding conversations. Within personal space, the depth cues of occlusion, relative size/density, convergence, accommodation, and retinal disparity provide the most useful relative or absolute distance and depth information for guiding precise motor actions.

Action space exists within two and thirty meters of the individual—just beyond personal space. Most locomotor and navigational tasks require perception of action space. In an interpersonal context, action space encapsulates activities such as walking, talking, and tossing/throwing to another individual. Depth cues useful in action space include occlusion, relative size/density, height in the visual field, binocular disparity, and motion perspective; accommodation and convergence, however, are not useful in action space.

Outside of action space exists vista space, which is any space beyond 30 meters. In vista space, many of the benefits of perceiving layout are greatly diminished, likely due to the extreme distance from the individual and the lack of immediacy the distance evokes. As a result, vista space distance judgments are less-accurate than those taking place within personal and action space. Similarly, the depth cues useful in vista space include the secondary or pictorial cues of occlusion, relative size/density, height in the visual field, and aerial perspective; these cues provide only relative depth information. Because of its
relevance to interpersonal interaction, the current research focuses on understanding how non-visual cues may scale our judgments of layout in action space.

Although visual-spatial perception research has historically revolved around the investigation of the use of visual stimuli and cues to perceive three-dimensional space, recent research has begun investigating the roles of non-visual factors in perception. A growing body of research suggests that various physical, motivational, and emotional factors can influence how we see the environment and objects within it. Proffitt (2006) reviewed a collection of studies that examined the effects of bodily states and motivation on various visual-spatial judgments, such as perceived object size, distance, and geographic slant (the steepness of a hill or incline). This research suggests that one’s energy level or potential to act influences the way one perceives the environment. For example, individuals who wore a heavy backpack or made spatial judgments after using a treadmill judged distances as farther (Proffitt, Stefanucci, Banton & Epstein, 2003) and hills as steeper (Proffitt, Bhalla, Gossweiler & Midgett, 1995) than those who were not encumbered or fatigued. Similarly, in a study by Linkenauger, Witt, Stefanucci, Bakdash, & Proffitt (2009), participants that held heavy weights while attempting to reach toward a target reported target objects to be farther away than those participants who were not holding weights. Collectively, these studies suggest that our perceptions of distance and steepness may rely not just on seeing the environment, but also on our perceptions of the effort required to traverse a distance or incline. More specifically, Proffitt and Linkenauger and colleagues have suggested that, especially when interaction with a target is specifically requested or required to achieve a goal, the effort required for that interaction influences the way we perceive the target. Depending on the particular
response a stimulus requires, our perceptions of the world around us are processed in a way that narrows our attention in favor of those things we deem as relevant or in need of our immediate focus, especially when those things are related to the completion of some goal or task.

In a similar fashion, Witt, Proffitt and Epstein (2004) also studied the effects of motivation on perceptions of distance, focusing on effort and intent. Witt and colleagues (2004) provided evidence that the process of perceiving egocentric distance is a function of both analyzing optically-specific geometric information about the surrounding spatial layout as well as acknowledging one’s behavioral goals and anticipated ability to perform goal-related tasks. As a result, optic information does not provide the only information with which to scale perceptions; anticipating and engaging in actions related to the target also helps to scale the visual-spatial layout. Notably, their results suggest, however, that action and intent only affect conscious judgments of visual-spatial distance scaling and are specific to the particular function necessary to interact with the target in a goal-oriented fashion. In other words, these non-visual factors do not influence distance judgments globally but are specific to goal-relevant spatial judgments.

Similarly, Witt, Proffitt and Epstein (2005) showed that intent and ability also work to scale judgments of distance, with the ability to interact with a target at its location providing an action-based scaling metric. Specifically, this study illustrated that when participants reached toward a target with a baton, they judged the distance to the target as closer than when reaching without the aid. They also found that targets within the participants’ reach appeared closer than those that were out of their reach. However, they found that the function of an aid played a role in the participant’s ability to scale
judgments; when the baton was held but not used to reach, there was no reduction in perceived distance to the target. Witt and colleagues (2005) referred to this phenomenon in terms of affordances, the combination of anticipating effort and ability in regard to interacting with a target. Their findings are consistent with the notion that affordances are fine-tuned to the potential for action and very sensitive to the boundaries for which said action is possible. More recently, Witt (2011) speculated that planning for future actions helps to avoid failed attempts to interact with a target due to a lack of ability by streamlining the attention we place on surrounding objects to focus on goal-oriented, precise actions. Ultimately, affordances motivate goal-oriented actions with a target when the target is “afforded” a trait related to successful completion of the goal, such as “reachability” being afforded to a target that needs to be grabbed.

**Motivation as a Determinant of Visual-Spatial Perception**

Because one of the functions of perception is to assist in directing our interactions with the outside world, there is a growing appreciation for the role that goal-related motivations might play in the spatial perception of goal-relevant objects (Balcetis, 2016). For instance, an approach-motivated orientation increases feelings of desire for objects and should lead to the perception of the objects of those desires as proximal. This suggests that we should exhibit an approach-oriented motivation when the stimulus presented is a loved one or romantic interest rather than a stranger or enemy and, as a result, we would perceive the loved one or romantic interest as closer to ourselves spatially. Balcetis and Dunning (2010) utilized this explanation of how motivation influences visual attention in the development of their theory of “wishful seeing.” According to this theory, objects we consider more desirable appear closer in proximity.
than those that we consider less desirable. Dunning and Balcetis (2013) observed differences in perceptual judgments when manipulating the desirability of a stimulus. When participants ate pretzels prior to reporting an estimate of the distance between themselves and a nearby bottle of water they reported shorter estimates compared to those who did not consume any pretzels.

