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Effects of Social Skills on Spatial Perspective Taking

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Honours Psychology Thesis

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Abstract

Spatial perspective taking is the ability to take the perspective of objects whereas social perspective taking is the ability to take the perspective of another person in a social situation. Past research has shown that better social skills have been correlated with having better spatial perspective taking abilities. However, other research on similar topics have revealed no such results and have provided evidence for the two abilities being separate. These research studies focused solely on a singular test to measure social skills which was the social and communication subscale of the Autism-Quotient. Therefore, we added two new tests as measures of social skills and combined them with the results from our spatial test. 33 participants complete the Spatial Orientation Test (SOT; Hegarty & Waller, 2004) which tested spatial perspective taking abilities and the social and communication subscales of the Autism-Quotient (AQ; Baron-Cohen et al., 2001), the Perspective Taking Mindset Measure (Ragins & Ehrhardt, 2021), and the Social Perspective Propensity Scale (Gehlbach et al., 2008) which measured social skills. Our results revealed that there was no significant correlation between the results of the SOT and the social skills test, meaning that someone's social skills were not related to their spatial perspective taking abilities. In conclusion, the addition of two new social skills test helped us provide further evidence that social skills and spatial perspective taking were not correlated.

Introduction

Spatial perspective taking is the ability to mentally reorient oneself and take the point of view of another person or object (Hegarty & Waller, 2004). The ability to take the perspective of another object or person plays an important role in being able to navigate the world. Spatial abilities have often been correlated with achievement in science, technology, engineering, and math (Newcombe, 2017). Similarly, social skills are also crucial for humans to navigate day-to-day activities and can be thought of in much the same terms as spatial skills. Social navigation, also known as “mentalizing”, is an active process where a person aims to understand the world from someone else’s point of view (Parks et al, 2022; Tavares et al., 2015). Spatial perspective taking is essential in being able to physically orient oneself in the world and understand how objects may look from different perspectives. Social navigation is important in being able to make and maintain healthy social relationships by understanding the perspective of others in social situations.

Furthermore, spatial perspective taking can take two different forms, egocentric perspective taking or allocentric perspective taking (Park et al., 2022). Park et al. (2022) described egocentric perspective taking as useful for recognizing objects in the immediate view of oneself. It requires the person to physically view the world and its surrounding depending on the position the person is in. With an allocentric reference frame, or cognitive map a person learns the layout of objects and landmarks, independent of their own position (O’Keefe & Nadel, 1978). Allocentric perspective provides information about the general environment and helps in practical ways such as giving directions (Taylor & Tversky, 1996). Allocentric perspective taking is especially useful for complex navigation of the world and relating landmarks with one another (Burgess, 2008).

In addition, social cognitive maps are constructed with an egocentric frame of reference to measure the strengths of relationships in a social situation (Tavares et al., 2015). Being able to take the perspective of another person is important in being able to predict the actions of others, whether one is interacting with someone or not (Tversky & Hard, 2009). Similarities between spatial and social navigations are also apparent at the neural level. Tavares et al. (2015) investigated hippocampal involvement in social navigation and found that participants that had better social skills also showed better navigation through the virtual world of a game and episodic memory played a crucial role in both types of navigation. They found that participants that reported better social skills showed higher hippocampal activity while moving through the virtual world. The hippocampus also played a more holistic role by computing a cognitive map representing the surroundings (Tavares et al., 2015).

Furthermore, these processes may be used together in social situations and the loss of one or the other could hinder day-to-day interactions. Shelton et al. (2011) argued that social skills play a crucial role in being able to physically imagine the perspective of another person. For instance, people with autism spectrum disorder experience challenges in being able to recognize that others have different ways of thinking. Thus, Shelton et al. (2011) proposed this would lead to the inability to take the perspective of another person whether it be socially or spatially. Different personality traits have also been correlated with better spatial and social skills. For instance, Carbone et al (2019) found a moderate correlation between spatial perspective taking and conscientiousness and emotional stability. A previous study also showed that people that are more compassionate have shown to be better at being able to mentalize and take another person's perspective (Allen et al., 2017). More specifically with social perspective taking, much research has focused on the specific ability to empathize with someone (Baron-Cohen, 2002; Tarampi et

al., 2016). If social perspective taking is related to spatial perspective, the two skills should be correlated.

