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Lights, Camera, Anxiety: The Spotlight Effect, Social Anxiety and the Perception of Gaze Direction

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Abstract

The goal of the current project was to replicate and extend research on the spotlight effect, a term used to describe the feeling of being the focus of others' attention (Gilovich, Medvec, & Savitsky, 2000). The spotlight effect has been linked to social anxiety, or the fear of negative social evaluation and scrutiny (Lipton, Weeks, Daruwala, & Reyes, 2016); however, there is little literature on how the spotlight effect might be linked to distorted perceptions of others' gaze direction (averted or direct). To address this gap in the literature, methods and materials from research on social anxiety, the spotlight effect, and eye gaze were combined. Participants completed measures of social anxiety, rated faces in a reaction time paradigm, and responded to vignettes that described typical, but mildly uncomfortable, social situations. Half of the participants completed the study in a darkened room with no researcher present, and half completed the same study with overhead lights on and a researcher present. The hypothesis that being observed by a researcher would prime the spotlight effect, particularly in those who scored higher in social anxiety, was supported. The effect was strongest in responses to vignettes, where trait self-consciousness of observed participants predicted the degree to which they felt attention and a spotlight would be on them, and that they would be obligated to represent their in-group. There was less support for the hypothesis that judgments of eye gaze would be similarly biased by researcher observation.

Introduction

As the main characters of our own story, much of our world revolves around awareness of our actions and appearance. Consequently, it may be difficult to realize that others are not as focused on us and our behaviors as we think they are. We expect others to notice both negative and positive things about us, including mistakes during a presentation, a stained shirt, new shoes, or a sports team cap. This egocentric bias may lead an unprepared student to believe they were called on by a clairvoyant teacher, or cause a person who enters a room of laughing peers to assume they are the subject of ridicule. Ross and Sicoly (1979) investigated egocentrically biased memory in a variety of group interactions in laboratory experiments, classrooms, and in ongoing relationships. In five studies, the authors found that individuals remembered more of their own contributions to joint activities and believed they were more responsible for

group outcomes. People recalled more of their own contributions to conversations, decisions, projects, and household chores than others credited to them. Krueger and Clement (1994) found that the egocentric bias was robust, even in the face of contradictory statistics and instructions that explained the nature of the bias before judgment tasks; participants consistently made the egocentric projection that a larger population would confirm their own thoughts, feelings and characteristics.

One form of egocentric bias has been called the "spotlight effect," a term used by Gilovich and colleagues (e.g. Gilovich, Medvec, & Savitsky, 2000; Gilovich, Kruger, & Medvec, 2002) to describe participants' consistent overestimation of the number of people who would notice their socially awkward, or their socially desirable, behaviors. In one representative study, Gilovich, Medvec, and Savitsky (2000) found that observers were far less likely to notice a T-shirt that depicted an embarrassing or admired figure than the participants who wore the shirt had predicted. In another study (Gilovich, Kruger, & Medvec, 2002), students rated themselves and their classmates on multiple occasions, over the course of a semester, on various features including whether they or their classmates were having a "good or bad day." Variability in day-to-day appearance was significantly less noticeable to others than it was to the participants themselves. Similar results were found for athletes; fluctuations in game-to-game performance commanded far less attention than the athletes suspected. Brown and Stopa (2007) studied the spotlight effect by asking half of their participants to stand in front of a video camera and complete a memory task, while others completed the same task sitting at a table unrecorded. Participants completed scales regarding self-awareness and fear of negative evaluation. Those who stood in front of the camera believed they had performed more poorly and that others would notice their mistakes.

Egocentric bias and the spotlight effect have also been demonstrated by studies that show they can be reversed or suppressed, as is the case when individuals experience the illusion of anonymity. The belief that one is unknown to others or the feeling of being unacknowledged by others has been linked to a diminished sense of personal responsibility and thoughtless or irresponsible behaviors, including the impulsive and destructive behaviors characteristic of mobs (Gilovich, Keltner, Chen, & Nisbett, 2016). For example, illusory anonymity was observed in masked trick-or-treaters, who were more likely to

behave dishonestly by taking extra candy or money, particularly when they arrived in groups and were not asked their names (Diener, Fraser, Beaman, & Kelem, 1976). In another example of the effect, Zhong, Bohns, and Gino (2009) generated an illusory sense of anonymity by manipulating darkness, through dimmed lighting or by asking participants to wear sunglasses. The authors found that college students were more likely to cheat an experimenter in a dimly lit room and that they behaved more selfishly when wearing sunglasses.