Similarly, social psychology theories have suggested that various social factors can affect the relationship between the perceiver and the physical and social environment. For example, interpersonal attraction influences many of our decisions and actions, from evaluating friendships (Morry, 2007) and interacting in groups (Krause, Back, Egloff, & Schmukle, 2014) to determining how to react in ambiguous situations; both visual and non-visual perceptions of those individuals and groups play roles in guiding our social behaviors. Hence, researchers have sought to determine more concretely the connections between what we are socially attracted to and how we spatially perceive those people or things. Dollar and Miller (1950) stated that attraction can be seen as an approach-motivated orientation, in that when presented with a stimulus that we are attracted to, it is most likely that we will direct behaviors and actions toward the stimulus rather than suppressing those behaviors or acting in a manner that would distance us from the stimulus. For example, when a person sees his or her relationship partner or friend, it is logical for that person to hug them or go over to them and have a conversation; it would seem contradictory to the idea of approach-motivated orientation, then, for someone to see his or her partner or friend and run away or avoid interacting with the person. Because of this approach-motivation, it is likely that a person would also view their friend or partner as being closer in egocentric proximity; following the same logic that we
are attracted to desired and familiar objects, familiar individuals may also be judged as *physically* closer due to the viewer’s desire to be closer to and interact with those individuals.

Additional research by Pitts, Wilson and Hugenberg (2013) speaks to avoidance-oriented motivations, suggesting that, after the loss of a desired source of interpersonal support, a desire to avoid further feelings of inadequacy can lead one to perceive future sources of support as more proximal. In their research, when a participant’s task partner left the study prematurely, the participant perceived distances to a new individual as shorter when told that the individual could take the place of the participant’s previous partner. Taking this finding a step further, it was seen that those participants who were then instructed to toss a beanbag to the potential new partner tended to underestimate the distance between themselves and the person, resulting in a shorter toss to the other individual. These findings further indicated that approach and avoidance motivations alter how we see and interact with desired stimuli. Overall, these studies suggest that our motivations may play a role in how we perceive visual-spatial layout.

**Affect as a Determinant of Visual-Spatial Perception**

In addition to motivational factors and consistent with the aforementioned notion of “wishful seeing” is the “affect-as-information” hypothesis, which asserts that our affective responses motivate the orientation of our attention to a stimulus. Morgado, Muller, Gentaz and Palluel-Germain (2011) sought to determine if increased affective closeness—feelings of connectedness and belongingness with other individuals—resulted in a reduction in the perception of distance between two people they liked. If a participant felt close to the individuals, he/she would anticipate being able to pass between them at
smaller distances due to an absence of feelings of personal space violation. Conversely, if a participant disliked the individuals he/she intended to walk between, the participant should judge the distance needed as greater, to avoid violating his/her own personal space in the process. Their findings supported the idea that affective closeness can alter perceptions of space through an exocentric—or target-centered—distance measure, and provides a substantial basis for further inquiry into the influence of social interaction on perception, especially from an egocentric—or viewer-centered—distance. This distinction between exocentric and egocentric is important because there may be an observable difference in the way individuals judge a distance between two targets (exocentric) and the way a distance is judged from an individual to a target (egocentric).

Zadra and Clore (2011) explored a further application of the affect-as-information hypothesis within a social context, suggesting that social information works to fine-tune our perceptions of people and situations. Considering the meaning or emotion evoked by the stimulus, we may classify things as important and, therefore, worthy of our attention. For example, a close friend or favorite food considered as pleasant would draw the focus of our attention. This phenomenon occurs because a familiar person or object tends to elicit stronger meaning and/or emotion than someone or something that is unfamiliar, thereby becoming salient and requiring additional perceptual processing. Zadra and Clore’s research suggests that emotions provide embodied information about the costs and benefits of interacting with a stimulus to determine the most-economical course of action and avoid loss or harm.

Along those lines, research on threat perception has provided more support for the reliance on affective and emotional information in the calibration of our perceptual
processes in times of uncertainty; Cole, Balcetis, and Dunning (2013) demonstrated that affective signals of threat influence visual-spatial information. Across two studies they found that, when faced with a threat-inducing target—an aggressive male student in the presence of a female participant—participants reported the target as being egocentrically-closer than when the target was not threatening, but was instead disgusting. They speculated that perceptual processes involve estimating the likelihood of harm that may result from engaging with a threatening target; the urgency of reacting to a potentially harmful target (fleeing or avoiding) is amplified by perceiving the target as closer than it is. Relatedly, Riener, Stefanucci, Proffitt and Clore (2011) illustrated an influence of mood on visual perception by investigating the effect of music (study one) and previous experiences (study two) on perceptions of geographic slant. Their findings revealed that, after hearing sad music or writing about a negative personal experience, participants estimated hills to be steeper than individuals who heard happy music or wrote about a positive experience. These findings are consistent with the idea that emotional responses to external stimuli can affect perceptions of a target, perhaps to heighten our awareness of the threat posed by a potentially harmful target or the value presented by a potentially beneficial target.

**Social Factors as a Determinant of Visual-Spatial Perception**

Although interpersonal factors have received less investigation as cues that may impact the perception of spatial layout, there have been studies that have implicitly acknowledged an interplay between interpersonal closeness and physical closeness. For example, a social influence on distance judgments is inherent to the notion of *proxemics*, the ways that individuals define and organize their personal and social space (Hayduk,
Classic proxemics studies have sought to characterize individuals’ definitions of personal space and perceived violations of—or intrusions upon—that protected space. For example, when presented with several available chairs, an individual will select a chair that provides a buffer between him/herself and another individual; stop distance for an approaching individual is also shorter when the individual is a familiar or known person, since we tend to allow people we know to walk closer to us and share our personal space. In general, individuals place less interpersonal space between themselves and another individual when the target is a friend than when the target is a stranger.

