Acta Psychologica 267 (2026) 106981

Contents lists available at ScienceDirect

Acta Psychologica

journal homepage: www.elsevier.com/locate/actpsy

The interference effect of direct eye gaze in the Stroop paradigm

Danna Oomen [a,b,*,1], Letizia Amodeo [b,1], Annabel D. Nijhof [b], Marcel Brass [b,c,d], Jan R. Wiersema [b]

[a] Institute of Management and Organization, Leuphana University, Germany
[b] EXPLORA, Department of Experimental Clinical and Health Psychology, Ghent University, Belgium
[c] Department of Experimental Psychology, Ghent University, Belgium
[d] Berlin School of Mind and Brain, Department of Psychology, Humboldt University of Berlin, Germany

ARTICLE INFO

Keywords:
Direct eye gaze
Eye contact
Stroop interference
Social cognition

ABSTRACT

Direct eye gaze is a salient social stimulus that may hinder concurrent task performance, even when presented with another prominent distracter, such as the incongruent word in the Stroop paradigm. Previous studies (Chevallier et al., 2013*;* Conty et al., 2010*)* reported a stronger Stroop effect when direct gaze (vs. closed eyes) was shown above the letter strings, though not all studies found this effect. We had two main goals. *The first was to replicate the increased Stroop effect under direct eye gaze. The second was to test whether this effect is specific to another person's eyes (ostensive nature explanation) or also occurs for one's own eyes (salience explanation).* In two experiments (one with a trial-based and one with a block-based manipulation), participants performed the Stroop task while presented with either their own or another person's direct gaze versus closed eyes. We found no increased Stroop effect under direct eye gaze compared to closed eyes, irrespective of whether one's own eyes or another person's eyes were presented. We conducted a third experiment *to directly replicate the original findings by* Conty et al. (2010) *and* Chevallier et al. (2013)*, including only another person's eyes.* Again, no increase in the Stroop effect under direct eye gaze was found. A *pooled analysis across the three experiments provided strong evidence for the null hypothesis.* Taken together, we could not replicate previous findings of direct eye gaze increasing the Stroop effect. Our findings underline the central importance of replication studies and negative findings in experimental psychology.

Eye gaze is of critical importance for multiple core aspects of social cognition. Indeed, a vast body of empirical research points to human eye gaze as a meaningful source of socially relevant information (see, e.g., Cañigueral & Hamilton, 2019; Carlin & Calder, 2013; Frischen et al., 2007), serving the dual function of both perceiving and signaling social cues (Gobel et al., 2015). Furthermore, eye contact regulates turn-taking behavior in dialogues (Degutyte & Astell, 2021) and supports joint attention in the early development of communication skills (Tomasello, 1995). Eye contact also plays a vital role when making inferences about the mental states of others, such as intentions and beliefs (Baron-Cohen, 1997; Frith & Frith, 2006; Khalid et al., 2016).

Given the elevated salience of eye contact, research shows that it is difficult for humans to disengage attention from this visual cue. For instance, Senju and Hasegawa (2005) demonstrated that when direct eye gaze (as opposed to averted gaze or closed eyes) is centrally presented, the detection speed of a subsequent peripheral target drastically decreases. Subsequent work has generally supported this attentional holding effect, although its expression may depend on contextual factors or measures used. For example, Dalmaso et al. (2022) replicated the finding in a typical adult sample, but not in adults with obsessive-compulsive disorder. Similarly, Syrjämäki and Hietanen (2020) observed the effect only in a subsample of socially included participants (but not socially excluded participants), while Dalmaso et al. (2017) found no evidence for the effect in saccadic response times, but did observe it in saccadic peak velocity. Consistent with this broader idea, studies have shown that direct eye gaze can affect cognition to the point of disrupting concurrent information processing. To assess the distracting effect of direct eye gaze on task performance, Conty et al. (2010) employed a variant of the well-known Stroop paradigm. In the classic version of this paradigm, participants are asked to identify the ink color of a series of letter strings. The content of the strings can either be congruent with the ink color (e.g. the word ‘BLUE’ printed in blue),

* Corresponding author at: Institute for Management and Organization, Leuphana University, Universitätsallee 1, Lüneburg, 21335, Germany.
E-mail address: danna.oomen@leuphana.de (D. Oomen).
[1] Shared first authorship.

https://doi.org/10.1016/j.actpsy.2026.106981
Received 9 December 2025; Received in revised form 1 April 2026; Accepted 29 April 2026
Available online 27 May 2026

incongruent with the ink color (e.g. the word 'BLUE' printed in red) or consist of neutral signs (e.g. 'XXXX' printed in red). Previous research has systematically observed slower reaction times for the incongruent than for either the congruent or neutral condition (MacLeod, 1991, 1992). This effect, known as the Stroop interference or Stroop effect (Stroop, 1935), is one of the most studied cognitive control paradigms (Viviani et al., 2024). In the study of Conty et al. (2010), participants conducted a Stroop task while either direct eye gaze or closed-eyes stimuli simultaneously appeared above the letter strings. The main results of this investigation indicated that the Stroop interference significantly increased when the words were presented in the context of direct eye gaze as opposed to closed eyes. In two additional experiments, they showed that this effect could not be accounted for by differences in low-level visual properties between the eye stimuli, nor by the mere presentation of open eyes gazing in any direction. These findings suggested that direct eye gaze significantly interferes with task performance even when outside the attentional focus, and in the presence of additional potent distractors within the attentional focus, such as the incongruent letter string in the Stroop paradigm. These findings were replicated in another study by colleagues from the same research group (Chevallier et al., 2013). The authors reported enhanced Stroop interference under concomitant direct eye gaze as compared to closed eyes in a sample of neurotypical adolescents and adolescents with autism (with no difference between the groups).

It is important to note, though, that there are also several studies that were not able to replicate the increased Stroop interference effect under direct eye gaze observed by Conty et al. (2010) and Chevallier et al. (2013). For example, in an adaptation of the original paradigm developed by Conty et al. (2010), participants were presented with direct versus averted eye gaze while being looked at by real-life present others (Hietanen et al., 2016). They did not find a stronger interference effect for direct eye gaze compared to averted eye gaze (see Exp. 2, Hietanen et al., 2016). In an additional study by Henschel et al. (2021), participants completed a Stroop task while either social (e.g. directly gazing human faces) or non-social (e.g. flowers) task-irrelevant stimuli were displayed above the strings. While a first experiment revealed a greater Stroop interference in presence of social (as opposed to non-social) distractors, a second experiment confuted this finding. That is, when a larger sample was tested and a broader range of distracting pictures was used, results provided no support for a modulation of the Stroop effect based on the type of distractor, casting doubt on the specificity of the previously observed direct eye gaze effects. In sum, the current findings on the Stroop effect of direct eye gaze are inconclusive and warrant replication.

It is also not yet clear what explains the observed effects of direct eye gaze on the Stroop task. Conty et al. (2010) suggested that the increased Stroop interference observed under direct gaze may arise because the mere presence of direct gaze automatically captures attentional resources. If attentional resources are partially diverted toward processing the gaze cue, the competition between word meaning and ink color may become more difficult to resolve, resulting in stronger Stroop interference. One explanation for why eye contact might recruit such resources concerns its ostensive social nature. In this regard, Conty et al. (2010) reasoned that the greater interference under direct eye gaze found in the Stroop task could be attributed to the adaptive function of processing eye contact in social contexts. Even when attending to this visual cue is strongly discouraged by the experimental setting (involving another relevant distractor, a color-incongruent word) and by task instructions (requiring participants to ignore the distracting eye stimuli), direct eye gaze of another person remains a prevailing, salient stimulus that humans seem to orient to involuntarily. The authors argued that this "cost of being watched" (Conty et al., 2010, p. 138) may be explained by the ostensive character of direct eye gaze, which conveys the potential willingness of another person to engage in social interaction, and therefore constitutes a highly salient cue that is better not ignored (Emery, 2000). In line with this view, it has recently been claimed that the disruptive effect of direct gaze on cognitive processing only manifests when the individual is aware of being watched by another 'mind' (Myllyneva & Hietanen, 2015).