Shelton et al (2011) demonstrated that better spatial perspective taking was positively correlated with having better social perspective taking abilities. They used three different targets with different levels of agency to test the correlation between social and spatial perspective taking. The different objects were an artist doll which represented the object with most agency, a tower of blocks, and a camera. Social ability of participants in this experiment was measured by the Autism-Spectrum Quotient (AQ; Baron-Cohen, et al., 2001). The participants with a higher score, translating to better social ability, also did better on the spatial perspective taking where a social agent was present. However, they found that placing a social agent alone was not enough in increasing spatial-perspective abilities, the participants needed to also have good social skills. Furthermore, Shelton et al (2011) also stated after their experiment that the agency level of the agent present could influence how successfully one might be able to take its perspective. Parks et al. (2022) also found a significant correlation between social skills and perspective taking abilities. Their experiment investigated the correlation between social skills, personality traits, and spatial perspective taking. Their results showed that people that were better at spatial perspective tasks were also better at mentalizing but did not find any significant correlation between personality traits and social and spatial perspective taking. Thus, these studies provided evidence for a correlation between social skills and spatial perspective taking skills.

Tversky and Hard (2009) investigated egocentric perspective taking and the natural instinct to take the perspective of a person when present in a scene. They conducted two experiments, the first experiment investigated whether a participant would automatically take the perspective of a person in a scene or look at an object from their own perspective. The second

experiment tested the effect of action on spatial perspective taking. The participants were asked different questions, phrased specifically in a way that called attention to moving or static information. The results of the first experiment showed that just the presence of the person caused many of the participants to take the perspective of the person in the scene rather than their own. The second experiments' results showed that phrasing the questions in a way that called attention to action information caused participants to take the perspective of the person rather than their own.

Some research has suggested that women perform better on spatial perspective taking tests when there is a social element to the test. For instance, Baron-Cohen (2002) found that women on average are greater empathizers than men, and that men are better at systemizing than women. According to Baron-Cohen (2002), systemizing is the ability to make sense of the inanimate world and empathizing is the ability to make sense of the social world. Women in general have shown to be more willing to comfort others in times of distress as well as, have a higher ability to empathize vocally and through non-verbal cues (Hoffman, 1977). Furthermore, girls at the age of 3 years old have shown the ability of being able to infer what people are thinking more than boys of that age (Happe, 1995). Disorders related to lack of empathy such as different personality disorders are seen in men at a higher rate (Blair, 1995; Dodge, 1980). Men also have shown to be better at mental rotation tasks and being able to read and interpret maps in a more accurate ways compared to women (Collins & Kimura, 1997; Galea & Kimura, 1993). Similarly, Linn and Peterson (1985) conducted a meta-analysis of research about sex differences in spatial abilities. They found that on average there was a large sex difference when it came to mental rotation tasks but a smaller sex difference when spatial-perspective abilities were in question.

Extending the idea of sex differences in social perspective taking to the spatial domain, Tarampi et al. (2016) hypothesized that women may be better at spatial perspective taking when there is a social agent present. They used the Spatial Orientation Test (SOT; Hegarty & Waller, 2004), to determine participants' abilities to take the perspective of different objects. The participants were presented with an array of objects at the top of the page and a circle, at the bottom, with the name of the object they are asked to take the perspective of in the middle and the object they are asked to look at on the top of the circle. They were then asked to point to another object within the array of objects from the perspective of the centre object, while facing the object at the tip of the arrow. Across three experiments, men and women were tested with the original SOT or a modified version, where the item that the participant was asked to take the perspective of was a human figure. In the first experiment participants were told men do better in the spatial condition and women do better in the social condition. The second experiment had the same instructions and conditions as the first however, only female participants were tested. And lastly, the third experiments only had female participants but there were no manipulations in the instructions and the same two conditions were present. The results of the first experiment showed that women did perform better in social conditions compared to their results in the spatial condition. In the second experiment where the experimental group was all women, the results on the SOT showed that there was not a significant difference between the results of participants in the spatial versus the participants in the social condition. The overall trend between the three experiments showed that males tended to do better throughout the different conditions. However, women did significantly better in the social conditions than they did in the spatial conditions. The results of these experiments were interpreted as evidence that adding a social component to a spatial test improved women's score, in particular.