At the center of the illusion of anonymity is a feeling that no one is watching, while the core of the spotlight effect is that everyone is watching (Jun, Mareschal, Clifford, & Dadds, 2013). Therefore, an important aspect of the spotlight effect should be direct eye gaze. A direct gaze is a signal of attention, which indicates the potential onset of social interaction or scrutiny (Roelofs et al., 2010; Straube, Mentzel, & Miltner, 2005) and can be seen as a positive or negative social cue; a sign of openness and friendliness or a sign of judgement and confrontation. Socially anxious individuals may be more vulnerable to social signals that indicate attention from others and expect negative evaluations or scrutiny (Watson & Friend, 1969). Even subtle cues of being watched, including paintings of eyes on the wall or drawings of eyes on study materials, can induce a sense of being seen and alter thoughts and behavior (e.g., Izuma, 2012; Pfattheicher & Keller, 2015).

Some individuals may be more sensitive or vulnerable to real or imagined signs of social scrutiny because of their strong chronic public self-awareness (Fenigstein, Scheier, & Buss, 1975; Gervais & Norenzayan, 2012). The importance of eye gaze, particularly for socially anxious individuals, has been demonstrated by Wieser, Pauli, Alpers, and Mühlberger (2009). The authors tracked eye movements in response to animated faces, depicted with neutral expressions, in which gaze direction was manipulated (direct or averted). Socially anxious participants spent more time looking at faces and fixated on the eye region longer than moderate or low anxiety participants, and their heart rates increased in response to direct eye gazes, suggesting a fear response. Roelofs et al. (2010) also found evidence that socially anxious individuals feared direct gaze. Participants viewed faces with different emotional expressions and gaze directions and indicated their desire to either approach the target (by pulling a joystick towards themselves) or avoid the target (by pushing the joystick away). For all participants,

avoidance responses were fastest when an angry expression was combined with a direct gaze. However, those who scored higher in social anxiety were also quick to push the joystick away from them when they saw a happy expression, regardless of the gaze direction, suggesting that for the socially anxious, an expression that signals likely interpersonal contact, even positive contact, represents a potential threat.

There is no real "threat" of social interaction with faces shown on a computer screen and some have suggested that socially anxious individuals may experience less discomfort and might even benefit from online interaction (Morahan-Martin & Schumacher, 2003; Yen et al., 2012), where they can engage in social contact without the fear of immediate disapproval (Reid & Reid, 2007). Others have found that for the socially anxious, even viewing faces on a computer results in physiological responses indicative of the spotlight effect. For example, researchers have found that socially anxious participants who viewed potential interaction partners on a computer screen had more activity in the amygdala, the area of the brain associated with fear responses (Roelofs et al., 2010), a more rapid heart rate (Wieser et al., 2009), and stronger physiochemical response (Rauch, Strobel, Bella, Odachowski, & Bloom, 2014), than control participants without social anxiety.

The work described above suggests links between the spotlight effect and social anxiety, and between eye gaze perception and social anxiety; however, little or no research has examined all three variables. The current study addresses this void in the literature by replicating and extending previous research. For example, inspired by Zhong et al.'s (2009) methods, some participants in the current study completed the face task and survey under the watchful eye of an experimenter (the spotlight condition), while others were in a dimmed room and not accompanied by the researcher during these tasks (control condition). Given Gilovich et al.'s (2000; 2002) findings, it was hypothesized that the spotlight manipulation would increase the degree to which participants believed others would notice them in hypothetical, but typical, social interactions (described in survey vignettes modified in part from Gilovich et al. 2000). Based on Pfattheicher and Keller's (2015), those in the spotlight condition were expected to underestimate the angle of eye gaze shown on the neutral faces presented on a computer screen (believing the gaze was more direct). Based on Roelofs, et al. (2010) and Watson and Friend (1969), participants in the spotlight condition were expected to

predict that targets with a direct eye gaze would more negatively evaluate them. As suggested by Wieser et al.'s (2009) findings, it was hypothesized that participants in the spotlight condition would spend more time assessing direct gaze targets, thus slowing their response times. Self-reported social anxiety was expected to exacerbate these effects.