Bailenson, Blascovich, Beall, and Loomis (2003) extended these findings by investigating proxemics in virtual reality. When interacting with a virtual character, participants maintained interpersonal distance that resembled the personal space boundaries employed in actual human-to-human interactions in the real world. Additionally, the threshold for personal space was reduced when interacting with a realistically-behaving agent (based on eye gazing and blinking behaviors). Still, avatars (virtual humans being controlled by another human) had lower thresholds for personal space than agents (computer-controlled virtual humans); in other words, when approached by human-like avatars and agents, participants were more likely to back away from a human-like agent than an avatar; this is likely due to the belief that a virtual human controlled by a sentient being would be less-likely to behave in a non-human fashion when compared to a computer-driven being. Overall, the proxemics literature suggests that needs for personal distance change with affiliation or familiarity with a target. Furthermore, this work suggests that social dynamics impact behaviors that rely on perceiving egocentric distance.
While the current literature and existing theories provide support for the notion that social and interpersonal factors influence visual-spatial perception, thus far there has been little attention paid directly to the relationship between psychological closeness and visual-spatial perception. In one of the few examples of this influence of psychological closeness on spatial perception, Faulkner and Clore (2012) studied the effects of the presence of a supportive or unsupportive friend on various measures of perception using a method that incorporated the use of the popular social media platform Facebook. In the study, immediately after participants viewed an online picture of either a supportive or unsupportive friend, the participants judged the slant of a hill while keeping the friend’s photo in partial view. When viewing a supportive friend—defined as a good friend to the participant—the judged geographical slant of the hill was reduced; even though, in this case, the friend was not the one being seen from a target distance, the mere presence of a supportive member of the participant’s online social circle impacted the participant’s judgment of the hill. While these studies suggest that interpersonal variables influence the human perceptual system broadly, there is still much to be learned about how specific social factors may impact the perception of the physical layout of the environment and objects within the environment.

**Direction of Present Research**

This project seeks to add to the increasing appreciation of the interplay between the social and cognitive aspects of perception by identifying the role of psychological closeness—feelings of social proximity and intimacy toward a familiar person—in spatial perception and awareness. Two experiments investigated the relationship between psychological closeness and perceived physical closeness to determine whether an
individual that is psychologically closer to the viewer is perceived to be physically closer than an individual to whom the viewer has little or no affinity or bond. I hypothesized that an individual’s feelings of psychological closeness to a best friend would lead to judgments of closer proximity to that friend than to a stranger at an identical physical distance.

Both studies employed magnitude estimates of perceived distance and an action-based indicator of perceived distance. It was important to include both types of measures because past research has suggested that conscious awareness of space may be influenced by different factors or subject to different processes than those that guide movements (Kunz, Wouters, Smith, Thompson & Creem-Regehr, 2009; Loomis, da Silva, Fujita & Fukusima, 1992; Loomis & Philbeck, 2008; Andre & Rogers, 2006; Milner & Goodale, 1995). Hence, the use of a conscious distance estimate and an action-based indicator of perceived distance allowed for determining whether social factors influence perceptual judgments globally, or if the effects were specific to either conscious judgments of space or visually-guided actions. Because visually-guided actions such as blind-walking are less influenced by non-visual factors (e.g. Proffitt et. al., 1995), I expected magnitude estimates (i.e. verbal-reports of the perceived distance and matching an extent to the perceived target distance) to be scaled by the feelings of closeness, such that participants would underestimate distances to the friend target, while subsequently overestimating distances to the stranger target. Performance in the action-based measure of perceived distance (blind-walking to the previously-viewed target) was predicted to reflect estimates that more closely resembled the actual distance between the participants and the targets.
EXPERIMENT 1: METHOD

Participants. Forty-seven undergraduate students enrolled at the University of Dayton were recruited individually through the online research portal to visit the lab to participate for partial course credit. All participants brought any necessary corrective lenses or eyewear, as the study required viewing objects at a distance.

Procedure and Materials. This study investigated how psychologically-close participants felt to friends compared to a stranger to determine how that closeness affected the way they judged the egocentric distance to targets representing each target person and how they directed their actions across the perceived distance to the targets. The participants were informed that they would be completing a study about how they view themselves and their social groups. After completing a brief set of demographic questions, each participant named his or her best friend (first name, last initial only). Next, the participants completed the “My Best Friend and I” questionnaire, a combination of newly-written items and those adapted from the social attraction subscale (α=.75) of McCroskey and McCain’s Measure of Interpersonal Attraction (1974), which was designed to measure interpersonal closeness based on the benefits provided by being affiliated with the individual in question. Items included statements such as I think my best friend is a good friend and It is difficult to meet and talk with my best friend (see Appendix A for complete measure). Each item was scored on a seven-point scale, (1=strongly disagree; 7=strongly agree), such that higher scores represented greater
psychological closeness to the target person; three reverse-coded items’ scores were converted to match the corresponding 7-point scale prior to analysis. After answering the questions regarding their closeness to their self-reported best friend, participants were read a profile of a stranger—a confederate named Alex—that included a photo of the target and a brief, pre-written description of the individual (with the sex of Alex matching that of the participant; see Appendix B for handout). This description was intended to describe a non-threatening individual with whom the participant had no existing affiliation and, consequently, no feelings of psychological closeness toward. The description read, “Alex is a freshman student from a private university in the Midwest who is majoring in social science and enjoys learning new things, meeting others and getting involved around campus...” The participant then re-read the profile and thought for a few minutes about what it would be like to meet Alex. Then the participant completed the same set of questions described above, but regarding Alex. Each item of the “My Best Friend and I” questionnaire, was reworded by simply substituting the words “my best friend” with “Alex” (see Appendix C for complete measure). The resulting score was intended to indicate the participants’ feelings of psychological closeness (or lack thereof) to Alex.

Following the survey portion of the study, each participant was led to a room where he or she viewed targets representing either the self-reported best friend or the stranger, Alex. Instead of having the actual best friend or a stranger serve as the targets, participants viewed a silhouette of a face, intended to provide a visual representation of either the participant’s best friend or the stranger Alex. The use of a visual symbol representing the best friend or Alex was necessary to avoid the challenges of requiring
participants to attend the study along with their best friends, a requirement that could have limited the participant pool, especially if a participant’s best friend did not live nearby or could not attend the session.