Nonetheless, assuming that elevated salience underlies the enhancement of the Stroop effect under eye contact, one could hypothesize that such an increase would also emerge when another salient stimulus is shown. One such stimulus could be one's own eyes, as self-related material is known to be particularly salient (Cunningham et al., 2013). Under task-relevant circumstances, stimuli that relate to the self tend to be prioritized over other-related ones and can be detected faster and lead to better performance (Cunningham & Turk, 2017). However, task-irrelevant, self-related stimuli can act as potent distractors and deteriorate cognitive performance (Humphreys & Sui, 2015; Sui et al., 2015). In other words, one would expect that irrespective of whether the direct gaze of one's own eyes or of another person is presented as distractor, this will result in increased salience and hence a stronger interference effect on task performance. If, instead, the enhanced task interference emerges as a result of the marked social nature of eye contact, one would expect the increment in the Stroop effect to exclusively appear when one is being looked at by the eyes of another person, not by one's own eyes. The current study had two main goals. The first goal was to replicate the increased Stroop effect under direct eye gaze as found by Conty et al. (2010) and Chevallier et al. (2013). The second goal was to test whether this effect is specific to the eyes of another person (ostensive nature explanation) or is also found for one's own eyes (salience explanation).

To address these goals, we conducted three experiments. In Experiment 1, we studied the effect of direct eye gaze vs. closed eyes for one's own eyes vs. another person's eyes, in order to test whether we could replicate the Stroop effect as a result of direct gaze (Chevallier et al., 2013; Conty et al., 2010), and whether this effect is specific to another person's eyes (ostensive explanation) or is also found for one's own eyes (salience explanation). We used the paradigm developed by Conty et al. (2010) and added the factor own vs. another person's eyes in a trial-based manipulation. As the results from this first experiment showed no significant increase in the Stroop effect in either condition (one's own or another person's direct eye gaze, relative to closed eyes), we conducted two additional experiments within a new sample in a single test session. The goals of Experiment 2 were identical to those of Experiment 1. However, since the lack of effects in Experiment 1 may have been due to the eye stimuli being presented on a trial-by-trial basis, a block-wise manipulation was used in Experiment 2 to separately explore the impact of either one's own or another person's direct eye gaze on the Stroop effect. In addition, in Experiment 3, we attempted to directly replicate the original findings as reported by Conty et al. (2010) and Chevallier et al. (2013) by implementing an experimental design as close as possible to that used by these authors, including only eye stimuli of another person.

1. Open science statement

Data and analysis can be found on the Open Science Framework (https://osf.io/bpxkr). The direct replication (experiment 3) was preregistered on the platform AsPredicted (https://aspredicted.org/yzww-d82j.pdf).

2. Experiment 1

2.1. Methods

2.1.1. Participants

We tested 70 individuals (7 males; mean age: 19.1 years, SD: 1.93), double the sample size of the original study by Conty et al. (2010). Most participants were Caucasian (85.7%) and native Dutch speakers (95.7%). All participants were right-handed, had normal or corrected-to-normal vision, and none of them reported any history of neurological or psychiatric disorders. Participants were recruited via online advertising and tested in the lab. In accordance with the Declaration of Helsinki, each participant provided informed consent prior to the start of the experiment. This study was approved by the local ethics committee of the Faculty of Psychology and Educational Sciences of [blinded for review] University (approval code: 2019/114).

2.1.2. Stimuli and task

2.1.2.1. Stimuli. The present task was based on the paradigm developed by Conty et al. (2010), involving a modified version of a standard Stroop task (See Fig. 1). This task typically comprises an incongruent and a neutral condition. In the incongruent condition, the stimuli consisted of capitalized four-letter strings indicating color words in Dutch (i.e. 'ROOD', 'GEEL', 'BLAUW', 'GROEN'; meaning 'red', 'yellow', 'blue', 'green'), presented in the three colors that did not match their meaning. In the neutral condition, task stimuli involved letter strings of neutral signs matched for grapheme length with the incongruent condition (i.e. 'XXXX' for 'ROOD' and 'GEEL', 'XXXXX' for 'BLAUW' and 'GROEN'), printed in either red, yellow, blue or green. Each letter string subtended 0.7° of visual angle horizontally and 0.2° vertically.

To obtain the eye stimuli for the 'Self' condition, two images were collected for each participant: in the first picture, the subject was asked to look straight into the camera, whereas in the second, the subject kept their eyes closed. To control for familiarity, each participant was asked to provide similar photographs (depicting either direct eye gaze or closed eyes) of an individual personally close to them (a 'close' other, e.g. a partner, a friend, a relative). These pictures were used as eye stimuli for the 'Other' condition. All images showed individuals facing forward, portraying a neutral expression, without any hair covering their face. Each photograph was cropped so that only the eye region was visible. As a result, four different eye stimuli were obtained for each participant, in which the person (i.e. the participant or their close other) and the eye condition (i.e. direct eye gaze or closed eyes) were varied in a 2 × 2 factorial design. All eye stimuli were in color and subtended 6.9° of visual angle horizontally and 2.1° vertically. Eye stimuli were displayed 0.5° of visual angle above the letter strings. As the present study was designed as a replication and theoretical extension of Experiment 1 of Conty et al. (2010), we only included eye stimuli. Non-eye control stimuli were not used because gaze specificity had already been addressed in Experiment 2 of Conty et al. (2010).

2.1.2.2. Task. Participants were seated approximately 60 cm from the computer screen. Before starting the experiment, they were instructed to attend the letter strings and identify the ink color in which the string was printed. In addition, they were told that each letter string would appear concomitantly with the eye stimuli, which were not informative for the task. Participants were thus asked to focus on the ink color, ignore the eye stimuli, and avoid reading the string. They were instructed to name the color of the string as accurately and quickly as possible using a four-alternative forced-choice keyboard press (i.e. F, G, H, J keys for the colors yellow, blue, green and red, respectively). Participants were instructed to use only their dominant (right) hand to respond.

Each trial began with a jittered inter-stimulus interval consisting of a fixation cross displayed at the center of the screen for 800–1200 ms, in steps of 50 ms. Following the fixation cross, a letter string appeared for 3000 ms or until a response was given, after which the next trial started immediately. Both incongruent and neutral letter strings were presented randomly and in equal proportion across all trials. The association between the letter strings and the eye stimuli was counterbalanced within subjects.

To ensure that participants appropriately learn to associate each color with the correct response key, they first completed a practice block (36 trials), in which words of neutral content (i.e. 'WIND', 'STORM', 'REGEN', meaning 'wind', 'storm', 'rain') appeared at the center of the screen in all four colors. Subsequently, participants performed a second practice block of 48 trials involving an actual Stroop task, in which both incongruent and neutral trials were presented, but no eye stimuli were displayed above the letter strings. Before the test block, participants were shown an explicit instruction screen stating "In this part of the task, you will see pictures of your own or another person's eyes above the word or string of X's. Please press the spacebar to see an example of what this will look like". In the test block, participants performed the Stroop task while the eye stimuli were shown above the letter strings throughout 192 trials (48 per condition), following a trial-based manipulation (i.e. both self and other, as well as direct eye gaze and closed eyes stimuli, were randomly presented within a single block). The task was programmed and carried out using *E*-Prime 2.0 software (Schneider et al., 2002).

2.1.3. Questionnaires

Since earlier studies found autism-related alterations in processing ostensive cues and self-related processing (Lombardo & Baron-Cohen, 2010; Nijhof & Bird, 2019), we aimed to explore the association between autism traits and Stroop effects when enhanced under direct eye gaze conditions. Autism traits were assessed via the Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001) and the Social Responsiveness Scale, Adult version (SRS-A; Constantino & Gruber, 2012).

2.1.4. Procedure

Participants completed the Stroop paradigm, the questionnaires, and two additional computer tasks in a counterbalanced order in the context of a larger study lasting approximately 1 h and 30 min. Since the two additional tasks included in this project do not relate to our research questions and are part of distinct investigations, we do not report them in the present manuscript. Once the experiment was completed, participants were compensated for their time, received a debriefing, and were thanked for their participation.

2.1.5. Analysis

The statistical analyses were conducted using R and RStudio (version 4.0.4, R Core Team, 2021). Partial eta squared (η_p^2) values are reported as measures of effect size for analyses of variance (ANOVAs).