Other findings show that women's performance on spatial perspective taking tests is not improved with a social element, suggesting that spatial and social skills are independent. Despite evidence from Tarampi et al. (2016) that women's spatial perspective taking was affected more strongly by the social agent compared to men, other findings have shown that women's performance on spatial perspective taking tests did not improve with a social element, suggesting that spatial and social skills are independent in women. Geer et al. (2022) attempted to replicate the Tarampi et al. (2016) findings but were not able to replicate some of their results. They argued that the fact that the human figure in Tarampi et al. (2016) research was facing the object in the array may have increased participants accuracy. To investigate this claim, they conducted four different experiments using the original or modified versions of the SOT. The first condition was the "No Spatial, No Social" condition, which used the original SOT. The second condition was the "Spatial, No Social" condition, this condition provided a directional cue but there was no social agent present. The third condition was "Social, No Spatial" condition, which had a human figure in the array, but it was not pointing to the object. Lastly, the fourth condition was "Spatial and Social" condition, and this condition had a human figure pointing to the object in the array. Geer et al. (2022) showed that the social cue alone was not sufficient enough to affect spatial perspective taking performance, and in fact, the social cue was only helpful if there was also some spatial information provided. Tarampi et al. (2016) had suggested that social cues were only helpful for women, whereas Geer et al. (2022) found that they were helpful for all participants regardless of gender. There were some similarities found between the original Tarampi research and the replication, one of which being that there was no correlation between the results of the AQ and spatial perspective taking. Consequently, there was no support for a correlation between social skills and spatial perspective.

To explain the Tarampi et al. (2016) findings, Geer et al. (2022) proposed that it might have been directionality that affected the results whereas Gunalp et al. (2019) argued that perhaps the familiarity of the starting object in the SOT array could increase performance. They tested this using a virtual reality version of the SOT as well as the traditional SOT. They hypothesized that if the human figure triggers a social mechanism in the brain, then participants should perform better in the social condition. However, if it's the directionality that is driving more accurate results, participants should do better in the condition where an arrow is pointing to an object. The results of the first experiment revealed that participants in the social condition did the best, followed by the arrow condition and then a control condition. However, there was no significant difference between the arrow and control condition, showing that directionality was not enough to change the results. Similarly, their second hypothesis was that if it is the social factor that drives improved performance, then participants should do better in the avatar condition but if the familiarity of the starting object is what increases performance, then participants should do better in the condition with a familiar object, which in this case was a chair. Their results showed that participants did significantly better in the familiar object and social conditions than they did in the control. And their results supported the familiarity of the directional cue as having more effect on performance than a social cue. Which once again debunked the finding that adding a social cue was enough to change the results of the SOT.

Findings about whether social skills and spatial perspective taking skills are related have been mixed. This could be in part due to the reliance on a single test of social skills, the Social and Communication subscale of the AQ. In the current study, we will further expand on whether there is a relationship between social skills and spatial perspective taking skills by using not only the AQ but also other measures of social skills. To test spatial perspective taking skills we will

be using an online version of the Spatial Orientation Test (SOT; Hegarty & Waller, 2004). In addition to the AQ subscales, participants will complete the Perspective-Taking Mindset Measure (PTMM; Ragins & Ehrhardt, 2021) and the Social Perspective Propensity Scale (SPPS; Gehlbach et al., 2008). Like the AQ, both these tests measure social skills however, the PTMM measures perspective taking from both a personal point of view as well as how someone believes others should behave when it comes to perspective taking. The SPPS asks participants to imagine themselves in specific situations and to rate their perspective taking skills. It is possible that these social perspective-taking tests may better reflect social perspective taking and correlate with spatial perspective taking. We predict the social and communication subscales of the AQ will not be related to women's SOT performance as in previous studies, although one or more of the other social skills scales may be positively related to SOT performance.