On each trial, the silhouette target representing the best friend or Alex was placed at a distance of 2, 5, or 8 meters from the participant (distance was randomized, with distances of 4 and 6 meters used as two initial practice trials). The participant was first asked to imagine either his/her previously-listed best friend or Alex standing where the silhouette was displayed. The target type order (silhouette representing the best friend vs. the silhouette representing Alex) was block randomized, with participants either making all judgments of the best friend or Alex first. After viewing the silhouette and surroundings for as long as necessary to judge the distance to the target, the participant either verbally estimated the distance to the target or walked without visual feedback to the target’s location. Verbal reports of distance are commonly-used indicators of consciously-perceived egocentric distance. The blind-walking task, on the other hand, was employed as a non-conscious indicator of perceived distance. In order to walk accurately to a previously-viewed target, the participant must initially perceive the distance to the target and then update his or her position relative to the target while walking without visual-feedback. This open-loop walking task is also frequently used as an indicator of perceived distance; performance in the task is typically accurate for distances up to approximately 20 meters (Loomis & Philbeck, 2008).

The order of the two types of distance judgments (verbal report vs blind-walking) was also counterbalanced, with participants either always completing verbal reports or blind-walking tasks first for all subsequent target types and distances. For each target
type (best friend or Alex) at a given distance (2, 5, 8 m) the researcher recorded the participant’s verbal report of the distance as well as the distance blind-walked to the target; the experimenter then repositioned the target for the next trial while the participant remained blindfolded. Once the experimenter completed each relocation of the first target person, the tasks were repeated in the same order (either verbal report or blind-walking first) for the other target, resulting in 14 trials. Following the distance perception task, the participants were debriefed and dismissed accordingly. Psychological closeness was predicted to influence the judged egocentric distance to another individual’s representation in the environment. More specifically, I predicted that the silhouette representing the participant’s best friend would be judged as closer than the silhouette representing the stranger, Alex. Because non-visual factors typically influence conscious judgments of space more than they influence visually-guided actions, the effect was predicted only for verbal reports of distance.
EXPERIMENT 1: RESULTS

To verify that participants felt psychologically closer to their best friends than to stranger-Alex, a paired-samples t-test was conducted on the items from the “My Best Friend and I” and “Alex and I” questionnaires to compare the levels of psychological closeness reported for each target person. There was a significant difference between responses for the best friends and stranger-Alex, \( t(46) = 12.10, p < .001 \); responses for the best-friends (\( M = 6.15, SD = 0.43 \)) resulted in higher social attraction scores than those for stranger-Alex (\( M = 4.74, SD = 0.71 \)).

To confirm that participants’ judgments of distance increased with increasing target distance, we first averaged the reported or walked distances for each target distance presented; these means were then entered into two repeated measures ANOVAs (one for verbal reports and another for blind-walking) with actual target distance included as a within-subject factor. As expected, there was a significant main effect of target distance across verbal report measurements, \( F(2, 42) = 105.17, p < .001 \) (see Table 1); for the blind-walking judgments, there was also a significant main effect of target distance, \( F(2, 42) = 703.42, p < .001 \) (see Table 2). While the omnibus ANOVA revealed a significant main effect of target distance, linear contrasts revealed that reported distance increased with increasing actual target distance, \( p < .001 \) for verbal reports; \( p < .001 \) for blind-walking. Thus, verbal reports of distance and distances walked increased consistently as target distance increased.
To address the hypothesis that psychological closeness impacted distance judgments, accuracy scores were calculated for verbal reports and blind-walking measurements by dividing the reported or walked distance by the actual target distance and multiplying by 100. These accuracy scores were then entered into separate 2 (level of psychological closeness) x 3 (target distance) two-factor repeated measures ANOVAs for verbal reports and blind-walking, respectively. Inconsistent with the hypothesis, verbal report estimates did not differ significantly for best-friend and stranger-Alex, $F(1, 43)=0.22, p=.64$. Blind-walking estimates also did not differ significantly for best-friend and stranger-Alex, $F(1, 43)=0.45, p=.51$. See Tables 1 and 2 for descriptive statistics by target type and target distance for each task (verbal report, blind-walking).

**Table 1: Descriptive Statistics for Raw & Accuracy Data of Verbally-Reported Distance Estimates by Target Type and Target Distance**

<table>
<thead>
<tr>
<th>Target Type</th>
<th>Target Distance</th>
<th>2m Target</th>
<th>5m Target</th>
<th>8m Target</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Best Friend</td>
<td>2.18</td>
<td>0.96</td>
<td>5.55</td>
<td>2.64</td>
</tr>
<tr>
<td></td>
<td>(108.87%)</td>
<td>(110.97%)</td>
<td>(120%)</td>
<td></td>
</tr>
<tr>
<td>Stranger-Alex</td>
<td>2.14</td>
<td>0.73</td>
<td>5.59</td>
<td>2.38</td>
</tr>
<tr>
<td></td>
<td>(106.79%)</td>
<td>(111.82%)</td>
<td>(116.58%)</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: Descriptive Statistics for Raw & Accuracy Data of Blind-walking Distance Estimates by Target Type and Target Distance**

<table>
<thead>
<tr>
<th>Target Type</th>
<th>Target Distance</th>
<th>2m Target</th>
<th>5m Target</th>
<th>8m Target</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Best Friend</td>
<td>2.18</td>
<td>0.66</td>
<td>5.16</td>
<td>1.52</td>
</tr>
<tr>
<td></td>
<td>(109.13%)</td>
<td>(103.27%)</td>
<td>(98.14%)</td>
<td></td>
</tr>
<tr>
<td>Stranger-Alex</td>
<td>2.12</td>
<td>0.49</td>
<td>5.08</td>
<td>1.13</td>
</tr>
<tr>
<td></td>
<td>(104.46%)</td>
<td>(101.63%)</td>
<td>(101.06%)</td>
<td></td>
</tr>
</tbody>
</table>
Although there was a predicted influence of target distance on mean distance judgments, as reported above, there was an unexpected main effect of target distance on judgment accuracy for verbal reports, $F(2, 42)=4.19, p=.02$. In other words, accuracy of judgments should not have been impacted by the physical distance of the target; the accuracy of distance judgments was predicted to change as a function of psychological closeness to target. Pairwise comparisons illustrated that the effect of target distance on accuracy of verbal reports was driven by significantly greater overestimation of the target distance when participants made verbal reports at 8 meters ($M=119.49\%, SE=7.46\%$) compared those made at 2 meters ($M=108.42\%, SE=5.88\%$), $p=.01$, as well as significantly greater overestimation of the target distance when participants made verbal reports at 8 meters compared those made at 5 meters ($M=112.39\%, SE=7.09\%$), $p=.01$.