Method

Participants

Fifty-seven students (20 males, 37 females; 45 Caucasian, 12 other), aged 17 to 24 (M = 19.63, SD = 1.43), were recruited from the Psychology Department subject pool, via SONA Systems, during the Spring 2018 and Fall 2018 semesters.

Materials

SuperLab software (Cedrus Superlab 5 [Stimulus Presentation Software]) was used to present participants with a variety of faces with neutral expressions. Stimulus faces (Caucasian and Moroccan males and females) were obtained from the Warsaw Set of Emotional Facial Expression Picture database (Olszanowsk et al., 2015). They were shown for 0.25 seconds and participants were asked to indicate eye gaze and face direction and rate the faces based on questions taken from the Evaluation, Motivation, and Expectancy Measure (Andersen, Reznik, & Manzella, 1996). The SuperLab software captured responses and response times.

After the Superlab activity, participants completed a pencil and paper survey packet that included six vignettes, each of which described plausible and potentially embarrassing or socially awkward classroom circumstances that would be expected to prime the spotlight effect. Two vignettes described events that had had been demonstrated in past literature to prime the spotlight effect (i.e., wearing a t-shirt that depicted an embarrassing or admired figure). Two vignettes asked participants to imagine that they were one of the only minority students or one of many minority students in a classroom setting where the professor made a hypothetical provocative comment about race. In two other vignettes, participants were asked to imagine (dependent on participant gender) that they were the only male or female or one of many males or females in a classroom setting where the professor made a comment about their fit in the class based on gender stereotypes (i.e. women in science; men in an art class). After reading each of the vignettes, participants were asked to rate their feelings and were asked three questions designed to measure the spotlight effect:

"how much do you feel like you would be the focus of attention," "how much do you feel as if there is a spotlight shinning down on you," and "how much do you feel like you would have to represent your in-group." They used a 10-point Likert scale from 1 (not at all) to 10 (very much so).

The survey packet also included three commonly used self-report measures of anxiety, including: the Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975), Social Anxiety Questionnaire (SAQ) for Adults (Caballo et al., 2010), and the Behavioral Inhibition and Activation Scales (BIS/BAS; Muris, Meesters, de Kanter, & Timmerman, 2005). The DSM-V defines social anxiety as a multifaceted disorder with experiences of intense fear or anxiety in situations of interaction, observation, and performance (APA, 2013; Caballo et al., 2015). The DSM-V also explains that anxiety disorders differ from one another in the types of objects/situations that induce fear, anxiety, and avoidance behaviors (APA, 2013). The measures of anxiety used in the current study were selected to try to capture the different aspects of anxiety and were based on previous research and appropriateness for our non-clinical sample. Research relevant to the current study used multiple scales to assess the various characteristics of social anxiety (Armstrong & Khawaja, 2002; Wieser et al., 2009). Scale intercorrelations appear in Table 1.

The Self-Consciousness Scale is a commonly used 23-item questionnaire that measures individual differences in private (attention to inner thoughts and feelings) and public self-focus (attention to the self as a social object). Participants rated items (e.g. "I'm concerned about the way I present myself" and "I'm always trying to figure myself out) on a five-point Likert scale from 0 (extremely uncharacteristic) to 4 (extremely characteristic). Chronbach alphas indicate a reliability of .75 for private self-consciousness and .84 for public self-consciousness (Fenigstein, Scheier, & Buss 1975; Scheier & Carver, 1985). Validity has been confirmed by research on a wide variety of personality and individual difference measures (e.g. Turner, Carver, Scheier & Ickes, 1978). In the current study Cronbach alphas were .77 for private self-consciousness and .86 for public self-consciousness.