Methods

Participants:

This study included sixty-four participants enrolled in Psychology 1015B at Brescia University College. However, only the results of 33 participants was analyzed.

Materials:

Spatial Orientation Task, (SOT; Hegarty & Waller, 2004)

The participants completed the Spatial Orientation Task (SOT; Hegarty & Waller, 2004). The SOT measured the participants' ability to imagine themselves from different perspectives and orient themselves in space. The participants were presented with an array of objects to their left and a circle, to their right, with the name of the object they were asked to take the perspective of in the middle and the object they were asked to look at on the top of the circle. They were then asked to point to another object within the array of objects from the perspective

of the centre object, while facing the object at the tip of the arrow. Participants were presented with 3 practice questions and then had 5 minutes to complete the 12 items on this test. The results were scored as absolute error in degrees from the correct angle.

SOT Strategy Question

After completing the SOT, participants saw an open-ended question which asked them about the strategies they used to solve the items on the SOT. The question stated *What mental strategies did you use to come up with answers on the previous Spatial Orientation Task?*

Autism-Spectrum Quotient (AQ; Baron-Cohen et al., 2001)

Following the strategy question, participants were asked to complete the Autism-Spectrum Quotient (AQ; Baron-Cohen et al., 2001). The AQ measured qualities in adults that were often seen in people with autism spectrum disorder and is commonly used for its social skills and communications subscales. We administered the social skills and communication subscales. The Social Skills subscale contained 10 items, measured on a 5-point Likert Scale ranging from “Definitely Agree” to “Definitely Disagree”. A sample item from the social skill subscale is *I prefer to do things on my own*. Similarly, the Communication section contained 10 items, measured on a 5-point Likert Scale ranging from “Definitely Agree” to “Definitely Disagree”. An item from the communication subscale is *I enjoy social chit-chat*.

Perspective Taking Mindset Measures (Ragins & Ehrhardt, 2021)

Next, participants completed the Perspective-Taking Mindsets Measures (Ragins & Ehrhardt, 2021). This test measured participants’ personal beliefs about perspective-taking and their own perspective taking skills. The measure included 2 sections. The first section measured participants’ beliefs about perspective taking. This section included 6 items, measured on a 5-point Likert Scale, ranging from 1(Strongly Disagree) to 5(Strongly Agree). Items included *It is*

important for people to consider the world from other people's perspective. The second section measured participants' personal perspective taking skills. This section also included 6 items, measured on a 5-point Likert Scale, ranging from 1(Strongly Disagree) to 5(Strongly Agree). Items included *I need to improve my ability to consider the world from other people's perspective.*

Social Perspective Propensity Scale (Gehlbach et al., 2008)

Lastly, participants completed the Social Perspective Propensity Scale (Gehlbach et al., 2008). This scale measured participants' tendency to consider others' perspective in social situations. This scale contained 7 items and was measured on a Likert Scale, ranging from "Almost Never" to "Almost all of the time". A sample question in the scale was *How often do you try to figure out how the people around you view different situations?*

Debriefing Form

At the end of the study, the participants were presented with the Debriefing form with information about they are interested in learning more about the topic. By clicking the arrow at the bottom of the screen the students will be re-directed to the SONA page and automatically granted their 1.0 credit

Procedure:

Participants had the opportunity to read the description of the study on Brescia SONA recruitment system. After signing up participants were then given a Qualtrics link to access the survey. Upon starting the study, the participants were presented with the Letter of Information (LOI). After reading the Letter of Information, participants had the chance to consent to the research. If they clicked Yes to consent, they were presented with the Spatial Orientation Task and the strategy follow-up question, then they were presented with the Autism-Spectrum

Quotient and following that they completed the Perspective-Taking Mindset Measure and then the Social Perspective Propensity Scale. At the end of the study, participants saw the Debriefing form and automatically received a 1.0 credit for their participation, which marked the end of the study. The entire study approximately took 20 minutes to complete.