Overall, verbal reports were overestimated, though a one-sample t-test revealed the difference between verbal reports and veridical judgments (judgments that were 100\% of the actual distance) was marginal, $t(46)=1.92, p=.06$. Collectively, these comparisons show that, as participants viewed targets from further distances, they overestimated those distances to a greater degree. For the blind-walking task, consistent with other studies employing this task, there was no effect of target distance on the accuracy of blind-walked distances, although the effect of target distance approached significance $F(2, 42)=3.05, p=.06$. 
EXPERIMENT 2: METHOD

Participants in Experiment 1 greatly overestimated the distances to the targets in their verbal reports, as seen in their measurements for their best friends and stranger-Alex across the three target distances. These misjudgments may have been due to a combination of the environment—a narrow hallway with doorways, signs and bulletin boards visible throughout—and a lack of familiarity with units of measurement used to report distance; at the time of debriefing, many participants reported using “other environmental cues,” such as the position of the target relative to doorways and signage throughout the hallway to assist in estimating the distances, which likely interfered with the target-specific scaling as a result of psychological closeness. As mentioned, since conscious judgments of space (i.e., verbal reports) may be processed differently than non-conscious, visually-guided actions, environmental cues may impact verbal reports more than visually-guided actions, which seem to be more resistant to the effects of non-visual cues. Moreover, verbal reports are typically less accurate and more variable than visually-guided actions (Loomis & Philbeck, 2008). As a result, the verbal report task was replaced by a visual matching task in Experiment 2. The visual matching task was adapted from a task employed by Cole, Riccio, and Balcetis (2014), in which thirsty participants matched the distance between themselves and an experimenter to the perceived distance between themselves and a cooler with soda. By switching out the verbal reports for the visual matching task, we eliminated the possibility that a lack of
familiarity with the units of measurement used in reporting impacted the participants’ judgments.

In addition to this change, Experiment 2 was completed in a different environment; rather than utilizing the 12m x 5m carpeted hallway that was used in Experiment 1, the second study was completed in a 13.7m x 11.9m tiled room. The space was more open, which allowed participants to be less anxious about colliding with walls and objects; additionally, there was no foot traffic in the large room, so the participants’ sessions were largely undisturbed by students passing through. Though the larger space was in a more secluded, ideal location, the tiled flooring was expected to be a possible additional distance cue that participants might use to determine distances rather than relying solely on their perceptual judgments.

Method

Participants. In Experiment 2, an additional 55 undergraduate students enrolled at the University of Dayton were recruited individually through the online research portal. Each participant completed the study individually over the course of one hour, in exchange for course credit. As in Experiment 1, participants brought any necessary corrective lenses or eyewear, as the study required viewing objects at a distance.

Materials and Procedure. Aside from the change to the testing environment and the replacement of verbal reports with a visual matching task, the materials and procedures used in Experiment 2 were the same as those used in Experiment 1.

As in Experiment 1, participants completed the “My Best Friend and I” questionnaire regarding their best friends; after reading about the stranger Alex, participants completed the modified version of the questionnaire to assess their closeness
to the stranger Alex. After completing these measures, participants judged the distances to silhouette targets that represented either the best friend or Alex. In lieu of the verbal report task, participants instead completed a visual matching task on each trial.

Participants matched the distance between themselves and the target representing the best friend/stranger-Alex to the distance between themselves and another researcher. To do this, participants looked at the target until they had an estimate of the distance between themselves and the target. Then, participants turned 90 degrees to the right to face a second experimenter standing across the room facing them. The participant then instructed the experimenter to step forward and/or backward until the distance between the participant and the experimenter matched the distance from the participant to the original target along the original plane; participants could refer to the target until they felt the distances matched. The first experimenter then measured and recorded the matched distance estimate.

All participants also completed blind-walking estimates identical to those in Experiment 1, in which they walked toward the target until they felt they were standing where the target was placed. Following the distance perception task, the participants answered a brief, open-ended questionnaire about the strategies they used to match the perceived distance. After this questionnaire, participants were debriefed and dismissed from the session. As in Experiment 1, psychological closeness was predicted to influence the judged egocentric distance between the participant and a representation of another individual’s in the environment. More specifically, I hypothesized that the silhouette representing the participant’s best friend would be judged as closer than the silhouette representing the stranger, Alex, but only for visually-matched reports of distance.
EXPERIMENT 2: RESULTS

To verify that participants felt psychologically closer to their best friends than to stranger-Alex, a paired-samples t-test was conducted on the items from the “My Best Friend and I” and “Alex and I” questionnaires to compare the levels of psychological closeness reported for each target person. There was a significant difference between responses for the best friends and stranger-Alex, $t(54) = 10.44, p < .001$, indicating that responses for the best-friends ($M = 6.09, SD = 0.42$) resulted in higher social attraction scores than those for stranger-Alex ($M = 4.88, SD = 0.74$).

In order to directly address the hypothesis, as in Experiment 1, accuracy scores were computed for the visual matching estimates and for blind-walked distances. Accuracy scores were entered into a 2 (level of psychological closeness) x 3 (positioned distance) two-factor repeated measures ANOVA. Contrary to the hypothesis, visual matching estimates did not differ significantly for best-friend and stranger-Alex, $F(1, 51) = 1.21, p = .28$. Blind-walking estimates also did not differ significantly for best-friend and stranger-Alex, $F(1, 51) = 0.21, p = .65$.

As in Experiment 1, we confirmed that participants’ judgments increased with increasing target distance by conducting an ANOVA using the mean distance judgments for each target distance displayed. As expected, there was a significant main effect of target distance across visual matching measurements, $F(2, 50) = 1,939.17, p < .001$ (see Table 3); for the blind-walking judgments, there was also a significant main effect of
target distance, $F(2, 50)=956.45, p<.001$ (see Table 4). While the omnibus ANOVA revealed a significant main effect of target distance, linear contrasts revealed that reported distance increased with increasing actual target distance, ($p<.001$ for visual matching reports; $p<.001$ for blind-walking). Thus, visual matching reports of distance and distances walked increased consistently as target distance increased.