The SAQ is a 72-item questionnaire that measures participant levels of uneasiness, stress, or nervousness. Participants responded to items such as "Wanting to start a conversation and not knowing how", "Being told that I am doing something wrong", and "Having to speak in class, at work, or in a meeting" on a seven-point Likert scale from 0 (not at

Table 1

Summary of Intercorrelations between Spotlight Effect Questions and Measures of Social Anxiety

	1	2	3	4	5	6	7	8
1. Would be the Focus of Attention	—							
2.Spotlight Would be on Me	.87**	—						
3.Should Represent my Ingroup	.47**	.58**	—					
4.Private Self-Consciousness	.09	.10	.22	—				
5.Public Self-Consciousness	.35**	.34**	.40**	.49**	—			
6.SAQ Total	.09	.09	.03	.30*	.53**	—		
7.BIS	.24	.34*	.32*	.35**	.76**	.69**	—	
8.BAS Reward	.21	.18	.51**	.45	.33*	.05	.33*	—
9.BAS Drive	.18	.12	.43**	.16	.02*	-.04	.02	.51**

Note. $N = 57$.
** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

all) to 6 (extremely high). In past research, Chronbach alphas indicated strong reliability (.96 overall and split-half reliability of .97) and concurrent validity was established with a variety of anxiety and individual difference measures in clinical and non-clinical samples (Caballo et al., 2010). Reliability in the current study was .98.

The BIS/BAS Scales (Carver & White, 1994) consist of a 20-item questionnaire that measures inhibition sensitivities, reward responsiveness, drive, and fun seeking. Seven BIS items measure participant's emotional responses to negative events that may result in punishment (e.g. "I usually get very tense when I think something unpleasant is going to happen). Thirteen BAS items measure emotional and behavioral responses to a potentially rewarding event (e.g. "When I am doing well at something, I like to keep doing this," and "When I see an opportunity to get something that I want, I go for it right away.") Participants were asked to rate each item on a four-point Likert scale from 0 (not true) to 3 (very true). Convergent and discriminant validity has been confirmed by research on a wide variety of personality and individual difference measures (e.g. Carver & White, 1994; Leone, Perugini, Bagozzi, Pierro, & Mannetti, 2001) and the subscales have demonstrated good alpha reliability (e.g. between .60 to .82 in Wong et al. 2016 and .58 to .77 in Brenner et al. 2005) in

clinical and non-clinical samples. In the current study Cronbach alphas were .84 for BIS and .92 for BAS reward response and .88 for BAS drive response.

Procedure

Participants completed the study in groups of 1 to 4. They were seated in a 9.5' x 12' foot room at a row of semi-private cubicles equipped with a computer screen and keyboard. They were randomly assigned to one of two conditions. Condition 1 (C1) was designed to emulate a more private setting; participants were in a darkened room with individual desk lamps at each cubicle and no researcher was present. Condition 2 (C2) was used to prime feelings of being under scrutiny by an audience (i.e. the spotlight effect); participants completed the study in a room where the overhead lights were on, and a researcher was standing behind them throughout the study. Twenty-nine participants were assigned to C1, and 28 participants were assigned to C2.

After pre-briefing and consent, participants started a computer module programmed with Super Lab software. Participants started the program by clicking the space bar to begin the experiment. Regardless of condition, participants were shown a practice image paired with instructions on what they were being asked to do. In both conditions, the researcher was present in the room during this trial period to make sure that participants understood the instructions and had no further questions. After the practice image, dependent on condition, the researcher would either leave the room (C1) or remain standing behind them for the duration of the research study (C2).