To evaluate accuracy, we calculated the percentage of correct responses across all trials for each participant. For the analysis of reaction time (RT) data, we first removed outlier responses shorter than 100 ms as well as those above or below 2.5 standard deviations from participants' individual mean, excluding less than 3.5% of the trials overall. Only RT data from correct responses were analyzed. We conducted a repeated measures 2 (Congruency: incongruent vs. neutral trials) x 2 (Eyes: direct eye gaze vs. closed eyes) x 2 (Person: self vs. other) within-subjects factors ANOVA.[2]

[2] The Kolmogorov-Smirnov test was significant, $p < .001$, indicating that RT data were non-normally distributed across all conditions. For this reason, in addition to the parametric approach reported in the main text, we performed an alternative non-parametric analysis to account for the non-normality of the data. To do this, we first removed outlier responses faster than 100 ms as well as those below the 0.5th percentile or above the 99.5th percentile of the RT distribution of each participant, as this consists in an equivalent outlier removal strategy for non-normally distributed data. This led to the exclusion of 1.4% of the trials overall. To reduce the skewness of the dataset, a log transformation on RTs was applied. To further account for inter-individual variability, a mixed-models Congruency x Eyes x Person ANOVA was conducted, which revealed a significant main effect of Congruency, $p < .001$. No other significant main effect or interaction was found, *ns*. Consequently, findings from such analysis did not change when using a non-parametric rather than a parametric approach. However, to make our results more comparable with those from previous research (Conty et al., 2010) and given the robustness of ANOVA against violations of normality (Blanca Mena et al., 2017; Schmider et al., 2010), the statistics from parametric analyses were reported in the main text.

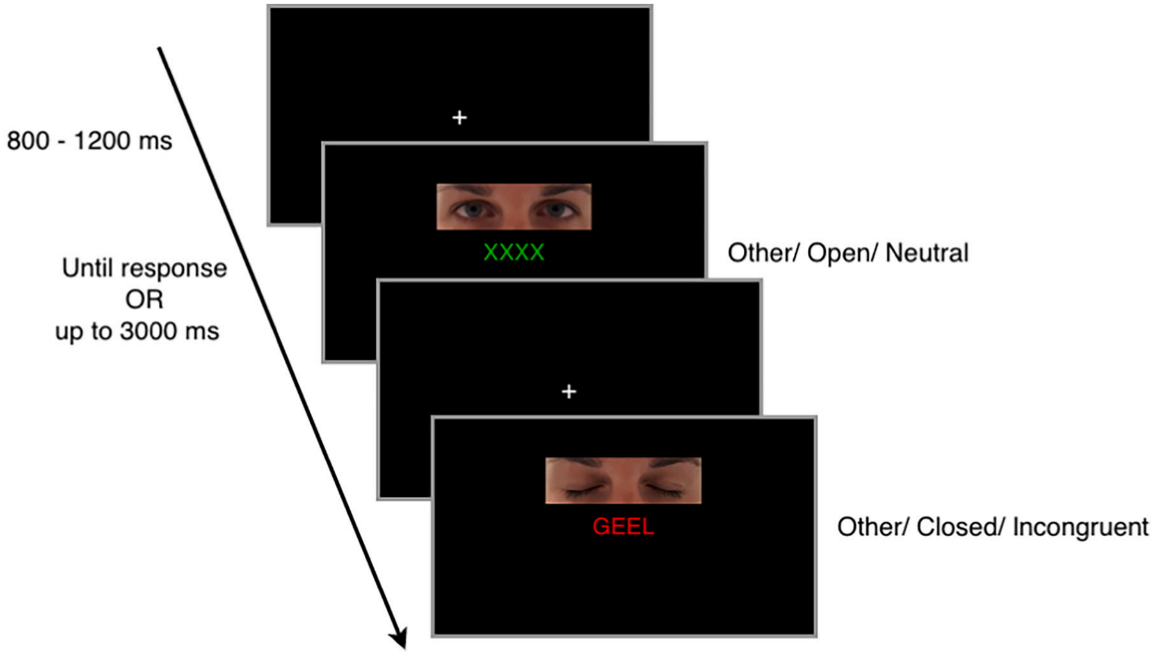

Fig. 1. Trial structure. Prior to stimulus presentation, a central fixation cross appeared for 200–1200 ms in steps of 50 ms. Following the fixation cross, a letter string and eye stimulus appeared for 3000 ms or until a response was given. The letter string "GEEL" is the Dutch word for yellow. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

To carry out correlational analysis for studying potential associations with autistic traits, the Stroop interference in presence of one's own as compared to the other's eye gaze was operationalized as the participant's average RT difference between the incongruent and neutral trials under the own gaze condition minus the participant's average RT difference between the incongruent and neutral trials under the other's gaze condition, i.e. [(mean RT for incongruent trials – mean RT for neutral trials, under own direct gaze) – (mean RT for incongruent trials – mean RT for neutral trials, under other's direct gaze)]. To determine whether this index and the questionnaires' scores were normally distributed, Shapiro–Wilk tests were conducted. Since no significant departure from normality was found for the distributions of the Stroop interference under the own vs. other's eye gaze, $W = 0.97$, $p = .109$, or the AQ scores, $W = 0.98$, $p = .239$, a parametric test (i.e. Pearson's r) was used for the correlation between these two measures. However, given that the SRS-A scores showed major departures from normality, $W = 0.93$, $p < .001$, we used a non-parametric test (i.e., Spearman's ρ) for the correlation between these scores and the Stroop interference under the own vs. other's eye gaze.

2.2. Results

Accuracy level was high across all participants ($M = 92.8\% \pm 4.4\%$) and was thus not analyzed any further. Table 1 reports an overview of the mean RTs for each level of Congruency, Eyes and Person (see also Fig. 2). The three-way repeated measures ANOVA on participants' RTs revealed a significant main effect of Congruency, $F(1, 69) = 68.18$, $p < .001$, $\eta_p^2 = 0.50$, with slower responses for incongruent trials as compared to neutral ones. However, the main effects of both Eyes and Person were non-significant, $F(1, 69) = 1.78$, $p = .187$, $\eta_p^2 = 0.03$ and $F(1, 69) = 1.08$, $p = .303$, $\eta_p^2 = 0.02$, respectively, indicating that the participants' response speed was neither modulated by the Eyes (direct eye gaze vs. closed eyes) nor by the Person (self vs. other) appearing above the strings. Importantly, also no interaction effects were found to be significant: Congruency x Eyes, $F(1, 69) = 1.16$, $p = .286$, $\eta_p^2 = 0.02$; Congruency x Person, $F(1, 69) = 0.35$, $p = .557$, $\eta_p^2 < 0.01$; Eyes x Person, $F(1, 69) = 0.82$, $p = .368$, $\eta_p^2 = 0.01$; Congruency x Eyes x Person, $F(1, 69) = 0.28$, $p = .598$, $\eta_p^2 < 0.01$.

To further explore the unexpected non-significant main effect of Eyes and Eyes x Congruency interaction, a follow-up two-way (Congruency x Eyes) ANOVA was conducted on participants' RTs for others' eyes condition only. Results indicated a significant main effect of Congruency, $F(1, 69) = 60.45$, $p < .001$, $\eta_p^2 = 0.47$, while corroborating the lack of significant main effect of Eyes, $F(1, 69) = 2.89$, $p = .093$, $\eta_p^2 = 0.04$, and Congruency x Eyes interaction, $F(1, 69) = 1.68$, $p = .199$, $\eta_p^2 = 0.02$. Thus, even when exclusively analyzing the response speed for the other's eyes, our findings did not reveal an enhanced interference effect for direct eye gaze.

Table 1
Experiment 1: Mean RT (ms) for Each Level of Person Under Both Congruency and Eyes Conditions.

		Congruency	
Eyes	Person	Incongruent	Neutral
Direct gaze	Self	851.05 (164.52)	799.62 (123.23)
	Other	857.69 (143.08)	794.48 (122.71)
Closed eyes	Self	850.53 (157.81)	804.03 (127.59)
	Other	861.57 (153.05)	814.37 (140.45)

Note. Standard deviations are reported in brackets.