Table 3: Descriptive Statistics for Raw and Accuracy Data of Visually-Matched Distance Estimates By Target Type and Target Distance

<table>
<thead>
<tr>
<th>Target Type</th>
<th>Target Distance</th>
<th>2m Target Placement</th>
<th>5m Target Placement</th>
<th>8m Target Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Best Friend</td>
<td>2.12</td>
<td>0.37</td>
<td>4.75</td>
<td>0.51</td>
</tr>
<tr>
<td>(105.94%)</td>
<td></td>
<td></td>
<td>(94.96%)</td>
<td></td>
</tr>
<tr>
<td>Stranger-Alex</td>
<td>2.16</td>
<td>0.32</td>
<td>4.75</td>
<td>0.46</td>
</tr>
<tr>
<td>(108.20%)</td>
<td></td>
<td></td>
<td>(95.05%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Descriptive Statistics for Raw and Accuracy Data of Blind-walking Distance Estimates By Target Type and Target Distance

<table>
<thead>
<tr>
<th>Target Type</th>
<th>Target Distance</th>
<th>2m Target Placement</th>
<th>5m Target Placement</th>
<th>8m Target Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Best Friend</td>
<td>1.84</td>
<td>0.36</td>
<td>4.32</td>
<td>0.64</td>
</tr>
<tr>
<td>(92.12%)</td>
<td></td>
<td></td>
<td>(86.33%)</td>
<td></td>
</tr>
<tr>
<td>Stranger-Alex</td>
<td>1.82</td>
<td>0.31</td>
<td>4.39</td>
<td>0.65</td>
</tr>
<tr>
<td>(91.08%)</td>
<td></td>
<td></td>
<td>(87.73%)</td>
<td></td>
</tr>
</tbody>
</table>

Just like in Experiment 1, there was an unexpected main effect of target distance on judgment accuracy for visual matching judgments, $F(2, 50)=27.14, p<.001$. Whereas the verbal reports in Experiment 1 revealed a tendency to overestimated target distance, a one-sample t-test performed on the accuracy data from Experiment 2 show that participants’ visually-matched estimates were marginally underestimated, $t(54)=-1.76$,
Pairwise comparisons illustrated that the effect of target distance on accuracy of visually-matched distances was driven by significantly greater underestimation of the target distance when participants made visual matching reports at 5 meters ($M=95.22\%$, $SE=1.11\%$) compared those made at 2 meters ($M=107.17\%$, $SE=2.09\%$), $p<.001$, as well as significantly greater underestimation of the target distance when participants made visual matching reports at 8 meters ($M=91.83\%$, $SE=1.23\%$) compared those made at either 2 meters, $p<.001$, or at 5 meters, $p=.002$; these comparisons show that, as participants viewed targets from further distances, they underestimated those distances to a greater degree via visual matching.

Similarly, the accuracy of blind-walking estimates also revealed an unexpected main effect of target distance, $F(2, 50)=8.50, p<.001$. Pairwise comparisons illustrated that the effect of target distance on accuracy of blind-walking judgments was driven by significantly greater underestimation of the target distance when participants made blind-walking judgments at 5 meters ($M=87.13\%$, $SE=1.63\%$) compared those made at 2 meters ($M=91.46\%$, $SE=1.99\%$), $p=.03$, as well as significantly greater underestimation of the target distance when participants made blind-walking judgments at 5 meters compared those made at 8 meters ($M=91.25\%$, $SE=1.67\%$), $p<.001$; these comparisons show that, as participants viewed targets from 5 meters, they walked shorter distances than when seeing targets at 2 or 8 meters. A one-sample t-test confirmed that the accuracy of blind-walked estimates was significantly less than the actual distance, $t(54)=-7.04, p<.001$. This stands in contrast to Experiment 1, where accuracy of blind-walking was not significantly different from the veridical distance; this is also inconsistent with
studies of blind-walking that illustrate that blind-walking is typically accurate for distances up to approximately 12 meters (see Loomis and Philbeck, 2008 for a review).
GENERAL DISCUSSION

Over the course of the two studies, it was seen that, while participants felt more socially attracted and psychologically-closer to their best friends than they did to stranger-Alex, there was no evidence that the effects of that social proximity influenced participants’ estimates of physical proximity to friends or strangers. Across two experiments, participants’ blind-walking estimates of the distances to targets representing both friends and strangers were generally accurate. In Experiment 1, participants’ verbal reports of the perceived distances to targets representing both friends and strangers were similarly inaccurate (overestimated). In Experiment 2, there was a tendency for participants to under-report the distance between themselves and both the friend and stranger targets in the matching task.

While interpreting null effects is problematic, there are several reasons to think that the manipulation of psychological closeness used here was insufficient to detect a potential effect of closeness on distance judgments. First, participants seemed to respond positively to both their best friends and the stranger-Alex (via the McCroskey and McCain questionnaire). Though the McCroskey and McCain (1974) measure confirmed that participants considered their best-friends as psychologically closer than stranger-Alex, the mean level of social attraction to stranger-Alex was still higher than expected. Second it may have been unrealistic to expect participants to visualize or to mentally represent their best friends (or stranger Alex) standing in the place of a silhouette. Adding
to this limitation, there was often no visual distinction between the friend silhouette and the stranger silhouette; most participants viewed the same silhouette for both their best friends and Alex, as many of them had same-sex best friends, and the sex of Alex was matched to the sex of the participant.

There are a variety of ways to address the shortcomings of the present experiments. Rather than having participants imagine viewing a close friend or a stranger, perhaps having the participants engage in a task designed to produce heightened feelings of psychological closeness to one of two confederates would provide a stronger manipulation of psychological closeness. For example, a participant would meet a confederate who would be introduced as another participant in the study and the two would engage in a brief period of getting to know one another using a task like the Relationship Closeness Induction Task (RCIT; Sedikides, 1999). After, the participant would make distance judgments to the target like those utilized in these studies, but the silhouette representations would be replaced with the interaction partner representing someone psychologically-close and another unknown confederate representing someone psychologically-distant. Such a study would provide a stronger manipulation of psychological closeness and allow for investigation of the effect of artificially-constructed acquaintanceships through mutual disclosure on visual perceptions of distance.

