

Meixner-Yun, Tae Kyeong; Gërkhani, Klarita; van de Rijt, Arnout

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Does gender status bias carry over from in-person to virtual interaction?

Tae Kyeong Meixner-Yun ^{a,c,*} , Klarita Gërkhani ^b , Arnout van de Rijt ^c 

^a WZB Berlin Social Science Center, Reichpietschufer 50, 10785, Berlin, Germany

^b Department of Ethics, Governance and Society, Vrije Universiteit Amsterdam, De Boelelaan 1105, 1081 HV, Amsterdam, the Netherlands

^c Department of Political and Social Sciences, European University Institute, Via dei Roccettini, 3, San Domenico di Fiesole, 50014, Florence, Italy

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ABSTRACT

It is well-established that in in-person settings, status-based performance expectations often result in gender disparities in performance. While video conferencing increasingly dominates social interactions, substituting for in-person interactions, we know little about whether status biases persist in video conferencing and contribute to gender inequality. We conducted a preregistered experiment with an undergraduate sample of 252 participants. Participants were randomly assigned to in-person or video conferencing settings. Within each condition, we further varied status ranking as either implicit (i.e., participants' competence is inferred from gender) or explicit (i.e., competence is explicitly shared with a third party—social status dimension of competition), replicating prior research. We examined how these conditions affected gender differences in performance—measured by the number of correct answers and attempts, focusing on whether the in-person findings hold in video conferencing. Our findings reveal significant gender disparities in performance in both in-person and video conferencing settings, disadvantaging women in both contexts. However, these disparities manifested differently across conditions. In-person, gender differences emerged only under explicit status ranking, replicating prior research. Conversely, in video conferencing, gender differences were observed only under implicit status ranking. To explore potential mechanisms, we conducted follow-up interviews, suggesting the mirrored self-view significantly heightens self-focused attention, activating status processes. These results suggest that while gender status biases are consistent across settings, their manifestation is influenced by interaction context. This work advances social status theory by testing its relevance in video conferencing and provides empirical evidence on the persistent influence of gender status biases in virtual environments.

1. Introduction

A key finding in the status literature is that the common expectation that men will outperform women on a given task is self-fulfilling, leading to real performance differences (Correll, 2001; Ridgeway, 2001a; Ridgeway & Correll, 2004; Penner & Willer, 2019; Schram et al., 2019). According to status characteristics theory (Berger et al., 1977; Correll & Ridgeway, 2003), this occurs because when an individual characteristic such as gender is salient (i.e., observable), individuals draw on widely held cultural beliefs about that characteristic to form “an *implicit* order of performance expectations” (Ridgeway, 2001b, p. 357). In such situations, individuals establish a status hierarchy inferred from gender, where men are (generally, or specifically with respect to a stereotypically masculine task) expected to perform better than women. The stereotype then becomes a threat that produces evaluation anxiety about performing on a task negatively associated with one's status

characteristic (Correll, 2004; Reuben et al., 2012; Thébaud, 2010), generating actual differences in performance that would not have been there otherwise (Lovaglia et al., 1998; Steele, 1997). Gendered performance differences are found to be particularly pronounced in competitive environments when individuals know that their performance will be compared to others in that same environment (Gërkhani et al., 2023). This social recognition of performance comparisons results in a social-status hierarchy, reflecting an *explicit* ranking of individuals based on competence, where one's relative standing is clearly defined and visible to others (Ball et al., 2001; Gërkhani, 2020, p. 2).

Past experimental studies have tested the theory by looking at status ranking interactions in an in-person setting (De Dreu et al., 2021; Gërkhani et al., 2023; Melamed et al., 2019; Ridgeway, 1982; Schram et al., 2019). That is, participants encountered each other in person within a shared physical space (i.e., laboratory). Increasingly, however, people are interacting through digital communication. Some studies

* Corresponding author. WZB Berlin Social Science Center, Reichpietschufer 50, 10785, Berlin, Germany.

E-mail addresses: taekyeong.meixneryun@wzb.eu (T.K. Meixner-Yun), k.gerxhani@vu.nl (K. Gërkhani), arnout.vanderijdt@eui.eu (A. van de Rijt).

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have found that there has been a decline in face-to-face interaction as a result (Patulny & Seaman, 2017; Twenge et al., 2019; Verduyn et al., 2021). The outbreak of the Covid-19 pandemic has further accelerated the shift towards online communication (Nguyen et al., 2020, 2021). Video conferencing (e.g., Zoom and Teams), in particular, has become a dominant means of communication (Okabe-Miyamoto et al., 2021). This rapid shift has led to the widespread adoption and normalisation of video conferencing, establishing it as a standard mode of interaction (George et al., 2022; Standaert et al., 2022). It is plausible this trend will continue, potentially further substituting face-to-face communication in the future (Adrjan et al., 2021; Barrero et al., 2021; Bick et al., 2023).