2.3. Interim discussion

Experiment 1 aimed to elucidate whether the origin of the enhanced Stroop effect is due to the ostensive nature of direct eye gaze or rather to stimulus salience. We did not find any difference in the effect of the eyes of the participant or of the close other being displayed. In fact, unexpectedly, we failed to replicate the previously found distracting effect of such a visual cue, i.e. a significantly increased Stroop interference in the presence of another person's direct eye gaze as opposed to closed eyes (Chevallier et al., 2013; Conty et al., 2010). A possible reason for the absence of effects may be the design used for Experiment 1, which varied the eye stimuli on a trial-by-trial basis. Although our trial-based manipulation is consistent with earlier studies (Chevallier et al., 2013; Conty et al., 2010), the inclusion of the factor Person (self versus other

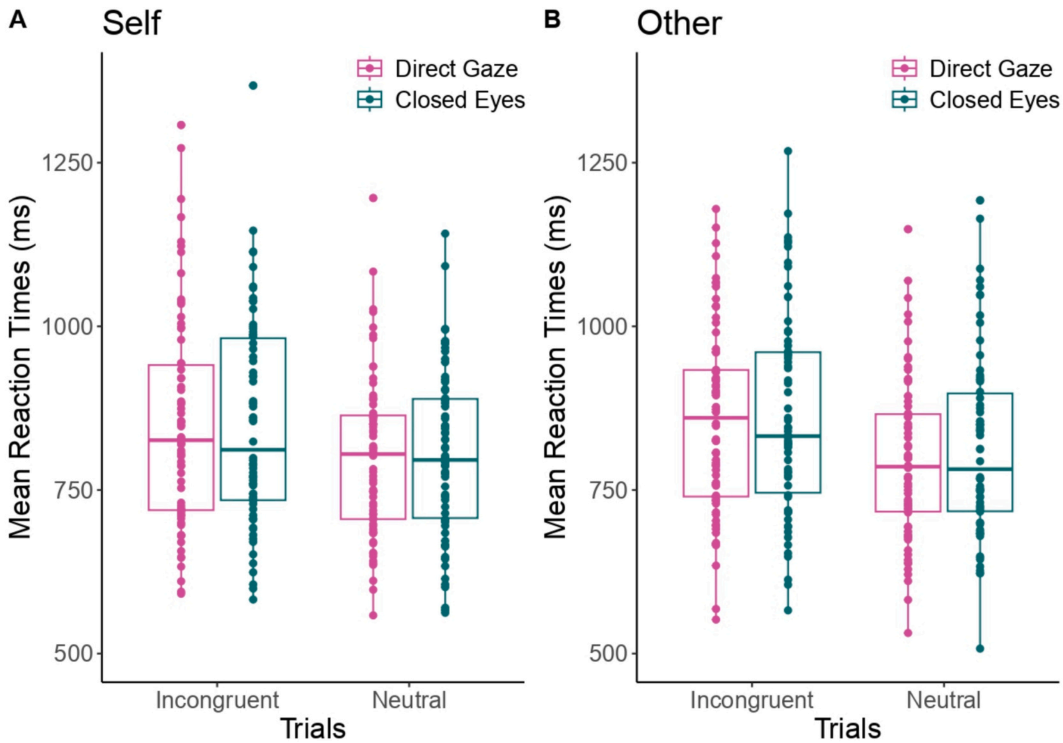

Fig. 2. Distributions of Mean Reaction Time (ms) Under the Self (A) and Other (B) Conditions for Both Congruency and Eyes Conditions in Experiment 1.

eye gaze) may have led to an absence of the expected effects. Indeed, research in the social attention literature suggests that whether stimuli differing in social characteristics (e.g., self vs. other in the present study, or in-group vs out-group in Zhang et al., 2023) are presented in an intermixed or blocked fashion can influence the extent to which they modulate attention, as intermixed presentations create an explicit comparative context between the different stimulus categories (Zhang et al., 2023). To address this potential issue, we therefore conducted a second experiment with the same purpose as Experiment 1, namely, to investigate the differential effect of the self and other eye gaze conditions on the Stroop effect. However, in Experiment 2 we applied a block-wise experimental design instead of a trial-based manipulation. As such, self and other eye gaze stimuli were separately presented in two distinct blocks.

3. Experiment 2

3.1. Methods

3.1.1. Participants

For Experiment 2, a new sample of 70 individuals was recruited via online advertising. No participant reported any history of neurological or psychiatric disorders, and all had normal or corrected-to-normal vision. Each participant provided informed consent before taking part in the experiment and was financially compensated for their participation. One participant showed an accuracy level below chance on the task and was thus removed from further analysis. This resulted in a final sample of 69 participants (24 male; mean age: 21.74 years, SD: 3.72). Most individuals were right-handed (84.1%), Caucasian (97.1%) and native Dutch speakers (98.6%).

3.1.2. Stimuli and task

3.1.2.1. Stimuli. The color, size, and content of the letter strings were the same as in Experiment 1. Eye stimuli consisted once again of eye-region cuts obtained from images of the participants themselves and other individuals. However, the experimenters themselves photographed participants' faces for the Self condition, using the same device and while participants were located in the same research room to ensure that image luminance, quality and resolution were consistent across the sample. Each photograph was taken while the individual was looking directly into the camera or with eyes closed. For the pictures, all subjects were instructed to face forward, keep a neutral expression and remove any hair covering their faces. For the Self condition, each eye region cut was mirror imaged to generate the visual stimulus participants would have seen when looking at their own eyes in the mirror. Additionally, the same two types of images (either direct eye gaze or closed eyes) were collected from eight individuals (four males and four females) to serve as the eye stimuli for the Other condition. Each participant was randomly gender-matched with an individual of the Other condition. The association between participants and gender-matched others was counterbalanced across the sample.

3.1.2.2. Task. The paradigm and task instructions were identical to those of Experiment 1 with one exception: while Experiment 1 followed a trial-based manipulation, Experiment 2 involved a block-wise manipulation, i.e. own eyes or other eyes conditions were presented in separate blocks. Direct eye gaze and closed eyes stimuli were randomized within each block. The order in which the blocks were administered was counterbalanced across participants.

3.1.3. Questionnaires

As in Experiment 1, participants completed the Autism Spectrum Quotient, full version (AQ, Baron-Cohen et al., 2001) and the Social Responsiveness Scale, Adult version (SRS-A, Constantino, 2002).

3.1.4. Procedure

During a test session of approximately 30 min, photographs of participants were taken, cropped, mirrored, and matched for gender with eye stimuli of the other condition. To prevent any potential carryover effect on the replication attempt, participants performed the two experiments in a fixed order, i.e. Experiment 3 was always conducted first, followed by Experiment 2 (for clarity purposes, we first report Experiment 2 in this manuscript). In addition, participants also completed the two autism-related questionnaires. At the end of the experiment, participants were thanked, financially compensated, and received a debriefing.

3.1.5. Analysis

The reported statistics, the analyses as well as the outlier removal strategy were analogous to those used in Experiment 1.[3] Applying the aforementioned strategy resulted in eliminating 3.5% of the trials overall.

3.2. Results

Across all participants, the percentage of correct responses was found to be very high ($M = 93.0\% \pm 6.9\%$). As a result, participants' accuracy level was not further analyzed. The average RTs for each level of Congruency, Eyes and Person are displayed in Table 2 (see also Fig. 3). Findings from the three-way repeated measures ANOVA showed a significant main effect of Congruency, $F(1, 68) = 49.89$, $p < .001$, $\eta_p^2 = 0.42$, suggesting that participants were slower when responding to incongruent trials as compared to neutral ones. No significant main effects of Eyes, $F(1, 68) = 0.88$, $p = .352$, $\eta_p^2 = 0.01$, or Person, $F(1, 68) = 0.03$, $p = .866$, $\eta_p^2 < 0.01$, were found. All interaction effects were found to be non-significant; Congruency x Eyes, $F(1, 68) = 1.91$, $p = .171$, $\eta_p^2 = 0.03$; Congruency x Person, $F(1, 68) < 0.01$, $p = .955$, $\eta_p^2 < 0.01$; Eyes x Person, $F(1, 68) = 0.39$, $p = .532$, $\eta_p^2 < 0.01$; Congruency x Eyes x Person, $F(1, 68) = 1.21$, $p = .275$, $\eta_p^2 = 0.02$.