If the strength of the manipulation is contingent upon the physical presence of a psychologically-close or distal individual, it is possible that social affiliations may significantly influence spatial perception and awareness only in the physical presence of others. In terms of social interactions, the proxemics and social psychology literature
suggests that we fill our social environments with those who add benefit and familiarity to our lives. It is likely, then, that we tend to hold an approach motivation toward those individuals that provide social benefits; as a result, when in the presence of an individual, our evaluation of the social benefits that may result from interacting with the individual may result in perceptual scaling as we evaluate the costs, benefits, effort, and affordances of engaging with a (non)beneficial other. In turn, such evaluations may lead us to coordinate our perceptual processes to incorporate the cognitions and perceptions of the (non)beneficial other; such a pattern has been explored in research on interpersonal coordination (Marsh, Richardson & Schmidt, 2009). Such research has found that, when looking at the coordination of perceptual and behavioral dynamics, participants considered part of a social unit (i.e. two or more individuals whose behaviors converge on similar perceptual processes and/or actions because of a joint goal or task) are able to coordinate more effectively due to their “joint perception” in the presence of the other individual(s), which can be extinguished simply by dismantling the unit. Connecting back to the studies conducted in this project, it is possible that the physical presence of the psychologically-close or distal individual would be necessary to evoke the scaling that was expected; the differences in distance scaling—though non-significant—still hint at a small effect of having a representation of a friend and a stranger present, but it is likely that the mechanism through which psychological closeness can affect distance judgments is most robust when sharing the space with other, physically-present individuals. Overall, if the presence of the social object or unit (i.e. a friend or interaction partner) is enough to induce scaling of the visual-spatial environment, we may find that visualization tasks
may not be sufficient to accurately study the social/interpersonal cues that may influence our perceptual judgments.

In terms of approach and avoidance motivations, it is possible that, though both can affect visual-spatial scaling, avoidance motivations produce more robust effects. Perhaps an individual or object that elicits an avoidance motivation—either by being perceived by the participant as fearful, threatening or repulsive—would have a more measurable impact on visual-spatial distance scaling than an individual that elicits an approach motivation. Balcetis (2016) and Balcetis and Cole (2015) attempt to clarify the differential effects of approach and avoidance motivations. They note that avoidance motivations have the unique ability to result in either underestimated or overestimated visual-spatial scaling. For example, an avoidance motivation toward a negative but non-threatening object (i.e. an object covered in feces) would result in overestimated distance judgments toward the object. Presumably, this spatial judgment maximizes the distance between the viewer and the undesirable target. On the other hand, a negative and threatening object (i.e.: a spider sitting across the table from a participant) resembles an approach orientation if the object is inescapable, resulting in underestimations in distance judgments. In this instance, if a threatening object is seen as closer, the immediacy of the threat increases, leading to actions that typically resemble a “fight or flight” response. Hence, avoidance motivations are seen to facilitate survival, rather than as facilitating higher-order goals or attainment of objects of desire. Additionally, it is possible that, when an object is ambiguous—neither particularly threatening or desirable—the object is classified within an approach motivation by default, resulting in estimations of distance
that are nearly indistinguishable from estimates made with regard to objects eliciting an explicit approach motivation.

In the case of the present study, the ambiguity of the silhouettes may have resulted in the indistinguishable differences between distance estimates made for the best friends and stranger-Alex. Overall, it might be that participants respond to mere representations of people who provide opportunities for avoidance with scaled perceptions of distances, but require their physical presence (or the presence of an unambiguous representation, such as a portrait or other meaningful symbol of the relationship) for the activation of approach motivations thereof. If this is so, future studies could attempt to manipulate the classification of the motivation elicited by the target individual by having a stranger that is both neutral and threatening or aversive; by comparing the perceptual judgments that result from sharing the environment with both neutral and aversive or threatening individuals, a clearer understanding of the mechanism through which approach and avoidance motivations are utilized in social interactions can be determined.

Lastly, and perhaps most notably, is the possibility that the effect of non-visual cues on visual-spatial perception is very small or non-existent. Despite some compelling evidence to suggest that factors such as energetic potential, motivation and other person-factors impact distance judgments, this literature is not without its detractors and counter-evidence. For example, attempts by Hutchinson and Loomis (2006a) to replicate the findings of Proffitt and colleagues (2003), found no effects of energetic potential on distance perceptions. While Proffitt, Stefanucci, Banton and Epstein (2006) countered these findings by citing a series of methodological differences between the two sets of
studies, Hutchinson and Loomis (2006b) later asserted that the effects of non-visual factors on distance judgments lack robustness, thereby limiting their importance as contributors to spatial perception. Durgin (2017) also questions the origin of these effects, stating that many of the classic studies’ findings are operating through demand characteristics and response biases, rather than by directly affecting perception.

Not only is there disagreement regarding whether visual-factors influence spatial perception and cognition, there is also controversy surrounding the mechanism through which these factors impact perception. Firestone and Scholl (2014) remain skeptical about the influence of non-visual cues on spatial perception, arguing that several studies fail to make the distinction between perceptual and post-perceptual processes. They critiqued several of the studies supporting a role for non-visual factors in spatial perception and attempted to replicate effects of earlier studies in the realm of embodied cognition and perception. They conclude that, instead of affecting perception per se, these studies demonstrated the effects of “top-down” (or post-perceptual) processes. In other words, instead of these non-visual cues having direct effects on perception at its most-basic (as much of the research cited in the included review would argue), they state that “cognitive penetrability” allows for such distinctions in post-perceptual judgments by affecting how individuals remember, recall, and report characteristics of the target, including relative distances, and allowing for demand characteristics to affect participants’ responses when engaging in the various tasks traditionally used in these studies. Witt, Proffitt, and Epstein (2010), however, concluded that the mechanisms through which non-visual cues (i.e.: effort and intent) showed an effect on visual-spatial scaling were being influenced at the time of perception. Witt (2015) also responded to
criticisms in Firestone (2013), in which he stated that awareness should be the driving mechanism in perceptual differences; she stated that, though awareness can affect perceptual processes, it is not necessary to warrant such visual-spatial scaling. Additionally, Witt and Riley (2014) asserted that the action-specific effects of embodied cognition and perception are a result of the combined information we receive from our perceptual system directly, as well as multimodal, higher-order information from the global array—the overarching integration of multiple sources of sensorimotor information, stemming from multiple, lower-order arrays, including the optic array.