In total, participants were shown 35 images of faces with varying face and eye gaze directions, which were shown for 0.25 seconds. They were asked to judge the face and gaze direction of each for the first 18 photos. After the photo disappeared, participants were asked to indicate where they believed the eye gaze and face direction to be. Participants used one of 17 alphanumeric keys on a standard keyboard to indicate the direction of targets' face and eye gaze. The numbers 1 (leftmost numeric) through 9 (rightmost numeric) and Q (leftmost alphabetic) through I (rightmost alphabetic) were chosen because their staggered placement on the first two rows on the keyboard allowed participants to make somewhat fine-tuned responses. For example, a "5" would be used to indicate the most direct face or gaze, the letters "R" (just to the left of "5" on the keyboard) or "T" (just to the right) could be used to indicate

face or gaze was slightly averted. The remaining 17 faces were rated on the Evaluation, Motivation, and Expectancy Measure (Andersen, Reznik, & Manzella, 1996), using the numeric keys 1 through 5 to select a response. For example, some questions asked the participant "How well do you think you will like this person?", "How comfortable do you think you would feel interacting with this person?" and "How much do you think this person would be accepting of you?". Keyboard responses and response times were captured by SuperLab software.

After the Super Lab section was completed, participants were asked to complete the pencil and paper survey located on the desk in front of them. Once both parts of the study were completed, participants were asked to hand their materials to the researcher. The researcher was either located down the hall in a separate room (C1) or located in the room behind them (C2). Once they gave the researcher their materials, participants were debriefed.

Results

The hypothesis that the spotlight manipulation would increase the degree to which participants believed others would notice them in hypothetical, but typical, social interactions (described in survey vignettes), was only partially supported. Analysis of variance (ANOVA) results indicated no significant effect of condition (researcher present or absent) on the three spotlight question ratings $F(3, 53) = 2.41$, $p = .07$; however, there was correlational evidence that socially anxious participants were influenced by the manipulation. In C2 (spotlight condition, researcher present), trait self-consciousness predicted the degree to which participants said that vignettes evoked feelings that they were the focus of attention $r = .41$, $p = .03$, that there was a spotlight shining down on them $r = .48$, $p = .01$, and they needed to represent their in-group $r = .54$, $p < .001$. The behavioral activation system (BAS) scales also predicted responses in C2. BAS reward response $r = .52$, $p = .01$ and BAS drive response $r = .53$, $p < .001$ were correlated with participants' reports that they should take action as a representative of a criticized in-group. None of the correlations were significant in C1, when the researcher was not in the room. SAQ and BIS (behavioral inhibition) scales were not linked to spotlight question ratings in either condition.

Analysis of variance tests indicated no support for the hypotheses that those in the C2 spotlight condition would demonstrate a self-centered bias by judging gazes as more direct $F(1, 55) = 2.35$, p

= .13. To test the predicted effect of direct gazes on participants' evaluation ratings, paired sample t-tests were used. Contrary to the hypothesis, those in C2 did not indicate that targets with direct and gaze would evaluate them more negatively than targets with indirect gaze $t(27) = 1.46$, $p = .16$; however, those in C1 (no researcher) thought they would be evaluated more favorably by direct gaze targets than by indirect gaze targets $t(28) = 2.35$, $p = .03$. Means and standard deviations appear in Table 2.

The expectation that the spotlight manipulation would result in slower response times was not supported $F(1, 55) = .032$, $p = .86$. Paired samples t-tests were used to test the hypothesis that C2 participants would be slower to respond to direct gaze targets. Results indicated that spotlight condition response times did not differ by gaze direction $t(27) = -.88$, $p = .38$, but those in C1 were faster to judge direct gaze targets than targets with an averted gaze $t(28) = -2.27$, $p = .03$. Means and standard deviations appear in Table 2.

Discussion

The hypothesis that those with a tendency towards social anxiety would be more vulnerable to the spotlight manipulation was supported in two ways. First, researcher presence was associated with increased feelings of the "spotlight effect" in response to the vignettes. Those who scored higher in measures of reward and drive response (behavioral activation) and public self-consciousness (attention to the self as a social object) reported stronger feelings that they were in the spotlight and feelings that they had to represent their in-group when the researcher was present. This suggests that behaviors associated with dispositional

Table 2

Mean Face Ratings Evaluations and Response Time (RT) by Condition

	No Researcher (C1)		Researcher (C2)	
Face Evaluations and Expectancies	*M*	*SD*	*M*	*SD*
Direct Gaze	3.05*	.41	2.99	.40
Indirect Gaze	2.94	.46	2.92	.41
Direct Gaze RT (ms)	16337.50	4079.80	15963.14	4778.48

