

The effect of perceived direct gaze on self-focused attention

Jonne Hietanen
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School of Social Sciences and Humanities
University of Tampere
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UNIVERSITY OF TAMPERE
School of Social Sciences and Humanities

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It has long been speculated that eye contact increases self-focus, but the effect has been little researched. Moreover, most of the studies so far have been based on self-report questionnaires, which are problematic due to issues of credibility and reactivity. In the present study, the effect of perceived direct gaze on self-focused attention was investigated with implicit measures.

The self-focus-inducing effect of direct gaze was examined with a video stimulus. Participants were instructed to imagine that the person in the video was a real person sitting opposite to them. Self-focus was measured with a novel latency-based measure, and an implicit pronoun-selection task, in addition to a commonly used self-report measure of self-focus. The participants were randomly assigned to either a direct or an averted gaze group, and their scores on these measures were compared. Self-focus was found to be higher for those in the direct gaze group as gauged by the latency-based measure. The results on the pronoun-selection task did not differ between the groups. Furthermore, the self-reported awareness of one's internal states was found to be heightened in the direct gaze group.

The results suggest that the perception of a direct gaze increases self-focused attention. The perception of a direct gaze without being observed seems to increase introspective self-focus, whereas mutual eye contact with a live person is known to increase the awareness of one's appearance. As introspective self-focus is associated with an increase in the salience of emotions and values, the results have implications for certain forms of communication, such as campaigning or advertising.

Keywords: self-focused attention, self-awareness, eye contact, gaze direction, direct gaze

With the appearance of the Other's look I experience the revelation of my being-as-object.

—Jean-Paul Sartre, *Being and Nothingness*, 1943.

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1. INTRODUCTION

1.1. Self-awareness, a self-centered state of mind

Self-awareness was originally defined by sociologist George Herbert Mead (1934) as entering one's own experience as an object, which requires assuming the perspective of others by which to view one's self. In addition to the awareness of an external perspective of one's self, self-awareness refers to the capacity to be aware of one's internal experience, such as feelings, thoughts and desires (Fenigstein, Scheier, & Buss, 1975). Self-consciousness is a related phenomenon that refers to the personality trait of habitual self-awareness. Already in the 1970s, Argyle (1975) speculated that eye contact would increase self-awareness. The perception of a direct gaze is a strong indication of being observed, which should quickly awaken the awareness of an outsider's perspective, turning the focus back on the self. Reddy (2003) has even proposed, that when engaged in eye contact, infants as young as two months old are aware of others focusing attention on them, showing reactions of self-awareness as a result. Regardless of a lot of speculation, the effect of eye contact on self-awareness has been little investigated.

Experimental research on self-focused attention¹ began in the early 1970s with the theory of objective self-awareness by Duval and Wicklund (1972). They began examining the cognitive consequences of the state which they called objective self-awareness, the state of being the *object* of one's own attention. Duval and Wicklund thought that conscious attention may be focused either inward toward the self, or outward toward the external environment. When focusing on the self, people begin to reflect upon themselves, which according to the theory, leads to an evaluation of the self. Duval and Wicklund suggested that this self-evaluation leads to a comparison of the actual self against the internal, idealized standards of how the person would like to be. If the more salient aspects of the self are inconsistent with the standards of one's ideal self, negative affect arises and the person will attempt to reduce the disparity by either modifying their behavior, or in some cases, changing their standards altogether in order to alleviate internal discord. If the disparity between one's actual self and one's idealized self is considerable, people are more likely to simply avert self-focused attention instead of attempting to reduce the disparity (Silvia & Duval, 2001). As most people are unlikely to meet all of the idealized standards they have set for themselves, to a varying extent, the theory of objective self-awareness proposed that self-focus is an aversive state (Duval & Wicklund,

1 To avoid confusion between the terms self-awareness and self-consciousness, this paper will use the term self-focused attention to refer to the momentarily state of self-awareness.

1972). The self-standard disparity can also be positive (for example in a situation where a person's successes exceed their expectations), which results in seeking self-focused attention (Morin, 2011). These consequences of self-focused attention—an evaluation of the self against internalized standards and the attempt for greater consistency between them—have been demonstrated in many studies (see e.g. Scheier & Carver, 1983).

Self-focused attention has a variety of effects on cognition, many of which are related to its self-evaluative nature. Presumably caused by the intent to meet self-related standards (Silvia & Gendolla, 2001), self-focus increases the adherence to rules and honest behavior (Beaman, Klentz, Diener, & Svanum, 1979; Bateson, Nettle & Roberts, 2006; Diener & Wallbom, 1976). Because focus on the self inherently evokes self-criticism, it is often avoided (Baumeister, 1991). Many forms of behavior, such as watching television, binge eating, abusing alcohol, or in extreme cases, committing suicide have been suggested to be means of escaping self-focused attention (Baumeister, 1991; Heatherton & Baumeister, 1991).

Self-focused attention has also been proposed to refine the perception of one's personality and experience (Silvia & Gendolla, 2001). Focusing on the self seems to facilitate self-knowledge. For example, in a self-focused state, people have been found to give more accurate self-reports (Pryor, Gibbons, Wicklund, Fazio, & Hood, 1977). Interestingly though, as self-focus increases, the ability to evaluate other people decreases (Vallacher, 1978). Some researchers suggest that inducing self-focus facilitates more accurate perception of internal states, such as arousal, excitement and taste (for a review, see Silvia & Gendolla, 2001). In a critical review of the “perceptual accuracy hypothesis”, Silvia and Gendolla (2001) argued that the results supporting the hypothesis were open to alternative explanations, such as greater consistency between actions and standards and exaggeration of physical symptoms. In a self-focused state, people do indeed appear to overestimate physical symptoms (e.g. Levine & McDonald, 1981). In later, more methodologically rigorous studies it was demonstrated that participants were more likely to accurately detect their heartbeat if self-focused attention was induced (Ainley, Tajadura-Jimenez, Fotopoulou, & Tsakiris, 2012; Ainley, Maister, Brokfeld, Farmer, & Tsakiris, 2013). More extensive methodologically-sound examination of the perceptual accuracy hypothesis remains to be carried out.

Attention directed inward can be conceptualized not only as a momentary state, but also as habitual attention to one's self. The trait of self-consciousness is characterized as the propensity to be concerned with one's behavior and appearance and a tendency toward introspection (Fenigstein, et al., 1975). Fenigstein and colleagues (1975) developed a theory on habitual self-consciousness and a self-report called the Self-Consciousness Scale to assess it. In their research, self-consciousness was found to have two major components, private and public self-consciousness. Private self-

consciousness is the tendency to examine and reflect on one's inner self, thoughts and feelings. By contrast, public self-consciousness is the tendency to be concerned with the public side of the self: how one is perceived by others. In addition to the private and public scales, the Self-Consciousness Scale, often abbreviated as SCS, also measures social anxiety, defined as the discomfort in the presence of others. Social anxiety was demonstrated to be a related phenomenon, having a modest correlation with public self-consciousness. The private and public scales do not appear to overlap considerably (Carver & Glass, 1976), and a longitudinal study suggests that they are stable enough to be considered personality traits (Davis & Franzoi, 1991).

1.2. Measuring self-focused attention

The level of self-focused attention has been gauged with many methods. Nowadays, the standard tool for this purpose is a questionnaire called the Situational Self-Awareness Scale or the SSAS, constructed by Govern and Marsch (2001). The SSAS measures three distinct aspects of self-focus or, as Govern and Marsch (2001) call it, situational self-awareness: awareness of one's public appearance, awareness of one's private experience, and awareness of one's surroundings. Basically, the public and private situational self-awareness refer to the same domains of the self as the corresponding personality traits of the SCS. The SSAS consists of three items for each of the three scales. Govern and Marsch (2001) have demonstrated SSAS to be sensitive to situational factors, such as different environments and a variety of self-focus manipulations. In conclusion, SSAS is considered to be a valid, versatile and convenient questionnaire of situational awareness.