Results

Thirty-three participants completed the entire survey. Participants' spatial perspective-taking abilities were measured using degrees of error on the Spatial Orientation Test ($M = 110.83$, $SD = 28.64$), and their social perspective taking abilities were measured using the social ($M = 3.46$, $SD = 2.15$), and communication ($M = 2.88$, $SD = 2.72$) subscales of the Autism-Spectrum Quotient. The social subscale of the AQ and the communication subscale of the AQ were measured by reverse scoring items 11,15,17,27,31,36,38,44,47,48 for "Definitely disagree" or "slightly disagree". This indicated that people with lower scores showed better social and communication skills. Social perspective taking was also measured using the Perspective Taking Mindset Measure ($M = 3.32$, $SD = 1.02$) and the Social Perspective Propensity Scale ($M = 3.58$, $SD = 0.85$). Both of these tests were measured on a Likert scale ranging from 1(Strongly Disagree) to 5(Strongly Agree).

There was no significant correlation found between scores on the SOT and any of the social skills measures (Table 1, Figure 1, Figure 2, Figure 3) indicating no association between participants' spatial and social perspective taking. However, a positive, moderate, and significant correlation was found between the scores of the social and communication subscales of the AQ. Furthermore, there was a weak, negative, and significant relationship found between the scores of the SPPS and the scores of the communication scale of the AQ, indicating that the lower the participants scored on the AQ, the higher they scored on the SPPS. Greater propensity to take

Table 1.
Correlations for Study Variables

	1	2	3	4	5
1. SOT	–				
2. AQ Social	.02	–			
3. AQ Communication	.12	.67***	–		
4. PTMM	-.09	.33	.12	–	
5. SPPS	-.26	-.27	-.39*	.004	–

* $p < .05$, *** $p < .001$

Figure 1.
Degrees of Error on the SOT vs. Total Scores on the PTMM

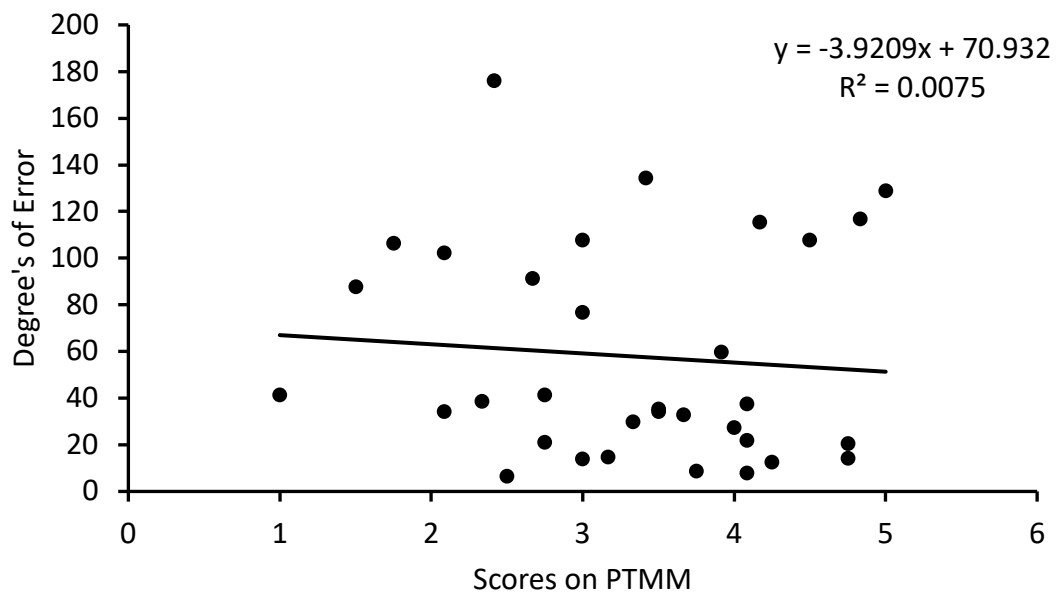


Figure 2.