Once again, to further examine the non-significant main effect of Eyes and Eyes x Congruency interaction in this second experiment, we conducted an additional, separate two-way (Congruency x Eyes) ANOVA on the responses for the others' eyes block only. This follow-up analysis showed a significant main effect of Congruency, $F(1, 68) = 37.63$, $p < .001$, $\eta_p^2 = 0.36$, and again the main effect of Eyes, $F(1, 68) < 0.01$, $p = .957$, $\eta_p^2 < 0.01$, and Congruency x Eyes interaction, $F(1, 68) = 0.02$, $p = .877$, $\eta_p^2 < 0.01$ were not significant. Hence, also within this experiment we did not find support for an increased interference effect under direct eye gaze conditions.

Table 2
Experiment 2: Mean RT (ms) for Each Level of Person Under Both Congruency and Eyes Conditions.

		Congruency	
Eyes	Person	Incongruent	Neutral
Direct gaze	Self	771.75 (159.74)	734.59 (138.10)
	Other	781.02 (157.49)	731.04 (123.74)
Closed eyes	Self	793.81 (161.14)	730.19 (125.50)
	Other	782.42 (156.32)	730.55 (121.39)

Note. Standard deviations are reported in brackets.

3.3. Interim discussion

Experiment 2 aimed to explore the influence of the self vs. other eye gaze conditions on the Stroop interference while addressing a possible methodological issue of Experiment 1. In this experiment, the Person condition was presented in a block-wise rather than a trial-based fashion. Results however showed no significant modulation of the Stroop interference depending on the Eye or Person condition, failing once again to replicate the original findings reported by Conty et al. (2010). In a third experiment, we tried to stay as close as possible to the original studies' design with the aim of replicating the distracting effect of direct eye gaze in the Stroop paradigm as observed in earlier studies (Chevallier et al., 2013; Conty et al., 2010), only using eyes of others.

4. Experiment 3

4.1. Methods

As this experiment was a direct replication, prior to collecting any data, it was preregistered on the platform AsPredicted (https://aspredicted.org; reference number: 48292).

4.1.1. Participants

To our knowledge, two previous studies found the interaction between Congruency and Eyes: Conty et al. (2010) and Chevallier et al. (2013). Based on the first study, to detect a large-sized effect ($\eta^2 = 0.18$, Conty et al., 2010) with 80% power at $\alpha = 0.05$, the required sample size is 38. Based on the second study, to detect a medium-to-large effect ($\eta^2 = 0.12$, Chevallier et al., 2013), with 80% power at $\alpha = 0.05$, a sample of at least 60 participants is necessary. To reach the estimated sample size for both a-priori power analyses and to take account of possible data removal based on accuracy level, we aimed to recruit a minimum of 70 participants. In fact, the same 70 individuals who participated in Experiment 2 also performed Experiment 3 in the same session. Participants with a below-chance accuracy level were excluded from the sample: this resulted in the removal of the RT data of one subject from further analysis. Note that this was a different subject than the one in Experiment 2. The final sample consisted of 69 participants (24 males, mean age: 21.8 years, SD: 3.77). The sample mostly included individuals that were right-handed (84.1%), Caucasian (97.1%) and native speakers of Dutch (98.6%).

4.1.2. Apparatus

All task features – e.g. content, size and color of the letter strings, size and screen location of the eye stimuli, distance between the strings and the eye stimuli – were the same as in Experiment 1 and 2 and resembled those of the paradigm by Conty et al. (2010) as much as possible. Differently from Experiments 1 and 2, eye stimuli consisted of eye region cuts obtained by cropping a series of colored photographs of 24 individuals (12 males and 12 females). These images were selected from the same previously-collected database of face images (see George et al., 2001; Vuilleumier et al., 2005) used in the already-mentioned studies reporting the interaction between Congruency and Eyes (Chevallier et al., 2013; Conty et al., 2010). As in these studies, two different stimuli (i.e. direct eye gaze and closed eyes) were created for each of the 24 individuals. As in the original study by Conty et al. (2010), all 48 eye stimuli were also presented in a mirror-imaged version, resulting in a total of 96 pairs of eyes.

4.1.3. Procedure

The procedure, paradigm and task instructions were the same as those used in both Experiment 1 and 2, adapted from prior research (Conty et al., 2010). To avoid any possible carryover effect from completing a prior task, participants always performed Experiment 3 first, followed by Experiment 2. To obtain the same number of

[3] According to the Kolmogorov-Smirnov test, $p < .001$, RTs distribution showed a significant departure from normality. Hence, we adopted the same non-parametric approach described in Note 1 to analyse this second non-normally distributed dataset. To this end, the same outlier removal strategy mentioned in Note 1 was used, resulting in the exclusion of 1.3% of the trials overall. A mixed-models Congruency x Eyes x Person ANOVA on the transformed RT data indicated a significant main effect of Congruency, $p < .001$. No other main effect or interaction was found to be significant, *ns*. Once again, results from non-parametric analysis did not differ from those from parametric analysis. In the main text, we report the results from the latter type of analysis so that these were more comparable with previous investigations (Conty et al., 2010), also taking into account the robustness of ANOVA against normality violations (Blanca Mena et al., 2017; Schmider et al., 2010).

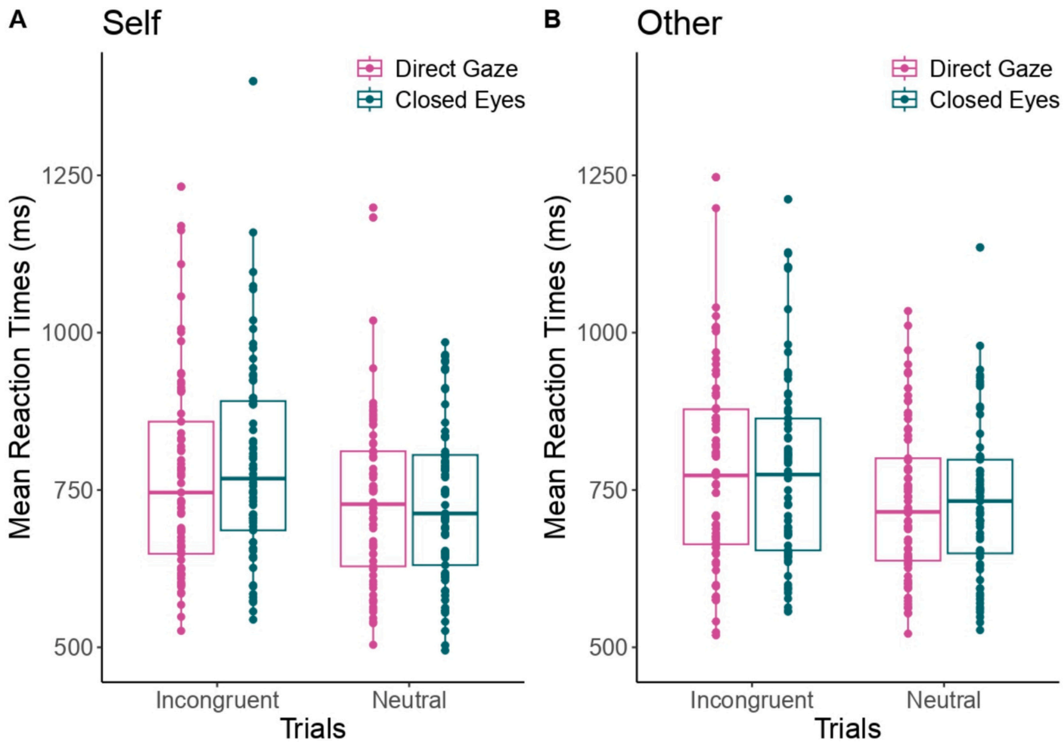

Fig. 3. Distributions of Mean Reaction Time (ms) Under Self (A) and Other (B) Conditions for Both Congruency and Eyes Conditions in Experiment 2.

observations per condition as in the study by Conty et al. (2010), each of the 96 eye stimuli was presented twice, resulting in 192 trials in total. The association between the letter strings and the eye stimuli was counterbalanced across the sample.