Though the Situational Self-Awareness Scale is arguably a practical measure of self-focus, it is not a flawless method. In general, all self-reports have many known validity issues. People may have conflicting motives affecting their reporting, and even when they are attempting to answer honestly and accurately, they can be limited in their capacity to accurately evaluate their own state (Paulhus & Vazire, 2007). In addition, research has demonstrated that completing self-report questionnaires increases self-focused attention (Osberg, 1985), presumably because of the introspection it requires (Eichstaedt & Silvia, 2003). Self-reports have even been used as a means to manipulate self-focus (Brown, 1988). Like other such measures, the SSAS is likely to induce self-focus, possibly decreasing its validity. This is a considerable detriment that applies to all self-report measuring of self-focus.

Researchers have also developed other measures of self-focused attention, many of which rely on linguistic processing. These indirect measures do not have the inherent problems of self-reports of self-focus, but they are not flawless either. A commonly used method is to present participants with

questions and count the proportion of self-related responses (Davis & Brock, 1975; Exner, 1973; Nasby, 1989). A higher proportion of self-related responses is assumed to reflect self-focused attention. The most widely used measure of this kind is the Self Focus Sentence Completion task (SFSC) developed by Exner (1973), in which participants complete 30 incomplete sentences with whatever comes to their mind. The answers are categorized into one of four categories. The categories are self-focus, external world focus, ambivalence, and neutral. The number of responses in the self-focus category is then used to gauge the participants' level of self-focus. However, the SFSC and systems alike have been criticized of their lack of standardized coding systems (Eichstaedt & Silvia, 2003). Eichstaedt and Silvia (2003) also argue that tasks such as the SFSC require monitoring and describing one's thoughts, which is likely to increase self-focused attention and thus cause similar sensitivity problems as the self-report measures of self-focus.

As previously mentioned, according to the theory of objective self-awareness, self-focused attention initiates a self-evaluative state (Duval & Wicklund, 1972). Some measures of self-focus are based on the measurement of self-evaluation as an indicator of self-focused attention. In one such measure, Geller and Shaver (1976) administered the study participants with a modified Stroop task. In the Stroop task, the participants are instructed to name the ink color of words and not to pay attention to the meanings of the words. In this study, the words were either neutral (such as sometime, twelve, survey) or self-evaluative words (such as disliked, proud and error). The threshold for reading a word has been shown to decrease if the word has been primed before, thereby slowing the competing task of naming the ink color of it (Warren, 1972). It was anticipated that a self-focus manipulation would increase self-evaluative thoughts, and thus slow down the color naming of self-evaluative words. Geller and Shaver (1976) manipulated the self-focus of the participants with a mirror and a camera. The results were as expected, but the researchers noted that the self-evaluative words were actually just referring to people in general and not only to the self. The results could be interpreted as an increase in any evaluative or people-related thoughts, and not necessarily as an increase in self-evaluation or self-focused attention. Eichstaedt and Silvia (2003) also pointed out, that the effect could have been due to the differences in valence in the word sets. The evaluative words were emotionally strong, whereas the neutral words were emotionally neutral. As the words were not specifically *self*-evaluative and they also differed from the neutral words in emotional valence, it would be imprudent to state that the effect seen on the color-naming latencies was necessarily due to heightened self-focus. It is also important to note that since all self-evaluative words are likely to differ in emotional valence from neutral words, this problem cannot be avoided even with a more careful selection of words. This effectively rules out all measures that compare the reading threshold of self-evaluative words to those of neutral words in the study of self-focused attention.

In an imaginative study, Davis and Brock (1975) used a foreign-language sentence task as an implicit measure of self-focus. The participants were asked to read sentences written in Swahili, which they did not understand. The pronouns in the sentences were underlined and the subjects' task was to determine which English pronouns corresponded to the pronouns in the sentences. The participants were led to believe that the task is a measure of sensitivity to foreign languages (Davis & Brock, 1975). The participants' self-focus was manipulated by the use of a television camera directed towards them. On average, participants in the camera condition chose 30 percent more first-person pronouns than participants in the no-camera condition. These results indicate that when people focus attention on themselves, they are more likely to use first-person pronouns. In later studies, corresponding results have been obtained with another pronoun-selection measure of self-focus, the Linguistic Implications Form (LIF; Wegner & Giuliano, 1980, 1983).

The presumed likelihood to use more self-related words while in a self-focused state was later utilized in the development of another measure of self-focus. Eichstaedt and Silvia (2003) recognized the problems of the available measures of self-focus and they took it upon themselves to develop a measure that is implicit and based on response time. Visual word-recognition has been shown to be affected by the relevance of the words to the participant's current mental state. For example, the emotional state of the participant has been found to facilitate the recognition of words corresponding to the participant's emotional state (Niedenthal, Halberstadt, & Setterlund, 1997). Based on this idea, Eichstaedt and Silvia (2003) developed a word-recognition measure of self-awareness. In this measure, the participants were presented with a box of constantly changing random letters. They were instructed to identify a hidden word that was disappearing and reappearing in different positions in the center row among three rows of randomly changing letters. When the subjects identified the hidden word, they were instructed to hit a key and type the recognized word. The word-recognition measure displayed ten words, five of which were self-relevant words (me, myself, self, face, mine) and the rest neutral words matched for length and frequency (up, theory, walk, drop, they). After 10 practice trials, the subjects were presented with the 10 test words in random order. The dependent measure was the recognition latency of correctly recognized words. Self-focus was expected to facilitate the recognition of the self-related words. The study was conducted online and 130 participants took part. The participants were administered the Self-Consciousness Scale randomly either before or after the task. Participants rating higher in the personality trait of self-consciousness were also expected to be more self-focused when administering the task. A regression analysis conducted on the results revealed that the higher the private self-consciousness of the person, the quicker they were to recognize self-relevant words. Conversely, as public self-consciousness increased, people recognized self-relevant words more slowly. The correlations imply that the word-

recognition measure of Eichstaedt and Silvia is a useful method of assessing the trait of self-consciousness. In addition, Eichstaedt and Silvia (2003) conducted another experiment with a self-focus manipulation. In this experiment, participants were assigned to three groups with different tasks. In the self-focused group, the participants were asked to write about how they differ from other people. The task is known by the name of self-novelty manipulation and it has been demonstrated to increase self-focused attention (Silvia & Eichstaedt, 2004). In the neutral task the participants were asked to write about their computers. No task was assigned to the third group. The participants who wrote about themselves recognized self-relevant words more quickly than the participants of the two other groups. According to the authors, the results indicate that the word-recognition task was also able to capture the situational variation in self-focus.

1.3. Manipulations of self-focus

In previous research, different means to increase self-focus have been utilized. According to the theory by Duval and Wicklund (1972), focusing the attention away from external surroundings and toward oneself should lead to heightened objective self-awareness. This so-called Duval-Wicklund effect has been demonstrated with many self-focus manipulations. Efficient self-focus manipulations have included listening to recordings of one's own voice (Wicklund & Duval, 1971), being in front of cameras (Davis & Brock, 1975), writing about oneself (Silvia & Eichstaedt, 2004), running in place in an embarrassing way (Wegner & Giuliano, 1983) or probably the most common manipulation of all, seeing one's reflection in a mirror (Carver & Scheier, 1978). Conversely, manipulations that deflect the attention away to an external task have been used to reduce self-focus (e.g. Duval & Wicklund, 1973).