Though the debate is ongoing regarding the influence of non-visual factors on spatial perception, the results of this study cannot rule out the possible interplay between the social and cognitive aspects of perception. Although the present studies were inconclusive, these and future related studies attempt to integrate theories of social interaction and visual-spatial perception to contribute to a growing understanding of the malleability and complexity of visual-spatial perceptual processes while also providing potential directions for further exploration thereof.
REFERENCES


The effects of handedness and reachability on perceived distance. *Journal of 
doi:10.1037/a0016875

perception and visually directed action. *Journal of Experimental Psychology: 
Human Perception and Performance*, 18, 906-921. doi:10.1037/0096-
1523.18.4.906

updating and action. In *Carnegie Symposium on Cognition, 2006, Pittsburgh, PA, 

joint action and interpersonal coordination. *Topics in Cognitive Science*, 1, 320-
339. doi:10.1111/j.1756-8765.2009.01022.x

*Speech Monographs, 41*, 261-266. doi:10.1080/03637757409375845

Oxford University Press.

doi:10.1068/p6830

Morry, M. M. (2007). The attraction-similarity hypothesis among cross-sex friends: 
Relationship satisfaction, perceived similarities, and self-serving perceptions.


APPENDIX A:

“MY BEST FRIEND & I” QUESTIONNAIRE

Instructions: Respond to the following statements regarding your best friend:

1. My best friend’s name is (first name & last initial)
   ______________________________.

2. My best friend is (check one): _________ Male _____________ Female

3. I think my best friend is a good friend.
   Strongly Disagree Disagree Somewhat Neither Disagree or Agree Somewhat Agree Agree

4. I like to have friendly chats with my best friend.
   Strongly Disagree Disagree Somewhat Neither Disagree or Agree Somewhat Agree Agree

5. It is difficult to meet and talk with my best friend. (R)
   Strongly Disagree Disagree Somewhat Neither Disagree or Agree Somewhat Agree Agree

6. My best friend and I have established a personal friendship with each other.
   Strongly Disagree Disagree Somewhat Neither Disagree or Agree Somewhat Agree Agree

7. My best friend just doesn’t fit in with my other friends. (R)
   Strongly Disagree Disagree Somewhat Neither Disagree or Agree Somewhat Agree Agree
8. My best friend is pleasant to be with.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Disagree Somewhat</td>
<td>Neither Disagree or Agree</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

9. I feel I know my best friend personally.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Disagree Somewhat</td>
<td>Neither Disagree or Agree</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

10. I don't care if I ever get to see my best friend. (R)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Disagree Somewhat</td>
<td>Neither Disagree or Agree</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

11. I sometimes wish I were more like my best friend.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Disagree Somewhat</td>
<td>Neither Disagree or Agree</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>
APPENDIX B:
“ABOUT ALEX” INFO SHEET

Instructions: Read the following description about Alex. While reading, think about what it might be like to meet Alex.

Meet Alex, a freshman student from a private university in the Midwest who is majoring in social science and enjoys learning new things, meeting others and getting involved around campus. Alex enjoys being involved in volunteer work, honor societies and social organizations and events as well as showing school spirit during various sporting events. Alex is also studious and attempts to maintain a good scholarly average in coursework.
APPENDIX C:
“ALEX & I” QUESTIONNAIRE

Instructions: Respond to the following statements regarding Alex.

1. I think Alex could be a good friend of mine.
   1. Strongly Disagree
   2. Disagree
   3. Somewhat Disagree
   4. Neither Agree nor Disagree
   5. Somewhat Agree
   6. Agree
   7. Strongly Agree

2. I would like to have a friendly chat with Alex.
   1. Strongly Disagree
   2. Disagree
   3. Somewhat Disagree
   4. Neither Agree nor Disagree
   5. Somewhat Agree
   6. Agree
   7. Strongly Agree

3. It would be difficult to meet and talk with Alex. (R)
   1. Strongly Disagree
   2. Disagree
   3. Somewhat Disagree
   4. Neither Agree nor Disagree
   5. Somewhat Agree
   6. Agree
   7. Strongly Agree

4. Alex and I could establish a personal friendship with each other.
   1. Strongly Disagree
   2. Disagree
   3. Somewhat Disagree
   4. Neither Agree nor Disagree
   5. Somewhat Agree
   6. Agree
   7. Strongly Agree

5. Alex just wouldn’t fit into my circle other friends. (R)
   1. Strongly Disagree
   2. Disagree
   3. Somewhat Disagree
   4. Neither Agree nor Disagree
   5. Somewhat Agree
   6. Agree
   7. Strongly Agree

6. I think Alex would be pleasant to be with.
   1. Strongly Disagree
   2. Disagree
   3. Somewhat Disagree
   4. Neither Agree nor Disagree
   5. Somewhat Agree
   6. Agree
   7. Strongly Agree
7. I feel I know Alex personally.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Disagree Somewhat</th>
<th>Neither Disagree or Agree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Disagree Somewhat</td>
<td>Neither Disagree or Agree</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

8. I don't care if I ever get to meet Alex. (R)

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Disagree Somewhat</th>
<th>Neither Disagree or Agree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Disagree Somewhat</td>
<td>Neither Disagree or Agree</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

9. I wish I were more like Alex.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Disagree Somewhat</th>
<th>Neither Disagree or Agree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Disagree Somewhat</td>
<td>Neither Disagree or Agree</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>