4.1.4. Analysis

The reported statistics, the analysis of accuracy and the criteria to exclude outliers were the same as those from Experiment 1 and 2. Using the aforementioned outlier removal strategy resulted in eliminating 3.5% of the trials overall. To analyse participants' RTs, a two-way repeated measures 2 (Congruency: Incongruent vs. Neutral trials) x 2 (Eyes: Direct eye gaze vs. Closed eyes) within-subjects factors ANOVA was conducted.[4] In addition, both frequentist and Bayesian statistics were calculated using JASP (https://jasp-stats.org; JASP Team, 2022). In the Bayesian approach, the Bayes Factor (BF) is the ratio between the likelihood of a hypothesis and the likelihood of the other, quantifying the amount of evidence supporting the hypothesis being tested. Greater values of the Bayes Factor (BF_{01}) indicate stronger evidence in favor of the null hypothesis (H0) over the alternative hypothesis (H1). A BF_{01} higher than 1 provides greater support for H0, while a BF_{01} lower than 1 provides greater evidence for H1. A BF_{01} approaching 1 indicates that both hypotheses have comparable likelihood. Conventionally, while a BF_{01} between 1/3 (i.e. 0.3) and 3 is deemed inconclusive, values below 1/3 are indicative of evidence in favor of H1, and those above 3 are considered in support of H0 (Schönbrodt & Wagenmakers, 2018).

4.2. Results

Accuracy level was found to be considerably high across the whole sample ($M = 92.5\% \pm 9.2\%$) and was not analyzed any further. Table 3 illustrates the response speed for each level of Congruency, Eyes and Person (see also Fig. 4). Repeated measures ANOVA on RT data revealed a significant main effect of Congruency, $F(1, 68) = 64.92, p < .001, \eta_p^2 = 0.49$, indicating greater responses in the incongruent condition than in the neutral one. Bayesian analysis provided decisive evidence in favor of the alternative over the null hypothesis for this effect ($BF_{01} < 0.001$). Results showed the main effect of Eyes, $F(1, 68) = 0.51, p = .476, \eta_p^2 = 0.01$ to be non-significant, suggesting that the presence of either direct eye gaze or closed eyes stimuli appearing above the strings did not significantly change participants' response speed. Similarly, when adopting a Bayesian approach, results indicated substantial proof in support of the null over the alternative hypothesis for this effect ($BF_{01} = 5.28$). Importantly, also no significant interaction between Congruency x Eyes was found, $F(1, 68) = 0.24, p = .625, \eta_p^2 < 0.01$. This was further corroborated by Bayesian analysis, indicating substantial evidence for the null over the alternative hypothesis for the interaction effect ($BF_{01} = 4.77$).

In addition, we computed a Bayesian paired samples *t*-test to

Table 3
Experiment 3: Mean RT (ms) for each level of eyes under both congruency conditions.

	Congruency	
Eyes	Incongruent	Neutral
Direct gaze	840.26 (156.27)	784.52 (133.42)
Closed eyes	847.85 (160.47)	786.23 (129.67)

Note. Standard deviations are reported in brackets.

[4] The Kolmogorov-Smirnov test revealed that RT data were non-normally distributed, $p < .001$. Thus, alongside the parametric approach reported in the main text, we analyzed this non-normally distributed dataset using a non-parametric alternative. We therefore used the same outlier exclusion criteria mentioned in Note 1 & 2. As a result, 1.4% of the trials were removed. A mixed-models Congruency x Eyes ANOVA on the log-transformed RTs was conducted. We observed a significant main effect of Congruency, $p < .001$, yet no other significant main effect or interaction, *ns*. Despite the non-parametric approach applied, results did not change from those from parametric analysis. To allow comparisons between our results and those from previous research (Conty et al., 2010) and considering that ANOVA is robust against normality violations (Blanca Mena et al., 2017; Schmider et al., 2010), statistics from parametric analyses are reported in the main text.

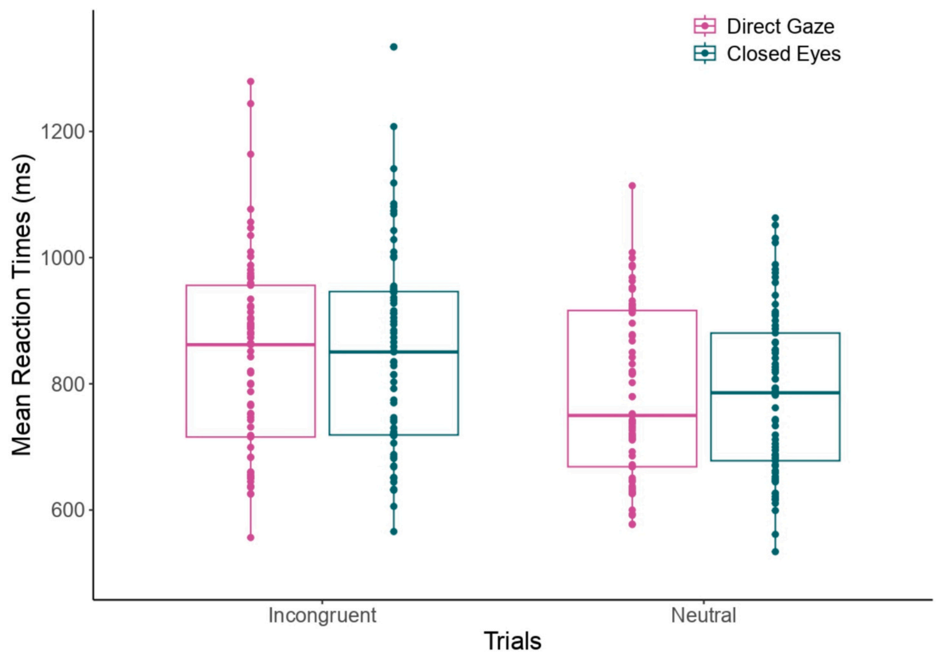

Fig. 4. Distributions of Mean Reaction Time (ms) for Both Congruency and Eyes Conditions in Experiment 3.

compare the RTs on incongruent trials between the two Eyes conditions (direct eye gaze vs. closed eyes). This analysis provided substantial evidence in favor of the null over the alternative hypothesis ($BF_{01} = 5.59$), indicating no difference between the direct eye gaze and the closed eyes conditions on incongruent trials. Similarly, an additional Bayesian paired samples t-test comparing the RTs on neutral trials under the levels of the Eyes condition also provided support for the null over the alternative hypothesis ($BF_{01} = 7.40$). This result further confirmed a lack of significant difference between the effect of direct eye gaze and closed eyes on neutral trials.

4.3. Pooled analysis

Although not preregistered, we conducted an additional pooled analysis across all three experiments to examine whether the combined data would converge on the same conclusion regarding the effect of direct gaze on the Stroop effect. For this analysis, data were collapsed across the self-gaze versus other-gaze manipulation, and only the effect of gaze (direct vs. closed) was examined. In line with the analyses of the individual experiments, the pooled analysis did not reveal any evidence that direct gaze affects the Stroop effect (main effect of Eyes: $F(1, 207) = 1.70$, $p = .194$, $\eta p^2 = 0.01$; Congruency x Eyes interaction: $F(1, 207) = 0.04$, $p = .833$, $\eta p^2 < 0.01$). Complementary Bayesian analyses provided substantial evidence in favor of the null hypothesis for the main effect of Eyes ($BF_{01} = 4.42$) and strong evidence for the null hypothesis for the crucial Congruency x Eyes interaction ($BF_{01} = 10.01$).

5. General discussion

Direct eye gaze is a vital tool for effectively navigating social environments (Emery, 2000; Frischen et al., 2007). As such, this visual stimulus is highly salient (Conty et al., 2016; Senju & Hasegawa, 2005) and can disrupt concurrent information processing. Earlier studies indeed observed a larger Stroop effect – i.e. slower RTs in the incongruent than in the neutral condition – when direct eye gaze, as opposed to closed eyes, was presented as distractor (Chevallier et al., 2013; Conty et al., 2010). This effect, however, was not found in later studies (Henschel et al., 2021; Hietanen et al., 2016). The reason for the effect also remains unclear: it may reflect the ostensive nature of direct eye gaze, which signals another person's intention to interact, or it may reflect the more general salience of eye stimuli. Our study therefore had two main goals: first, to replicate the increase Stroop effect under direct eye gaze, and second, to test whether this effect is specific to another person's eyes (ostensive explanation) or is also found for one's own eyes (salience explanation). However, the findings did not permit us to address the second goal as across three distinct experiments, we could not replicate the reported effect of an increase of Stroop interference under direct eye gaze.