Gazing at a mirror is the classic manipulation of self-focus. It forces the participants to look at themselves which effectively turns the focus on the self. Interestingly, as measured by the SSAS, a mirror small enough to reveal only a part of the subjects' face increases private self-awareness, whereas a mirror large enough to reveal the entire face increases public self-awareness (Govern & Marsch, 2001). Both of them turn the attention inward, but a small mirror seems to increase the scrutiny of the more private aspects of the self in a way that a larger mirror does not. The large mirror represents the person as a whole, portraying how one appears in the eyes of others, thereby directing the attention to the public side of the self. A mirror seems to remind us of how others perceive us when we are being observed by them, alerting us to a similar state as when we are actually being observed.

Being observed turns the attention to the self. The effect of observation has been studied in many ways, such as placing study participants in front of an observing research assistant (Carver & Scheier, 1978). Direct observation has consistently proven able to induce self-focused attention. In addition to direct observation, a mere assumption of being observed suffices to induce self-focus. The belief of being observed has been demonstrated to induce public self-awareness even when the assumed observer cannot be seen (Myllyneva & Hietanen, 2016). Previous research has also shown this by manipulating participants' self-focus with the use of television cameras (e.g. Davis & Brock, 1975; Govern & Marsch, 2001). Being in front of a camera does not necessarily mean that a person is being observed but it can alert them to the possibility of it, reminding how they would appear to the presumed observers. Moreover, even imagining being observed without necessarily believing so has been suggested to affect behavior. In some studies, a mere image of a pair of eyes has been a cue strong enough to increase honest and prosocial behavior (e.g. Baillon, Selim, & van Dolder, 2013; Bateson et al., 2006; Haley & Fessler, 2005). Bateson and colleagues (2006) proposed that the behavioral change is caused by an image of a direct gaze exerting a subconscious effect on the participants' perception of being observed. In light of studies (e.g. Beaman et al., 1979; Diener & Wallbom, 1976) that have demonstrated an increase in normative behavior due to self-focused attention, it is warranted to presume that the effect on behavior is likely mediated by increased self-focus, although self-focus per se was not measured in the studies by Bateson and colleagues (2006) or Haley and Fessler (2005).

1.4. Perceived direct gaze and self-focused attention

As noted earlier, the most intimate form of direct observation, eye contact has for long been speculated to increase self-focused attention (Argyle, 1975), but the studies on the effect are scarce. As far as we know, the self-focus-inducing effect of eye contact has only been investigated in four studies (Baltazar et al., 2014; Hietanen, Leppänen, Peltola, Linna-aho & Ruuhiala, 2008; Myllyneva & Hietanen, 2015; Pönkänen, Peltola, & Hietanen, 2011).

Most of the studies have demonstrated an increase in self-focus, but only when the participants are in true mutual eye contact with another person (Hietanen et al., 2008; Pönkänen et al., 2011; Myllyneva & Hietanen, 2015). Hietanen and colleagues (2008) measured self-focus with the Situational Self-awareness Scale while the participants were presented with the direct gaze of a real person or that of a picture of a face. The participants reported higher levels of public self-awareness when facing the real person than when facing the picture. The ratings of private self-awareness or

awareness of surroundings did not differ between the situations. In a study of similar design, the participants saw either a live person or a picture of the same person looking directly at them or away from them, after which they completed the SSAS questionnaire (Pönkänen et al., 2011). Similarly, the perceived direct gaze elicited higher ratings of public self-awareness (but not of the other factors) than averted gaze only when the participants were looking at the face of an actual person. When looking at a picture of the same face, the gaze direction had no effect on the SSAS ratings. In addition to the SSAS, in both studies the frontal EEG asymmetry was measured. When looking at a live face, a direct gaze elicited an increase in relative left-sided frontal EEG asymmetry indicative of a motivational approach tendency and an increase in autonomous arousal. In the picture condition, the brain and autonomic responses did not differ between the gaze directions.

In another study, the belief of being observed was investigated by comparing mutual eye contact with an identical view of the other person in a situation where the participant believed that the other person could not see them (Myllyneva & Hietanen, 2015). The model person was seated behind a window, alternately looking directly at the participant, or away from them. The belief of being observed was manipulated by leading the participant to believe that a one-way mirror was attached onto the window glass. In reality, what was attached was only a transparent sheet. The perceived direct gaze elicited higher ratings of public self-awareness only when the participant believed to be observed by the other person. Correspondingly, the autonomic responses and event-related potentials were stronger only when the participants believed that they were being observed. Based on these results, the increase in public self-awareness seems to be dependent on the belief of being observed by another person. Thus, a mere image of direct gaze without being observed would be an insufficient stimulus for the self-focus effect.

Conversely, the study by Baltazar and colleagues (2014) indicated that a mere picture of direct gaze suffices to increase self-directed attention. They studied the effect with a method based on interoceptive self-awareness. To avoid the pitfalls of investigating self-focus with self-reports, they measured self-focus as the accuracy of evaluations of bodily sensations. As previously noted, many earlier studies supporting the “perceptual accuracy hypothesis” have been disputed on methodological grounds, such as a lack of physiological measures or not standardizing the measured values (Silvia & Gendolla, 2001). With a careful study design, Baltazar and colleagues (2014) intended to avoid the methodological problems brought up by Silvia and Gendolla (2001). The participants were presented with pictures of either a face looking at them, away from them or a picture of a fixation cross on the screen. The picture of a face or a cross was followed by an emotional picture. Compared to the averted gaze or the fixation cross, the perception of direct gaze led the study participants to rate their subjective arousal to the emotional pictures more consistently with objective

measures of their physiological arousal. The authors had two possible explanations for the results: physiological reactions might have increased due to eye contact, making accurate evaluation easier, or the perception of the physiological reactions had sharpened due to heightened self-focus. As the perception of direct gaze was not related to a greater arousal, the researchers concluded that the more precise ratings of the emotional reactions were due to the self-focused attention induced by the direct gaze.

As we have seen, the studies on the self-focus inducing effect of perceived direct gaze are few and the results are conflicting. Preliminary evidence refers to only true eye contact inducing public self-awareness (Hietanen et al., 2008; Pönkänen et al., 2011; Myllyneva & Hietanen, 2015), but the results rely on self-reports, which are known to be problematic for various reasons (Eichstaedt & Silvia, 2003; Paulhus & Vazire, 2007). On the contrary, other studies in which participants have been presented with a mere image of direct gaze have demonstrated an improvement in perceptual accuracy and an increase honest behavior, both of which are thought to be mediated by increased self-focus (Baltazar et al., 2014; Bateson et al., 2006). These studies rely on presumptions of cognitive effects of self-focused attention, and are thereby unable to definitively determine that self-focus increased as a response to perceived direct gaze. In conclusion, the results on the matter are conflicting and they are based on indirect or otherwise problematic measures. Therefore, the self-focus effect of perceived direct gaze remains to be compellingly demonstrated.

1.5. Current study

In the study at hand, the self-focus-inducing effect of perceived direct gaze was investigated. The primary objective was to find out whether the effect holds true when the level of self-focus is assessed by implicit measures.

The study was carried out on computers, and the participants were presented with video clips of people making direct eye contact or looking downward. Self-focus was measured with a response-latency-based word-recognition task (Eichstaedt & Silvia, 2003), a pronoun-selection task (Davis & Brock, 1975), and a self-report questionnaire (Govern & Marsch, 2001). In addition, the participants' levels of habitual self-consciousness were assessed, to analyze their possible effects on the self-focus measures.

We expect the direct gaze videos to elicit higher self-focused attention than the averted gaze videos. In the word-recognition task the relative recognition speed of self-related words is expected to be quicker in the direct gaze group than in the averted gaze group. In the pronoun-selection task,

participants in the direct gaze group are expected to use more first-person pronouns compared to the participants in the averted gaze group. In the self-awareness questionnaire, the direct gaze group is expected to score higher in the public self-awareness scale than the averted gaze group. In addition, privately self-conscious participants are expected to have shorter latencies of self-related words in comparison to less privately self-conscious subjects, as was found in the study by Eichstaedt and Silvia (2003).