Degrees of Error on the SOT vs. Total Scores on the SPPS

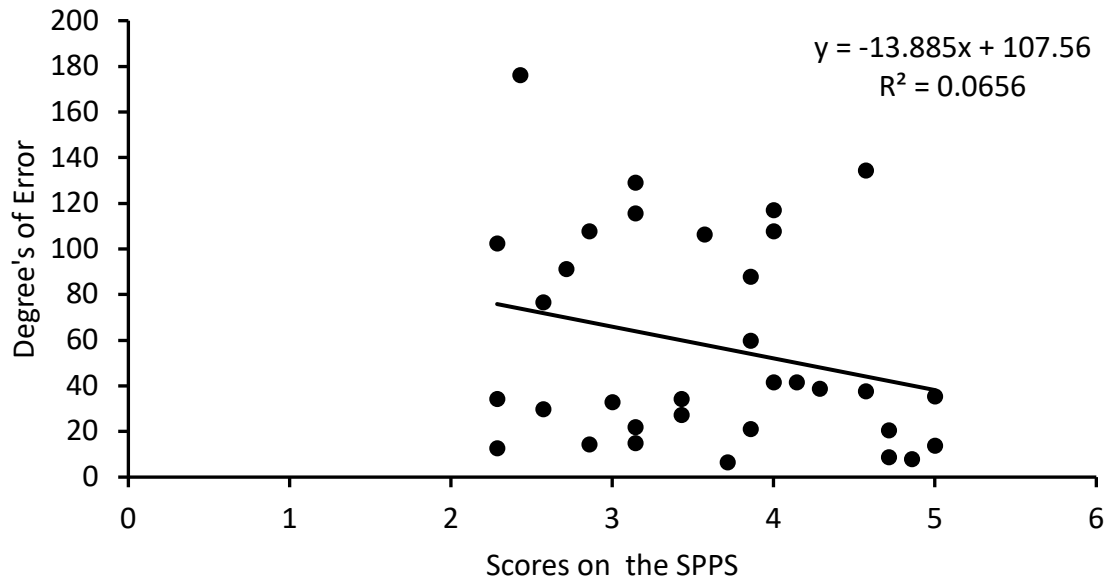
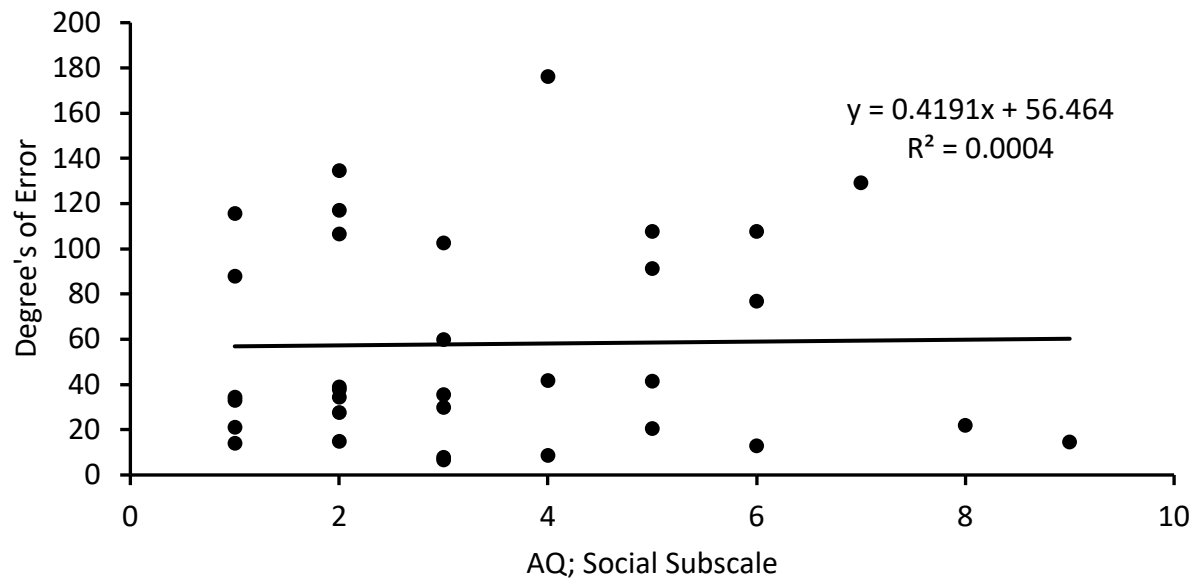


Figure 3.