Contrary to prior research (Chevallier et al., 2013; Conty et al., 2010), findings from Experiment 1 suggest that the Stroop interference was modulated by neither kind of distractors, i.e. eye stimuli varying based on the type of eyes (direct gaze or closed eyes) or the person the eyes belong to (self or other). We conducted two additional experiments to test whether the previously observed increase in the Stroop effect under direct gaze could be replicated. First, given that using a trial-based manipulation to evaluate the effect of one's own or another's eye gaze may explain our failure to replicate, Experiment 2 involved a block-wise design. We thus prevented the effect of one's own eyes from interfering with that of the other, and vice versa. Second, since any substantial modifications to the original task may per se explain our failure to reproduce prior findings, Experiment 3 was designed to simulate the original study of Conty et al. (2010) as closely as possible, and in which exclusively eye gaze of another person was included. Both investigations revealed a classical Stroop effect, yet no increase of this effect under direct eye gaze (vs. closes eyes) conditions. More to the point, results of Experiment 2 were consistent with those of Experiment 1, indicating no increased Stroop effect under direct eye gaze conditions, irrespective of whether the eyes were one's own or of another person. Findings from Experiment 3, which made use of another person's eyes only, again showed no effect of direct eye gaze on Stroop interference. Bayesian analysis provided substantial evidence in favor of the null over the alternative hypothesis for the effect of direct eye gaze (vs. closed eyes) on Stroop interference. To further corroborate these findings, we also conducted a pooled analysis across all three experiments. Both frequentist and Bayesian analyses, were consistent in showing that direct gaze does not module the Stroop effect, with the Bayesian approach providing strong evidence in favor of the null.

Although these results stand in strong contrast with the findings from the original study by Conty et al. (2010), our investigation is in line with more recent findings on the distracting effect of direct gaze during concomitant information processing (Henschel et al., 2021; Hietanen et al., 2016). To our knowledge, the significantly greater Stroop interference in presence of direct gaze was only replicated by Chevallier et al. (2013), who adopted a variant of the paradigm developed by Conty et al. (2010) to test social attention in a sample of adolescents with and without autism. However, this study did not constitute an independent replication (i.e. it was not conducted by an entirely novel group of researchers), which is considered a valuable research practice that improves the quality and reliability of scientific findings (LeBel, 2015). In addition, the conclusions on the pervasive effect of direct gaze on task performance were drawn on the basis of a smaller sample ($N = 48$) – hence, a lower level of statistical power (Case & Ambrosius, 2007) – than those we tested across three experiments ($N = 70$ for Experiment 1, $N = 69$ for Experiment 2 and 3). Furthermore, as mentioned previously, more recent investigations using similar methodological approaches also failed to replicate Conty et al. (2010). For instance, Hietanen et al. (2016) tested participants using a Stroop task while presenting direct or averted 'live' eye gaze as distractor. Results showed no greater Stroop effect under direct gaze. Similarly, Henschel et al. (2021) did not consistently replicate earlier findings when exploring the impact of a series of social and non-social distractors on the Stroop interference. Although a first experiment suggested a heightened interference effect for directly gazing faces than other non-social stimuli, a follow-up and more adequately powered experiment disproved this result. A comparison of effect sizes across studies further illustrates this pattern (see supplementary Table S1 for an overview). Whereas the original reports suggested relatively large interaction effects (Conty et al., 2010: $N = 33$, $\eta^2 = 0.18$ [$\approx \eta p^2 = 0.19$]; Chevallier et al., 2013: $N = 48$, $\eta p^2 = 0.12$),[5] later investigations yielded substantially smaller estimates (Hietanen et al., 2016: $N = 40$, $\eta p^2 = 0.04$; Henschel et al., 2021: $N = 39$, $\eta G^2 = 0.003$ [$\approx \eta p^2 = 0.07$], and $N = 51$, $\eta G^2 = 0.0003$ [$\approx \eta p^2 < 0.01$]). In line with the latter studies, the present experiments likewise produced very small effect sizes (Exp 1: $N = 70$, $\eta p^2 = 0.02$; Exp 2: $N = 69$, $\eta p^2 = 0.03$; Exp 3: $N = 69$, $\eta p^2 < 0.01$). The fact that we were unable to replicate the original reported effects across three sufficiently powered experiments, one of which closely resembled the original study by Conty et al. (2010), raises doubts on the reliability of the effects as originally reported.

Although we attempted to design Experiment 3 as methodologically close as possible to that of Conty et al. (2010), minor differences were still present in terms of size and type of task stimuli. For instance, contrary to Conty et al. (2010), the letter strings in Experiment 3 subtended approximately 0.7° of visual angle horizontally (instead of 1°), whereas the eye stimuli were presented in color (instead of greyscale) and subtended 2.1° of visual angle vertically (instead of 1.6°). However, if these minor methodological details played a role in our findings being null, one could call into question the value and relevance of the previously observed increase in the Stroop effect, if this is so easily affected by such negligible factors.

In conclusion, results across three experiments suggest that direct eye gaze does not modulate the interference effect in the context of the Stroop paradigm. Our investigation highlights the importance of null results and independent replication (Kepes et al., 2014).

CRediT authorship contribution statement

Danna Oomen: Writing – original draft, Software, Methodology, Investigation, Data curation, Conceptualization. **Letizia Amodeo:** Writing – original draft, Visualization, Project administration, Investigation, Formal analysis, Data curation. **Annabel D. Nijhof:** Writing – review & editing, Supervision. **Marcel Brass:** Writing – review & editing, Supervision, Conceptualization. **Jan R. Wiersema:** Writing – review & editing, Supervision, Conceptualization.

Declaration of Generative AI and AI-assisted technologies in the writing process

N/a

Funding declaration

DO was supported by the Special Research Fund of Ghent University, project number: BOF18/DOC/348. LA was supported by a special Research Fund of Ghent University, awarded to JRW: 24 J148-17 BOF.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Danna Oomen reports financial support was provided by Special research fund Ghent university. Letizia Amodeo reports financial support was provided by Special research fund Ghent university. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.actpsy.2026.106981.

Data availability

Data and analysis can be found on the Open Science Framework (https://osf.io/bpxkr)

References

Baron-Cohen, S. (1997). *Mindblindness: An essay on autism and theory of mind*. MIT Press. https://doi.org/10.7551/mitpress/4635.001.0001

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The Autism-Spectrum Quotient (AQ): Evidence from Asperger Syndrome/High-Functioning Autism, Males and Females, Scientists and Mathematicians. *Journal of Autism and Developmental Disorders, 31*(1), 5–17. https://doi.org/10.1023/A:1005653411471

Blanca Mena, M. J., Alarcón Postigo, R., Arnau Gras, J., Bono Cabré, R., & Bendayan, R. (2017). Non-normal data: Is ANOVA still a valid option? *Psicothema, 29*(4), 552–557.

Cañigueral, R., & Hamilton, A. F.d. C. (2019). The role of eye gaze during natural social interactions in typical and autistic people. *Frontiers in Psychology, 10*. https://doi.org/10.3389/fpsyg.2019.00560

Carlin, J. D., & Calder, A. J. (2013). The neural basis of eye gaze processing. *Current Opinion in Neurobiology, 23*(3), 450–455. https://doi.org/10.1016/j.conb.2012.11.014

Case, L. D., & Ambrosius, W. T. (2007). *Power and Sample Size* (pp. 377–408). https://doi.org/10.1007/978-1-59745-530-5_19

Chevallier, C., Huguet, P., Happé, F., George, N., & Conty, L. (2013). Salient social cues are prioritized in autism Spectrum disorders despite overall decrease in social attention. *Journal of Autism and Developmental Disorders, 43*(7), 1642–1651. https://doi.org/10.1007/s10803-012-1710-x

Constantino, J. N. (2002). *The social responsiveness scale*. Western Psychological Services.