2. METHOD

2.1. Participants

The participants were 42 adults (mean age = 24.15 years, $SD = 3.6$, 22 females). All participants were 19–31 years old to avoid the potential confound of age on word-recognition speed. They were recruited from the email lists of the University of Tampere, Tampere University of Technology, and Tampere University of Applied Sciences. The participants were all native speakers of Finnish with no history of neurological or psychiatric disorders. Participants were rewarded with a movie ticket, a 10-euro gift card to a retail chain, or course credit. All participants gave their written informed consent.

2.2. Materials

The gaze stimuli were video clips of a person with either direct gaze or averted (downward) gaze. The video models were four different persons, two males and two females. During the preparation of the video clips, the models were instructed to maintain a neutral expression and stay motionless, but minor movements and natural eye blinking were allowed. The models were filmed against a dark background. Two videos were made with each model, one with a direct gaze, another with a downward gaze. For an illustration of the stimuli, see Figure 1.

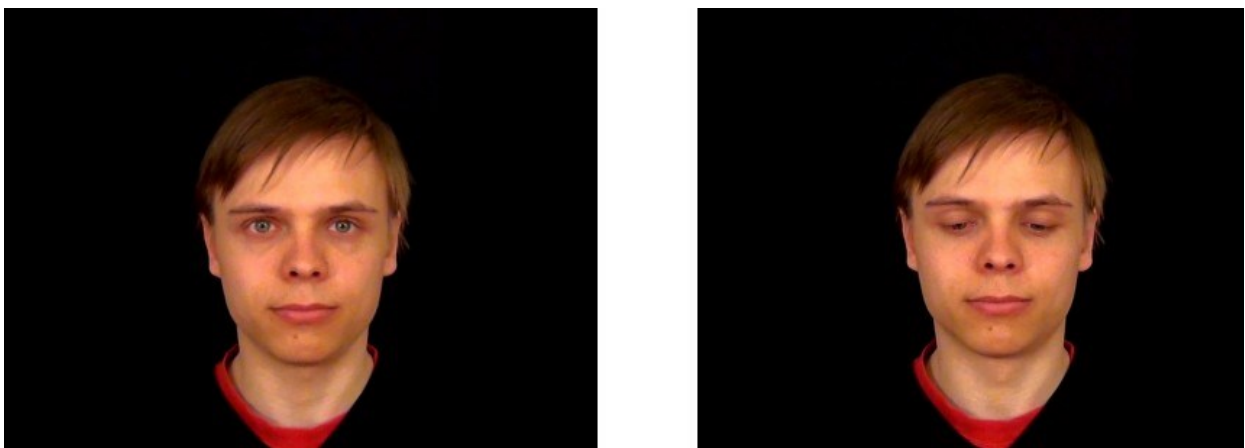


Figure 1. Still images extracted from the video clips to illustrate the gaze stimuli.

The stimuli were presented on a 19-inch LCD monitor with a resolution of 1280×1024. The participants were seated 100 cm from the computer screen. The videos had a resolution of 1024×768

and they were shown on full screen. The face of the video model covered a visual angle of approximately 11° horizontally and 15° vertically.

In the word-recognition task, the computer program presented three lines of 30 constantly changing random uppercase letters. The letters changed every 400 milliseconds. In each trial, there was a single target word to be recognized, which appeared for 400 milliseconds every 1200 milliseconds. The target words were written in lowercase and they appeared in random positions in the central row. In the original study using the word-recognition measure, the changing characters and target words were all in uppercase (Eichstaedt & Silvia, 2004). A pilot experiment ($n = 37$) was carried out with the target words in uppercase letters, but the recognition latencies turned out to be considerably long with substantial variance ($M = 52271$ ms, 34135 ms). This was likely to reflect that the task was too demanding. Therefore, the target words were changed to lowercase. Changing the target words to lowercase was expected to make them more noticeable among the uppercase letters, thus facilitating their recognition. This was found to be a successful improvement, and the overall performance in the task improved substantially.

Finnish and English words were used as target words. The self-related Finnish target words were approximate equivalents of the original English words used in the study by Eichstaedt and Silvia (2004). The original English words alongside the translated Finnish words were used in the study. Ten practice trials with Finnish words preceded the actual experiment. The practice words were *tämä* (this), *meni* (went), *vaan* (but), *tuli* (came), *aina* (always), *taas* (again), *liian* (too much), *yhden* (of one), *tehdä* (do), and *usein* (often). In the experiment trials, five of the words were self-related, five neutral. The control words were matched for length and frequency (Kotimaisten kielten keskus, 2015). The self-related words were *minä* (I), *minun* (mine), *minua* (me), *itse* (self), and *olen* (I am) and the control words were *noin* (about), *antaa* (give), *siksi* (so), *enää* (anymore), and *mikä* (what). The self-related English words were me, myself, self, face, and mine, and the control words, of matching length and frequency, were up, theory, walk, drop, and they (Eichstaedt & Silvia, 2004).

The pronoun-selection task consisted of multi-choice tasks regarding sentences in foreign languages. The first 10 sentences were in Swahili, the other 10 in Basque. The sentences were extracted from language books (Benjamin, Mironko & Geoghegan, 1998; King, 1994; Mohamed, 2001). The target pronoun was underlined, and a multi-choice task of Finnish translations for the pronoun was presented. In each task, there were six options to choose from, one in each particular grammatical person, all conjugated in the same form. For each trial, the options were presented in a different, randomized order. Examples of the sentences are *Nakaa na dada yangu* (I live with my sister) and *Gu fruta saltzen ari gara* (we sell fruits).

2.3. Procedure

2.3.1. Word-recognition task

Participants were randomly assigned to two groups, one that was presented with direct gaze videos, and another that was presented with averted gaze videos. Each group saw the videos with two models. For each participant, the models were looking at the same direction at all times, either directly at the participant or downward. The genders and identities of the video models as well as their gaze directions were counterbalanced across participants' gender. Three to four participants took part in the study at the same time in the same room. In each session, at least one of the participants was assigned to a different group (direct gaze vs. averted gaze) than the others. The computers were located in small cubicles. The participants wore earmuffs during the experiment.

Upon arrival to the laboratory, participants were informed on the general aspects of the experiment. They were told that the experiment would be carried out on a computer and it included two tasks, which would later be instructed to them on the computer screen. They were seated in the cubicles and a written consent was obtained. Before beginning the tasks, participants filled in information regarding their age, gender, and handedness. The experimenter announced that during the experiment he would be seated behind a partition wall, and not be able to observe the participants.

The word-recognition task began with detailed instructions on how the task would be performed. After the instruction, ten practice trials with neutral target words followed. The practice word order was randomized for each participant. In each word-recognition task, the target word appeared repeatedly for 400 milliseconds at a time after which it disappeared for every 800 milliseconds. After pressing the space bar as indicator of having recognized the word, the participants were prompted to type the seen word. Then the program proceeded to the next trial. In the first five practice trials, the participants were told which word they should be looking for. The last five practice words were to be recognized without previous knowledge of the word.

After the practice trials, the ten experimental trials with the Finnish words began. Each experimental trial consisted of a 5-second video of a person making eye contact or gazing downward (depending on the participant's group assignment) and one word-recognition task. To strengthen the potential effect of the gaze, the participants were instructed to perform a mental visualization task during the videos. They were instructed to imagine that the person in the video were a real person sitting opposite to them; someone they could see, hear, talk to, and touch. After the experimental trials with the Finnish target words, the participants were informed that in the remainder of the trials the

target words would be in English. The participants were reminded to perform the mental visualization task during the videos. After they were given these instructions, ten experimental trials with the English target words followed. The trials with the Finnish words and the trials with the English words were similar in that each experimental trial consisted of a 5-second video of a person and one word-recognition task.