Degrees of Error on SOT vs. Total Scores on the AQ Social



others perspective was associated with better communication skills. Due to the lack of a significant correlation between the SOT and the social skill measures, the planned regression analysis was not carried out.

Following the SOT, the participants were asked to describe the techniques they used while working on the SOT. The three most reported technique was placing oneself within the array of objects ($n = 13$). More specifically participants often imagined themselves within the array of objects and used hand-motions and body rotation to determine where the third object would be. For instance, participants reported “I pictured myself at each location and thought about where the other object would be in comparison” and “I imagined myself standing next to each object in order to determine what was on the left and the right side of me”. Another specific technique use was, rotating the image ($n = 5$), participants reported “I tried to rotate the picture in my head to see if I could picture the positioning” and “I looked at the angles and ‘swung’ the image mentally to line up with the diagram and find out where the 3rd image was”. Lastly, there were also non-specific techniques ($n = 10$) reported by participants such as “focussing” and “pointing to the direction of the images”.

Discussion

The current study aimed to determine if there was a correlation between social skills and spatial perspective taking. Spatial perspective taking was measured using the Spatial Orientation Test (SOT; Hegarty & Waller, 2004). While social skills were measured using the social and communication subscales of the Autism-Quotient (AQ: Baron-Cohen et al., 2001), the Perspective Taking Mindset Measure (Ragins & Ehrhardt, 2021), and the Social Perspective Propensity Scale (Gehlbach et al., 2008). It was hypothesized that the results on the social and communication subscales of the Autism-Quotient would not be related to participants

performance on the Spatial Orientation Test. Although one or more of the other social skill tests would be positively related to SOT performance. Our hypothesis was proven partially incorrect, since the AQ questionnaire was not related to performance on the SOT as predicted. In addition, there was no significant correlation between the Perspective Taking Mindset measure or the Social Perspective Propensity Scale and the scores on the SOT. Furthermore, there was no significant correlation between either of the two social skill tests. However, there was a significant negative correlation between the scores on the SPPS and the communication subscale of the AQ. The higher participants scored on the SPPS the lower their score was on the AQ, meaning that participants with better communication skills were more likely to take the perspective of others in a social situation. Together, these results show that social perspective taking does not appear to be associated with spatial perspective taking and better communication skills were correlated with a higher likelihood of taking others perspective.

These results further added to the evidence provided by Geer et al. (2022) that adding a social component alone was not enough to improve spatial perspective taking abilities. Their replication of Tarampi et al. (2016) study showed that social cues were not enough to affect participants' scores on the SOT. Which could be interpreted as there being no correlation between social skills and spatial perspective taking. Furthermore, Gunalp et al. (2019) also suggested that directionality and familiarity are more important determining aspects of someone's outcomes on the SOT rather than just the social cue alone. Which further confirms our findings that a stronger ability to take social perspective alone is not enough to improve spatial perspective taking abilities.

Some studies have suggested that the ability to take another's perspective in social situations may play a key role in being able to navigate the world through spatial perspective

taking (Shelton et al., 2011, Tarampi et al., 2016). However, our results showed that regardless of participants performance on the social skills tests and the spatial test, there was no correlation between the two providing evidence that those two skills may not be correlated. These results contradict the findings from Tarampi et al. (2016) who found that adding a social cue was enough to help women perform better on the SOT. Their research investigated whether social skills, at least in part, were intertwined with women's spatial perspective taking abilities. However, our results provided evidence that the two may not be related. Furthermore, Shelton et al. (2011) found that there was a positive correlation between the social skills and spatial perspective taking. They used the AQ to determine participants' social and communication skills and used a modified version of Piaget's three mountain perspective test, named the three-building test. They discovered that people that were rated as more sociable tended to do better on their spatial perspective task. More specifically, they also found that a social agent alone was not enough to help someone improve their spatial perspective taking, rather the participants needed to have good social skills to help with spatial perspective taking. Although past studies showed that social skills and spatial perspective taking abilities may be associated, our research found no correlation between the two.