Constantino, J. N., & Gruber, C. P. (2012). *Social responsiveness scale: SRS-2*. Torrance: Western Psychological Services.

Conty, L., George, N., & Hietanen, J. K. (2016). Watching eyes effects: When others meet the self. *Consciousness and Cognition, 45*, 184–197. https://doi.org/10.1016/j.concog.2016.08.016

Conty, L., Gimmig, D., Belletier, C., George, N., & Huguet, P. (2010). The cost of being watched: Stroop interference increases under concomitant eye contact. *Cognition, 115*(1), 133–139. https://doi.org/10.1016/j.cognition.2009.12.005

Cunningham, S. J., Brady-Van den Bos, M., Gill, L., & Turk, D. J. (2013). Survival of the selfish: Contrasting self-referential and survival-based encoding. *Consciousness and Cognition, 22*(1), 237–244. https://doi.org/10.1016/j.concog.2012.12.005

[5] The test statistics of Hietanen et al. (2016) were obtained by contacting the authors; Most studies reported eta squared (ηp^2), when this statistic was not reported, we calculated it from the reported F statistics ($\eta p^2 =$ (F x df_effect)/ F x df_effect + df_error).

Cunningham, S. J., & Turk, D. J. (2017). A review of self-processing biases in cognition. *Quarterly Journal of Experimental Psychology, 70*(6), 987–995. https://doi.org/10.1080/17470218.2016.1276609

Dalmaso, M., Castelli, L., & Galfano, G. (2017). Attention holding elicited by direct-gaze faces is reflected in saccadic peak velocity. *Experimental Brain Research, 235*(11), 3319–3332. https://doi.org/10.1007/s00221-017-5059-4

Dalmaso, M., Petri, L., Patron, E., Spoto, A., & Vicovaro, M. (2022). Direct gaze holds attention, but not in individuals with obsessive-compulsive disorder. *Brain Sciences, 12*(2), 288. https://doi.org/10.3390/brainsci12020288

Degutyte, Z., & Astell, A. (2021). The role of eye gaze in regulating turn taking in conversations: A systematized review of methods and findings. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.616471

Emery, N. J. (2000). The eyes have it: The neuroethology, function and evolution of social gaze. *Neuroscience & Biobehavioral Reviews, 24*(6), 581–604. https://doi.org/10.1016/S0149-7634(00)00025-7

Frischen, A., Bayliss, A. P., & Tipper, S. P. (2007). Gaze cueing of attention: Visual attention, social cognition, and individual differences. *Psychological Bulletin, 133*(4), 694–724. https://doi.org/10.1037/0033-2909.133.4.694

Frith, C. D., & Frith, U. (2006). The neural basis of Mentalizing. *Neuron, 50*(4), 531–534. https://doi.org/10.1016/j.neuron.2006.05.001

George, N., Driver, J., & Dolan, R. J. (2001). Seen gaze-direction modulates fusiform activity and its coupling with other brain areas during face processing. *NeuroImage, 13*(6), 1102–1112. https://doi.org/10.1006/nimg.2001.0769

Gobel, M. S., Kim, H. S., & Richardson, D. C. (2015). The dual function of social gaze. *Cognition, 136*, 359–364. https://doi.org/10.1016/j.cognition.2014.11.040

Henschel, A., Bargel, H., & Cross, E. S. (2021). Faces do not attract more attention than non-social distractors in the Stroop task. *Collabra. Psychology, 7*(1). https://doi.org/10.1525/collabra.18521

Hietanen, J. K., Myllyneva, A., Helminen, T. M., & Lyyra, P. (2016). The effects of genuine eye contact on visuospatial and selective attention. *Journal of Experimental Psychology: General, 145*(9), 1102–1106. https://doi.org/10.1037/xge0000199

Humphreys, G. W., & Sui, J. (2015). The salient self: Social saliency effects based on self-bias. *Journal of Cognitive Psychology, 27*(2), 129–140. https://doi.org/10.1080/20445911.2014.996156

JASP Team. (2022). *JASP (0.16.3.0)*.

Kepes, S., Banks, G. C., & Oh, I.-S. (2014). Avoiding Bias in publication Bias research: The value of "null" findings. *Journal of Business and Psychology, 29*(2), 183–203. https://doi.org/10.1007/s10869-012-9279-0

Khalid, S., Deska, J. C., & Hugenberg, K. (2016). The eyes are the windows to the mind: Direct eye gaze triggers the ascription of others' minds. *Personality and Social Psychology Bulletin, 42*(12), 1666–1677. https://doi.org/10.1177/0146167216669124

LeBel, E. P. (2015). A new replication norm for psychology. *Collabra, 1*(1). https://doi.org/10.1525/collabra.23

Lombardo, M. V., & Baron-Cohen, S. (2010). Unraveling the paradox of the autistic self. *WIREs Cognitive Science, 1*(3), 393–403. https://doi.org/10.1002/wcs.45

MacLeod, C. M. (1991). Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin, 109*(2), 163–203. https://doi.org/10.1037/0033-2909.109.2.163

MacLeod, C. M. (1992). The Stroop task: The" gold standard" of attentional measures. *Journal of Experimental Psychology: General, 121*(1), 12. https://doi.org/10.1037/0096-3445.121.1.12

Myllyneva, A., & Hietanen, J. K. (2015). There is more to eye contact than meets the eye. *Cognition, 134*, 100–109. https://doi.org/10.1016/j.cognition.2014.09.011

Nijhof, A. D., & Bird, G. (2019). Self-processing in individuals with autism spectrum disorder. *Autism Research, 12*, 1580–1584. https://doi.org/10.1002/aur.2200

R Core Team. (2021). *R: A language and environment for statistical computing (4.0.4)*. R Foundation for Statistical Computing.

Schmider, E., Ziegler, M., Danay, E., Beyer, L., & Bühner, M. (2010). Is it really robust?: Reinvestigating the robustness of ANOVA against violations of the normal distribution assumption. *Methodology, 6*(4), 147–151. https://doi.org/10.1027/1614-2241/a000016

Schneider, W., Eschman, A., & Zuccolotto, A. (2002). *E-Prime Reference Guide*. Psychology Software Tools Inc.

Schönbrodt, F. D., & Wagenmakers, E.-J. (2018). Bayes factor design analysis: Planning for compelling evidence. *Psychonomic Bulletin & Review, 25*(1), 128–142. https://doi.org/10.3758/s13423-017-1230-y

Senju, A., & Hasegawa, T. (2005). Direct gaze captures visuospatial attention. *Visual Cognition, 12*(1), 127–144. https://doi.org/10.1080/13506280444000157

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 18*(6), 643–662. https://doi.org/10.1037/h0054651

Sui, J., Liu, M., Mevorach, C., & Humphreys, G. W. (2015). The salient self: The left intraparietal sulcus responds to social as well as perceptual-salience after self-association. *Cerebral Cortex, 25*(4), 1060–1068. https://doi.org/10.1093/cercor/bht302

Syrjämäki, A. H., & Hietanen, J. K. (2020). Social inclusion, but not exclusion, delays attentional disengagement from direct gaze. *Psychological Research, 84*(4), 1126–1138. https://doi.org/10.1007/s00426-018-1108-2

Tomasello, M. (1995). Joint attention as social cognition. In P. D. C. Moore, & P. J. Dunham (Eds.), *Joint attention: Its origins and role in development* (pp. 103–130). Psychology Press.

Viviani, G., Visalli, A., Montefinese, M., Vallesi, A., & Ambrosini, E. (2024). The Stroop legacy: A cautionary tal eon methodological issues and a proposed spatial solution. *Behavior Research Methods, 56*, 4758. https://doi.org/10.3758/s13428-023-02215-0

Vuilleumier, P., George, N., Lister, V., Armony, J., & Driver, J. (2005). Effects of perceived mutual gaze and gender on face processing and recognition memory. *Visual Cognition, 12*(1), 85–101. https://doi.org/10.1080/13506280444000120

Zhang, X., Dalmaso, M., Galfano, G., & Castelli, L. (2023). Tuning social modulations of gaze cueing via contextual factors. *Psychonomic Bulletin & Review, 30*(3), 1004–1010. https://doi.org/10.3758/s13423-022-02211-z