2.3.2. Pronoun-selection task

In the beginning of the pronoun-selection task, the participants were presented with detailed instructions on how the task would be carried out. As before, the participants were also instructed to perform the mental visualization task during the videos. Each trial consisted of a 5-second video of a person and one multi-choice task. The video model portrayed in the video was different than in the word-recognition task, but the gaze direction remained the same depending on whether the participant was assigned to the direct or the averted gaze group. After each video, the participants were presented with a sentence in a foreign language with one personal pronoun underlined and six possible translations for the underlined word. The participants were instructed to guess which of the six personal pronouns might be the correct translation. After choosing one of the six options, the next trial began. The pronoun-selection task consisted of twenty trials.

2.3.3. Self-evaluations

After the two tasks, the computer program presented the participants with the Situational Self-Awareness Scale, three control questions, and the revised Self-Consciousness Scale. All of the questions were in Finnish. The first nine items were the Situational Self-Awareness Scale (Govern & Marsch, 2001). The SSAS questionnaire includes three factors, each of which is measured with three items. The factors are public self-awareness, private self-awareness, and awareness of surroundings. The items are responded on a 7-point Likert scale, ranging from strong disagreement to strong agreement. The participants were instructed to answer based on how they were feeling when they were watching the eye gaze videos. The items were translated to Finnish, and altered so that they referred to the moment of watching the videos instead of the present moment. Public self-awareness was measured with items such as “I was concerned about the way I present myself”, private self-awareness with items such as “I was conscious of my inner feelings”, and of immediate surroundings,

with items such as “I was keenly aware of everything in my environment”.

The next three items were control questions. The participants were asked whether the person in the video had looked like he or she was looking directly at the participant. After that they were asked whether they had understood the sentences in Swahili or the sentences in Basque. The control questions were responded on the same 7-point Likert scale, ranging from strong disagreement to strong agreement.

Lastly, the participants were presented with the 22 items of the revised version of the Self-Consciousness Scale (SCSR; Scheier & Carver, 1985). The SCSR includes three factors: private self-consciousness (e.g. “I generally pay attention to my inner feelings”), public self-consciousness (e.g. “I’m usually aware of my appearance”), and social anxiety (e.g. “Large groups make me nervous”). In the SCSR, the participants were instructed to answer based on how they think and behave in general. The SCSR items were responded on a 4-point scale, where 0 stands for “not like me at all” and 3 for “a lot like me”. The items were translated to Finnish. After responding to these questions, the participants were asked to wait in their cubicles until the experimenter announced the experiment to be over.

After all the participants had completed the task and the questionnaires, the experimenter debriefed the participants and told them that the study had actually examined the effect of eye contact on self-awareness, and that the tasks were actually measures of self-awareness. Participants were then given movie tickets, gift cards, or course credit certificates and thanked for their participation.

2.4. Data Analysis

2.4.1. Word-recognition task

The recognition latencies of the incorrectly recognized words were excluded from the data. Words that included a minor typographical error were included if the typographical error did not change the category of the word from self-related to neutral or vice versa (e.g. “face” recognized as “ace” would be excluded, but “myself” recognized as “self” would be included). 30 trials of the Finnish words and 30 trials of the English words were excluded (0–3 trials per participant). In a Z-score examination, a threshold-value of $Z = 3$ was set for outliers. No Z scores were greater than 3, so no cases were removed. A minimum of four out of five correctly recognized words were required for each word category. Two participants did not meet the criteria in either language, and they were excluded from

the data analysis of the trials of that language. One participant was excluded from the analysis of the trials with the Finnish words and one from the analysis of the trials with the English words.

Statistical analysis was conducted using three-way mixed design analysis of variance (ANOVA). Language-specific analyses were conducted using repeated-measures ANOVA. When interactions were found, further analyses were conducted using the independent samples t-test. For these analyses, a relative self-related word-recognition latency was calculated for each participant by subtracting the average latency for the neutral words from the average latency for the self-related words.

2.4.2. Pronoun-selection task

The frequency of first-person pronoun responses between the gaze groups was compared. The statistical analysis was conducted by using the independent samples t-test.

2.4.3. Situational Self-Awareness Scale

The scores on Situational Self-Awareness Scale between the gaze groups were compared by using the independent samples t-test.

2.4.4. Self-Consciousness Scale

Pearson correlation analysis was conducted to examine whether there were relationships between the three factors of SCS. A linear regression analysis with enter method was conducted to test whether private and public self-consciousness predicted the relative word-recognition latencies of self-related words.

3. RESULTS

3.1. Manipulation checks

All participants correctly perceived whether the video model was looking at them or away from them. On a scale ranging from 1 (strongly disagree) to 7 (strongly agree), most of the participants in the direct gaze group strongly agreed with the statement “The person in the video appeared to be looking at me” ($M = 6.43$, $SD = 0.75$), whereas most of the participants in the averted gaze group strongly disagreed with the statement ($M = 1.33$, $SD = 0.92$; $t(40) = 19.8$, $p < .001$).

None of the participants reported that they had understood the foreign languages in the pronoun-selection task. To the statement “I understood the sentences in Swahili”, 41 participants (98%) strongly disagreed and 1 participant (2%) neither agreed nor disagreed. To the statement “I understood the sentences in Basque”, 41 participants (98%) strongly disagreed and 1 participant (2%) disagreed.

3.2. Word-recognition task

A three-way mixed design ANOVA was conducted for the word-recognition latencies, with Gaze Direction (Direct/Averted) as a between-subject factor, and Language (Finnish/English), and Word Category (Self-related/Neutral) as within-subjects factors. The main effect of Language was not significant ($F(1, 38) = 2.596$, $p = .115$). A main effect of Word Category was found ($F(1, 38) = 8.963$, $p = .005$). The recognition of Self-related words was quicker ($M = 3925$ ms, $SD = 1749$) than the recognition of Neutral words ($M = 4279$ ms, $SD = 1890$). No interactions for Gaze Direction \times Language ($F(1, 38) = 0.141$), Gaze Direction \times Word Category ($F(1, 38) = 0.759$, $p = .389$) or Language \times Word Category ($F(1, 38) = 0.184$, $p = .670$) were found. The three-way interaction for Gaze Direction \times Language \times Word Category was marginally significant ($F(1, 38) = 2.881$, $p = .098$).

The three-way interaction was examined by analyzing separately the data of each language. A two-way ANOVA was conducted to analyze the trials with Finnish words. There was no main effect of Word Category ($F(1, 39) = 0.423$, $p = .519$). A statistically significant interaction effect of Gaze Direction \times Word Category ($F(1, 39) = 4.210$, $p = .047$) was found. A paired-samples t-test was conducted to compare the recognition latencies of the two word categories within each gaze group. For the direct gaze group, a marginally significant effect was found ($t(19) = 1.902$, $p = .072$). The

recognition latencies of the self-related words ($M = 3343$ ms, $SD = 1589$ ms) were shorter than those of the neutral words ($M = 4328$ ms, $SD = 3252$ ms). For the averted gaze group, no difference was found in the recognition latencies of the two groups (for the self-related words, $M = 4274$ ms, $SD = 2439$ ms; for the neutral words, $M = 3763$ ms, $SD = 1574$ ms; $t(20) = 0.996$, $p = .331$). Figure 2 presents the mean word-recognition latencies in both groups and for each word category.