A common theme in the above-mentioned studies was the usage of a singular test to determine social skills. However, the reliance on a singular test to measure social skills has the potential to cause mixed results when it comes to measuring social perspective taking abilities. Specifically, the AQ was used as a measure of participants' social abilities. However, this measure was developed to specifically test autism symptoms in participants and therefore the validity of this scale to test for social skills in individuals without autism is questionable. Furthermore, the whole test was also not utilized and only the social and communication

subscales were used to measure social skills in previous studies (Shelton et al., 2011; Tarampi et al., 2016; Geer et al., 2022). The results of the current study showed that there was no significant correlation between the scores on the social and communication subscales of the AQ and the degrees of error on the SOT. This was also seen in the results of Tarampi et al., (2016) and in the results presented by Geer et al. (2022) which found no correlation between the social and communication scales of the AQ and the SOT.

The addition of the Perspective Taking Mindset Measure and the Social Perspective Propensity Scale helped us further show that social skills were not correlated with spatial perspective taking abilities. The PTMM is a measure of participants' personal beliefs about social perspective taking as well as their own social perspective taking skills. This test was an important addition because it is a measure designed specifically to test social perspective taking. Furthermore, the questions presented on the measure gave the participants a chance to think about what perspective taking meant to them in social settings. Similarly, the SPSS was also used to determine the participants' tendency to consider other's point of view. Comparing the SOT with these additional social skills tests allowed us to compare spatial skills and social skills on a greater level. Meaning, it helped us investigate participants abilities specifically relating to social perspective taking and what their opinions were regarding taking the perspectives of others. Specific questions on the social tests asked participants to imagine how the person they are conversing with would be feeling, similarly to the SOT which asked participants to imagine standing at different objects and taking the objects perspective. Although the questions sounded similar and asked participants to perform similar tasks the results showed that the results of the two were unrelated. Which further provided evidence that even though both skills required imagining the perspective of another person or object, the two skills were not correlated.

In the current study, participants also reported using different strategies to solve the SOT, which included mental rotations of the array of objects and imagining themselves within the array of objects. Past research has shown that men are generally better at mental rotation tasks (Linn & Peterson, 1985) but our sample was all women. They also reported imagining themselves in the array standing at the object and then deciding where it would be situated in their surroundings. This type of perspective taking can be categorized as egocentric perspective taking which involves the ability to picture oneself standing at a specific place and trying to map out where objects would be situated in that surrounding. The participants' utilized different techniques such as mental rotation and imagining themselves within the array of objects, the use of this type of egocentric perspective taking was proven useful in solving the SOT.

The current study had several limitations which limit interpretation of the data. The first was the small sample size which contributed to the lack of statistical power. When studying extremely specific traits such as social skills and spatial perspective taking, a large sample size helps us attain a stronger power and creates more variance. For instance, Shelton et al. (2011) reported a significant relationship between the two skills and had a slightly larger sample size of 48 participants. While Tarampi et al. (2016) also reported a significant relationship, and their sample size was 139 participants. Therefore, our small sample size made it difficult for to make strong conclusions and provide concrete results. Another potential limitation was presenting the SOT online. The SOT can be a challenging task that has specific instructions that one must follow to provide the best results. Thus, if participants had a researcher present, it would have allowed them an opportunity to ask for clarifications which could have led to a decrease in the substantial dropout rate.

Further research on this topic could perhaps look at the correlation between more specific spatial skills, such as mental rotation or spatial navigation and whether they seem to be affected by specific social skills, such as extroversion or introversion. In conclusion, our study aimed to determine if there social skills effected spatial perspective taking abilities. We measured spatial skills using the Spatial Orientation Task and measured social skills using the social and communication subscales of the Autism Quotient, the Perspective Taking Mindset Measure, and the Social Perspective Propensity Scale. Our results revealed no significant relationship between the subscales of the AQ, PTMM, SPPS and the SOT. Our research revealed that the ability to take another's perspective in a social setting is not related to one's spatial perspective taking ability.

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