* $p < .05$

tendencies toward action and self-consciousness were enhanced by the spotlight manipulation. The results supported Pfattheicher and Keller's (2015) findings that social awareness was increased when participants thought they were being watched. The current study also supports Fenigstein et al.'s (1975) and Gervais and Norenzayan's (2012) suggestion that some individuals may be more sensitive to environmental cues. Participants who scored higher in self-consciousness and behavioral activation appeared to have been more vulnerable to the researcher's scrutiny in C2, or their egocentric biases were reduced under conditions that primed illusion of anonymity in C1.

The current study was inspired by Gilovich and colleagues' (e.g. Gilovich et al., 2000; Gilovich et al., 2002) representative studies regarding the spotlight effect and the vignettes were created based on the situations they tested with groups of participants and live interactions. Although not designed to replicate the specifics, the results reported here give support to the body of literature that Gilovich et al., (2000) produced and suggests that individuals may feel the spotlight effect in both real life and in hypothetical situations as described in the vignettes. The current study extended prior work to suggest that a spotlight manipulation could influence expectations of evaluation when gaze was direct and indirect. While the hypothesis was not directly supported, responses suggest that the default expectation for direct gaze to result in positive evaluation was mitigated by the spotlight manipulation. Those in the privacy condition (C1) rated targets with a direct eye gaze as more likely to evaluate them positively compared to those in the spotlight condition (C2). This suggests a tendency for most people to view a direct gaze as a sign of engagement, attention, and openness, and for socially anxious individuals to interpret a direct gaze more negatively. A similar pattern was found in response times, where the hypothesis that the spotlight condition would slow response times was indirectly supported; those in C1 were faster to judge direct gaze targets and took more time looking at those with an indirect gaze, while those in the C2 condition devoted similar time to judging all faces, regardless of gaze direction. Together, results support the suggestion that social anxiety may lead to negative interpretation of direct gaze (Brown & Stopa, 2007; Watson & Friend, 1969) and that public self-awareness can increase feelings of uncertainty, vulnerability and expectations of scrutiny (Fenigstein, Scheier, & Buss, 1975; Gervais & Norenzayan, 2012).

The failure to find differences in judgements of

gaze direction based on condition was disappointing and the small sample size does not allow for analyses that might reveal interaction effects (target gender and condition, for example). The present study was not designed to measure clinical anxiety and participants were not asked whether they were currently, or had ever been, diagnosed or treated for social anxiety. Prior research on eye gaze judgment has focused on a clinical population, as highlighted in research done by Wieser et al., (2009) and Roelofs et al., (2010), so the manipulation in the current study may not have been strong enough to elicit such biases in a non-clinical sample. Enrolling a sample of college students with clinical diagnoses of social anxiety, or comparing responses from those with social anxiety to responses from participants diagnosed with depression, would allow for more definitive conclusions, but the significant results found with self-report measures indicate that responses to eye gaze may not be unique to clinical levels of anxiety.

At a time when over 40% of college students indicate that anxiety is one of their main concerns (Campbell, Bierman, & Molenaar, 2016), and screen time continues to rise (Reed, 2016), the method (assessing faces on a computer screen) and sample (college students) of the current study are particularly relevant in contemporary culture. The results shed light on one way individuals perceive social scrutiny, and how it may influence behavior in those who are dispositionally vulnerable. Anticipatory anxiety often motivates avoidance behaviors, including the avoidance of eye contact (Respondek, Seufert, Stupnisky, & Nett, 2017), which effectively reduces opportunities to learn new coping skills and perpetuates the problem (Lipton et al., 2016; Russell & Shaw, 2009). This cycle has been linked to school failure and dropouts (Carsley, Heath, Gomez-Garibello, & Mills, 2017). It is important to continue to investigate symptomatic and perpetuating behaviors that may lead to a better understanding of environmental cues and dispositional factors that elicit anxiety in social settings and this study contributed to the literature by examining the relationships between the spotlight effect, social anxiety, and gaze perception.

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