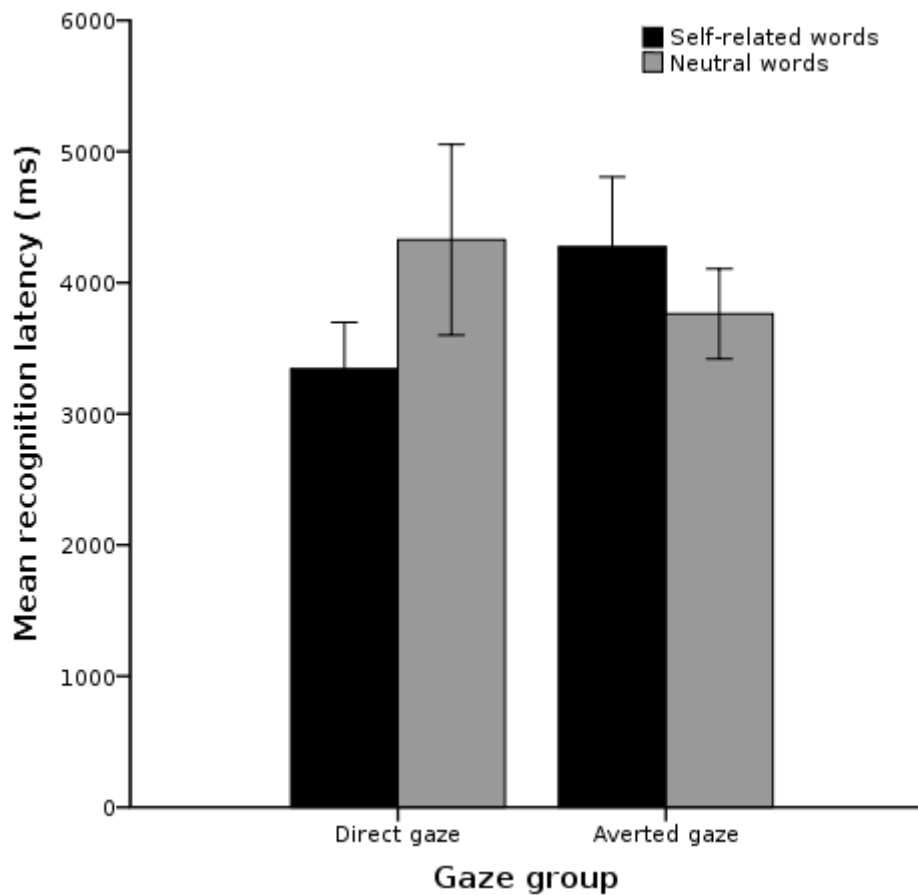


Figure 2. Mean word-recognition latencies for self-related and neutral words in both gaze groups. The error bars represent standard errors.

Similarly, a two-way ANOVA was conducted to analyze the trials with the English words. A main effect of Word Category was found ($F(1, 39) = 5.546$, $p = .024$). The latencies for Self-related words were shorter ($M = 3929$ ms, $SD = 1667$) than the latencies for Neutral words ($M = 4553$ ms, $SD = 2216$). In the trials with the English words there was no interaction of Gaze Direction \times Word Category ($F(1, 39) = 0.746$, $p = .393$).

3.3. Pronoun-selection task

The frequency of the first-person singular pronoun answers in each gaze group was compared with the independent samples t-test. The use of first-person singular pronouns did not differ between the two gaze groups ($t(40) = 1.635, p = .110$). On average, the direct gaze group used first-person pronouns in their responses 1.86 times ($SD = 1.352$), and the averted gaze group used first-person pronouns 2.52 times ($SD = 1.289$). Also, the frequency of other pronouns in the responses did not differ between the two groups.

3.4. Situational Self-Awareness Scale

An independent samples t-test was conducted to analyze the differences in scores on Situational Self-Awareness Scale between the gaze groups. Interestingly, the reported private self-awareness was higher in the direct gaze group ($M = 12.86, SD = 3.41$) than in the averted gaze group ($M = 10.62, SD = 3.38; t(40) = 2.135, p = .039$). The groups did not differ in their reports of public self-awareness ($t(40) = 0.359, p = .722$) or awareness of surroundings ($t(40) = 0.865, p = .392$). For means and standard deviations of SSAS scores, see Table 1.

Table 1. Mean scores and standard deviations on Situational Self-Awareness Scale by gaze group

Gaze group	Public self-awareness		Private self-awareness		Awareness of surroundings	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Direct gaze	2.32	1.12	4.29	1.14	2.92	1.46
Averted gaze	2.46	1.44	3.54	1.13	3.32	1.51

Note. A statistically significant ($p < .05$) difference between the gaze groups is indicated by bolding.

3.5. Self-Consciousness Scale

Private and public self-consciousness were correlated ($r = .372, p = .015$). Private self-consciousness ($r = .252, p = .107$) or public self-consciousness ($r = .216, p = .170$) did not correlate with the social anxiety scale.

A linear regression analysis was conducted to test whether private and public self-consciousness

predicted the relative word-recognition latencies of self-related words. A relative word-recognition latency of Self-related words was calculated for each participant. Negative values of the score indicate relatively quicker and positive values relatively slower recognition of Self-related words. As the results of the word-recognition task suggested that the trials with the Finnish words were better able to capture the self-focused attention of the Finnish-speaking participants, only the Finnish word-recognition trials were examined. Using the enter method it was found that private self-consciousness and public self-consciousness explained a marginally significant amount of the variance in the recognition latencies ($F(2, 38) = 2.616, p = .086, R^2 = .348, R^2_{Adjusted} = .075$). The participants recognized self-relevant words more quickly as private and public self-consciousness increased. However, the analysis showed that neither private self-consciousness ($\beta = -155.07, t(40) = 1.266, p = .200$) nor public self-consciousness ($\beta = -140.45, t(40) = 1.304, p = .213$) alone significantly predicted the relatively faster recognition of self-related words.

4. DISCUSSION

The main purpose of the present study was to investigate whether the perception of direct gaze has an effect on self-focused attention. The level of self-focused attention was measured with two implicit methods, a latency-based word-recognition task and a pronoun-selection task, and an explicit self-report questionnaire. Videos of models with direct or averted gaze were used as stimuli and the participants were instructed to imagine that the person in the video were a real person sitting opposite to them. The participants were randomly assigned to two groups, one group seeing the models gazing directly at them, and the other seeing the same models looking downward. The main hypothesis was that, in comparison to the averted gaze group, the participants in the direct gaze group would exhibit a higher level of self-focused attention.

The results offered support for the self-focus-inducing effect of perceived direct gaze. In the word-recognition task, the direct gaze group exhibited a heightened level of self-focused attention. In the pronoun-selection task, the two groups did not differ from one another. On the Situational Self-Awareness Scale, the direct gaze group reported a higher level of private self-awareness than the averted gaze group. On the other two scales of the SSAS the ratings between the two groups were similar.

4.1. The perception of direct gaze increased self-focus

In the word-recognition task, the participants in the direct gaze group recognized self-related words relatively more quickly than the participants in the averted gaze group, supporting the main hypothesis regarding the task. In this task, a relatively quicker recognition of self-related words is related to a heightened self-focus (Eichstaedt & Silvia, 2003). The hypothesis gained support only from the trials with the Finnish words. In the trials with the English words, the relative recognition latencies of the self-related words were similar in both groups.

Direct gaze facilitated the recognition of self-related words, such as *minä* (I), *minua* (me), and *minun* (mine). Visual word-recognition has been shown to be facilitated by the relevance of the target words to the person's current mental state (Niedenthal, Halberstadt, & Setterlund, 1997). As self-focused attention is associated with self-related thoughts, the self-related target words are presumably relevant to a self-focused state of mind. Hence, the observed effect on word recognition is likely mediated by a semantic priming effect of self-related thoughts. Accordingly, the word-recognition

measure has been found to be sensitive to self-related thinking. In the study by Eichstaedt and Silvia (2004), an introspective task of thinking about how one differs from others was demonstrated to facilitate the recognition of self-related words. Moreover, they found habitual self-consciousness to correlate with the recognition of self-related words in the word-recognition task, so that self-related words were recognized more quickly as private self-consciousness (the tendency toward introspection) increased, but more slowly as public self-consciousness (the tendency to be concerned with how others view the self) increased. Thus, it appears that the word-recognition task is particularly sensitive to introspective thinking, and in the present study the participants who were presented with a person looking directly at them were more engaged in introspection than those who saw the person looking downwards.

The hypothesis regarding the word-recognition measure gained support in the trials with the Finnish words, but not in the trials with the English words. The heightened self-focus only facilitated the recognition of Finnish self-words, but not that of the English self-words. Since all the participants spoke Finnish as their mother tongue, the result can be interpreted as the semantic priming effect of self-related thinking affecting only the recognition of the words in one's mother tongue. Presumably, the self-related thinking occurs only in one's mother tongue, and the semantic priming effect is thus limited to that language.

In previous studies, an increase in self-reported self-focus has only been observed for eye contact with a live person, and a mere perception of direct gaze had no such effect (Hietanen et al., 2008, Pönkänen et al., 2011). However, in the present study, with the use of an implicit measure, the perception of direct gaze without a live observer was found to increase self-focused attention. A possible explanation for the different results is that a perception of direct gaze does increase self-focus, but conscious rationalizations led the participants in the previous studies to report a heightened self-focus only when they were looked at by another person. As it may have made more sense to the participants to consider themselves self-aware when they were actually looked at than when they were merely perceiving the direct gaze on a computer screen, it is possible that due to this thinking they reported being more self-aware in that situation. This explanation fits together with the results by Myllyneva and Hietanen (2015) showing that eye contact elicited heightened self-reported self-focus only when the participants believed to be observed by the other. When they saw the same person behind a window and believed that they were not being observed by them, they did not report an increase in self-focused attention. A possible explanation is that it did not make sense to them to consider themselves self-aware in a situation where they were not being observed by anyone. However, it seems that when an implicit measure is used instead of a self-report questionnaire, the results are different. In a study by Baltazar and colleagues (2014) self-focused attention was measured

indirectly as the awareness of one's bodily sensations, and a mere direct gaze image was found to increase this bodily self-awareness. Similarly, in the present study, the results of the implicit measure demonstrated an increase in self-focused attention with the perception of a direct gaze in a situation where the participants were not observed by another. It appears that the level of self-focused attention does increase with the mere perception of direct gaze, but self-report questionnaires may be unable to capture this change in the mental state, possibly due to conscious rationalizations of the situation.

In addition to the implicit measures, self-focus was assessed with a self-report questionnaire. For this purpose a Finnish translation of the Situational Self-Awareness Scale was used (SSAS; Govern & Marsch, 2001). The SSAS measures awareness of the public side of the self (of one's appearance), awareness of the private side of the self (of one's thoughts and feelings), and awareness of one's surroundings. The direct gaze group was expected to rate their level of public self-awareness higher than the averted gaze group. Contrary to the hypothesis, no difference in self-reported public self-awareness ratings was found between the two gaze direction groups. This result fits with the previously presented possible explanation of different outcomes with self-reports and implicit measures. The findings of the present study along with previous findings (Hietanen et al., 2008; Myllyneva & Hietanen, 2015; Pönkänen et al., 2011) suggest that for one to report a heightened public self-awareness, being observed and believing to be observed by another person is required and a mere perception of direct gaze without that belief will not suffice for the effect.

Surprisingly however, the participants in the direct gaze group reported higher private self-awareness than those presented with an averted gaze. This finding fits together with the implicit results that reflect an increase in introspective thinking. In the SSAS, private self-awareness is measured with the items “I am conscious of my inner feelings”, “I am reflective about my life”, and “I am aware of my innermost thoughts”, all of which refer to introspection. An introspective task of thinking about a personally experienced event has also been found to increase self-reported private self-awareness (Govern & Marsch, 2001). Based on these observations, it can be argued that the private self-awareness scale of the SSAS and the word-recognition measure are both similarly sensitive to introspective self-focus. The increase in self-rated private self-awareness conflicts with many previous studies that found no such effect with similar gaze stimuli (Hietanen et al., 2008; Pönkänen et al., 2011). The key difference between this study and the referred studies is, that, in the present study, the participants were assigned with a mentalization task. They were instructed to imagine that the person in the video were a real person sitting in the same room opposite to them, someone they could interact with. A reasonable explanation for the differing results is that the mentalization task enhanced the effect of direct gaze, which in previous studies was not strong enough to alter the self-reported ratings of private self-awareness. The results suggest that a direct gaze image

induces introspective self-focus, but the effect may require one to imagine that the person in the image is real. To summarize, according to the present results with the word-recognition task and the SSAS, in a context where direct gaze is not associated with being observed by another, self-related, introspective thinking is elicited, whereas for awareness of one's appearance to increase, being observed by another person is required. An increase in introspection as a result of direct gaze is a novel finding, which to the best of the author's knowledge has not been observed in previous studies.

Some previous studies seem to indirectly support the claim that an image of a direct gaze increases private self-awareness. The behavioral results of Bateson and colleagues (2006) can also be interpreted accordingly. Private and public self-awareness are distinct in their effects on human behavior (Buss, 1980; Froming, Walker, & Lopyan, 1982). Private self-awareness has been found to increase the salience of one's affects, motives, and values. Public self-awareness, on the other hand, seems to increase the concern of others' appraisal. This, in turn, may lead to an attempt to modify one's behavior to meet the expectations of others, even to the extent of acting against one's morals. In the study by Bateson and colleagues (2006), users of a coffee room had been informed that they were supposed to pay for their drinks by putting money in a specific box in the room. Every other week alternating images were placed on the box; one week an image of a pair of eyes with direct gaze, the next week, an image of flowers. People paid nearly three times more for their drinks when the box had an image of a direct gaze. This result can be interpreted to be caused either by an increase in the salience of values (private self-awareness) or by an increase in the concern of others' appraisal (public self-awareness). However, if the behavioral change was related to a concern of others' appraisal, the effect would only appear when others are observing the situation. The presence of observers itself is likely to have a much stronger effect on self-focus than a mere image of eyes on the money box, thus mitigating the effect the image alone could have had on the patrons of the coffee room. Also, the number of people using the coffee room is likely to have stayed the same across the weeks. If public self-awareness mediated this behavioral effect, no difference between the eye weeks and the flower weeks would have been observed, because the stronger elicitor of public self-awareness, the presence of other people, was similar in both situations. Hence, it appears that an increase in private self-awareness as the result of the pair of eyes in the box is a more likely explanation for the increase in generous and cooperative behavior. Thus, considering the current results (obtained with the word-recognition measure and with the SSAS) and the behavioral results of Bateson and others (2006) likely mediated by heightened private self-awareness, perceiving a direct gaze without being observed can be argued to increase specifically private self-awareness.

4.2. Pronoun-selection task

In the pronoun-selection task, the participants were presented with sentences in foreign languages with one word underlined. The underlined word was a person pronoun, and the assignment was to guess from six person pronouns the correct meaning of the word underlined in the sentence. The participants were explicitly told that they were not expected to know the answer, but to guess the word instead. In comparison to the averted gaze group, the direct gaze group was expected to give more first-person pronoun responses. However, contrary to the hypothesis, no difference was found in the frequency of first-person-pronoun responses between the two groups.

A possible explanation for not obtaining the expected results with the pronoun-selection task is that the task may have contained too few answer options or trials. The participants seemed to balance their answers quite evenly across all the options, which might have been more difficult with a more diverse selection of answer options or a larger number of trials. They may have rationalized that as a whole there would be the same number of sentences with each person pronoun, so that each person pronoun should appear approximately the same number of times. They may have also reasoned that as the target words were different in every trial, the correct answer was likely different, too, thus giving a very balanced number of answers in each person-pronoun category. In previous studies two kinds of pronoun-selection tasks have been used for measuring self-focus, a foreign-language task, similar to the task used in the present study (Davis & Brock, 1975) and the Linguistic Implications Form (LIF; Wegner & Giuliano, 1980, 1983). In the foreign-language task of Davis and Brock (1975), the participants were instructed to determine the equivalent English pronouns for underlined pronouns in a foreign-language text, which they did not understand. They were given a series of 17 sentences, which had a total of 49 pronouns underlined, and instructed to choose from a list of 15 pronouns (three of which were first-person pronouns) and correspond them to the foreign-language pronouns. In the present study, for presentation reasons, the options were fewer (15 vs. 6) and the number of trials was much less (49 vs. 20). Instead of presenting all the sentences and answer options at once on paper, it was considered more convenient to present the task on a computer screen, one sentence with its answer options at a time, alternating with the eye gaze videos. A lower number of trials was used in order to reduce participant fatigue with the monotonous task. The number of answer options was six, so that each answer option would correspond to each person pronoun. A higher number of answer options and trials in the study by Davis and Brock (1975) may have made it more difficult for the participants to keep track of the frequency of each pronoun response, thus leading to a more skewed number of responses in some categories. This, in turn, may have possibly better reflected the

level of self-focused attention. In the other pronoun-selection task, the LIF, the participants are presented with 20 sentences with one person pronoun replaced with a blank in each sentence, for example “The noise got to ... before long” (Wegner & Giuliano, 1980, 1983). For each blank, there are three person-pronoun options, one of which is always first singular, to choose from. The participants are instructed to determine (and when in doubt encouraged to guess) which of the three options best fit the sentence. In comparison to the present study, in the LIF there is only half the number of answer options, though the number of trials is exactly the same. It must be noted, however, that from the participants' point of view, the LIF is an entirely different task. Instead of merely guessing the meanings of ambiguous words in foreign-language sentences, the LIF instructs participants to choose the best fitting pronoun based on the perception of the sentence and one's “linguistic intuition”. Due to these differences between the two tasks, a comparison of the answer options and trial numbers is problematic. That being said, it would be unwarranted to conclude that the present null result on the pronoun-selection task was caused by too many answer options or too few trials.

One participant noted after the experiment that he perceived the written sentences as something the person in the video would have said. As mentioned earlier, each trial in the task consisted of a five-second video of a person immediately followed by the sentence and the six options. Perceiving the sentences as something that was being said by the person on the screen alters the perception of the task in a fundamental way. If the task is seen this way, a first-person pronoun would refer to the person on the screen, and not to the participant. Thus, the pronouns would be chosen with the person in the video in mind, and would unlikely be a reflection of self-related thinking of the participant. Moreover, the perception of the sentences as dialogue or thoughts of the person in the video largely alters their context, in turn altering the selection of person pronouns. If this was a common perception among study participants, a higher number of first-person responses could not necessarily be interpreted to reflect heightened self-focus, as it may also demonstrate a different and unexpected perception of the task. Three other participants heard this notion, and agreed that they, too, had perceived the task similarly.

4.3. Habitual self-consciousness and the recognition of self-related words

In addition to the situational state of self-focus, habitual self-consciousness was assessed. The measure used was a Finnish translation of the revised version of the Self-Consciousness Scale (SCSR; Scheier & Carver, 1985). SCSR measures two distinct aspects of habitual self-consciousness, private

self-consciousness (the tendency to attend to one's inner experience), public self-consciousness (the habitual concern of one's appearance), and the related phenomenon of social anxiety. Based on the previous results of the word-recognition task (Eichstaedt & Silvia, 2003), the participants were expected to recognize self-related words more quickly as private self-consciousness increased but more slowly as public self-consciousness increased. A regression analysis was conducted to test the hypothesis. In a regression model that included private and public self-consciousness, the traits predicted recognition latencies so that as the scores on the traits increased, the participants recognized the self-related words more quickly. Statistically the effect was only marginally significant. When examined separately, neither of the traits alone predicted quicker recognition of self-related words. One possible explanation for the results is that the present study simply included too few participants. The statistical power of the present study was considerably lower than the statistical power of the study that demonstrated a significant association between the recognition of self-related words and the two aspects of self-consciousness (Eichstaedt & Silvia, 2003). The present study included only 42 participants, whereas the previous findings were obtained from 130 participants. Another possibility is that the self-focus manipulation affected the word-recognition latencies much more strongly than the trait of self-consciousness; therefore, the effect of the trait on the task may have been concealed by the effect of the group assignment.

4.4. Limitations and future research

One weakness of the present study is that the study situation itself might have increased the level of self-focus of some participants. The participants entered the lab in a group of three or four people. The experimenter paid little individual attention to each participant, they were not specifically referred to by name, and in most cases, incidentally, conversation among the participants prior to the experiment was minimal. Despite the experimenter's attempt to pay equal attention to each participant, minor occurrences, such as arriving late or not understanding a detail of the instructions could have altered their level of self-focus.

One aspect that was not controlled and balanced was the assignment of participants to the time slots for the experiment. Each individual was able to freely choose when they would participate. As a result of this, gender was not evenly balanced across each study situation. In some cases, only one participant was male or female, the rest belonging to the opposite gender. Being the only person of one's gender in a group can make a person more aware of their gender (Diener, Lusk, DeFour, Flax, 1980), which in turn might have increased their level of self-focus. Similarly, being several years

older or younger or generally dissimilar to the other participants might have increased the self-focus of those who stood out of others. That is to say, any factor that put one participant in a different position than the others might have affected the level of self-focus of the participants. Moreover, before the tasks, the participants filled in personal information (age, gender, and handedness) in the computer program. Inserting this information might also have heightened the self-focus-inducing effect of being the only person of one's gender or being older or younger than the others.

Another limitation of this study is that because a mentalization task was carried out during the direct or averted gaze videos, the results cannot be readily extrapolated to a situation where such a task is not executed. As argued before, the mentalization task may have strengthened the effect of the direct gaze to an extent of which it would not have had otherwise. One can argue that these results would not have been obtained without the mentalization task, and therefore, the increase in self-focus cannot be solely attributed to the mere perception of direct gaze.

In future research, it would be interesting to investigate the effect of eye contact with a live person on self-focused attention with an implicit method, such as the word-recognition task, and compare it with the effects of a picture of a direct gaze. Such a comparison would provide further information regarding the self-focus-inducing effects of the direct gaze. Moreover, a study comparing the effects of private and public self-awareness on the word-recognition measure of self-focus would be interesting, as this would clarify the question of how private and public self-focus differently affect self-related thinking, thereby facilitating the recognition of self-related words.

4.5. Practical applications and conclusions

The results of the present study have some interesting practical applications. The findings suggest that perceiving an image of a face with a direct gaze can increase private self-awareness. Private self-awareness increases the salience of one's affects, motives, and morals (Froming, Walker, & Lopyan, 1982). An image with a direct gaze could be used to enhance communication, in situations where increasing the salience of emotions or values is considered to be of benefit, such as campaigns or advertisements that aim to appeal to the emotions or values of their audience. Examples include health campaigns, fund raisers, and product commercials. Studies that have found an increase in generosity and prosocial behavior as a result of a direct gaze image already demonstrate the effectiveness of such an application (e.g. Baillon et al., 2013; Bateson et al., 2006; Haley & Fessler, 2005). In addition, a direct gaze image may be used to increase introspection and the salience of emotions. Possible applications include decision making, psychological evaluation, psychotherapy, and other social

situations that are facilitated by a better awareness of one's inner feelings and thoughts.

In conclusion, the present study indicates that a perception of direct eye gaze increases the level of self-focused attention. By using implicit measures to gauge self-focused attention, the knowledge of the self-focus-inducing effect of direct gaze was expanded upon. The results suggest that a picture or a video of a direct gaze elicits introspection and self-related thinking, but not necessarily a concern of one's appearance. However, further studies using implicit measures to compare the effect of mutual eye contact with a live person to that of a picture of a direct gaze are warranted.

5. REFERENCES

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