While video conferencing shares some similarities with in-person interaction, such as the conveying of visual and audio cues in synchronous information exchange (Daft & Lengel, 1984, 1986; Dennis et al., 2008), it differs in its functional capabilities (Standaert et al., 2021). For example, while video conferencing enables individuals to see and hear one another, it lacks the immersive qualities of physical copresence and offers only limited visual information due to camera and screen constraints. As a result, video conferencing arguably reduces the saliency of several observable status cues. Body size, height, body language, posture, and clothing, which typically differentiate genders, may become less readily observable in video conferencing due to the limited visual field of the camera and screen (Bailenson, 2021; Paradisi et al., 2021). Given the potentially weaker transmission of gender status cues in video conferencing compared to in-person settings, it has been argued that video conferencing may serve as an equaliser against cognitive gender biases (Chen, 2020). As such, gender differences in performance may arguably be reduced.

Here, we argue that other inherent features of video conferencing may offset the reduced visibility of gender status cues, allowing gender to remain a significant status characteristic. As a result, gender differences in performance may persist in video conferencing settings. First, the lack of physical co-presence in video conferencing may lead to a narrower visual and cognitive focus of individuals (Brucks & Levav, 2022). With the shared environment between individuals confined to computer screens, people may pay more attention to the prominent appearance (i.e., gender) of their interaction partner, which can potentially increase the saliency of gender in interactions. Second, video conferencing leads to excessive close-distance eye gazing and constant exposure to the standard mirrored self-view feature in most software, which may heighten self-focused attention (Bailenson, 2021; Ingram et al., 1988), particularly among women for whom self-representation carries a greater social cost (Fauville et al., 2023). These features together may then trigger social evaluation comparisons against social expectations (Duval & Wicklund, 1972; Ingram et al., 1988; Yao & Flanagan, 2006), leading women to engage in increased negative self-judgment, undermining their performance.

To investigate whether gender disparities in performance carry over from in-person to video conferencing settings, we conducted a pre-registered experiment that randomly assigned participants to an in-person condition in a laboratory and to a video conferencing condition in an online setting (i.e., Zoom). Participants were instructed to perform a real-effort task. The in-person condition replicates the main treatment effects of a previous experimental study (Schram et al., 2019) that distinguishes between an implicit and an explicit status ranking condition, with performance being socially compared only in the latter condition. We also report on semi-structured qualitative interviews we conducted to explore in depth which specific features of video conferencing might activate status processes.

Analysis of the experimental data revealed significant gender disparities in performance in both in-person and video conferencing settings, which put women at a disadvantage in both conditions. At the same time, we found a striking discrepancy between the in-person and video conferencing conditions that we did not anticipate and cannot account for theoretically: In the in-person condition, we found a significant gender difference in performance only when status ranking is

explicit, precisely what Schram et al. (2019) found. In the video conferencing condition, however, we found a significant gender difference in performance only when status ranking is implicit. Analysis of the qualitative interviews suggests that the mirrored self-view feature, that is common in video conferencing software, intensifies self-focused attention and activates status processes even when they are implicit.

2. Status in video conferencing

2.1. Saliency of gender in video conferencing

Interaction through video conferencing is not a direct form of interaction since it is mediated by a computer. Consequently, the quality of interaction heavily relies on the capabilities of visual and audio functionalities (Riedl, 2022). One of the key differences from in-person interaction is the limited visual field caused by the physical constraints of camera angles and positions. In video conferencing, individuals' appearances are often smaller and only visible from the waist up. As a result, the transmission of subtle gender status cues that convey information to others regarding their status may be less effective or diminished. According to status characteristics theory, individuals aggregate available status cues in a given setting to form performance expectations and establish a status hierarchy (Berger et al., 1977; Correll & Ridgeway, 2003; Fişek et al., 2005; Webster & Walker, 2016). Therefore, the reduced availability of gender-related status cues in video conferencing may weaken this status process.

The theoretical relevance of the effects of different media on status processes was stressed by Troyer (2002). She argued that the absence of visual cues and stimuli in computer-mediated interactions may reduce status cues and the saliency of status characteristics. Indeed, empirical studies demonstrated the importance of available status cues in interactions regarding how actors draw information and organise that information into expectation states. For instance, Kalkhoff et al. (2008) experimentally examined the effects of text-based and pre-recorded video status manipulation on status processes. Their findings demonstrated that partner visibility enhanced status processes, likely due to more accessible status cues. Similarly, other studies indicated that status differences can be reduced in computer-mediated interactions (often in text-based settings) where there is a general lack of social information and status cues associated with status characteristics (Dubrovsky et al., 1991; Siegel et al., 1986; Spears & Lea, 1994; Sproull & Kiesler, 1986). These studies suggest that, compared to in-person interactions, the limited capability of video conferencing to present and convey status cues may dampen the effects of status.

Yet, the absence of physical co-presence in video conferencing settings introduces several features that may make gender a prime status characteristic after all. A recent study by Brucks and Levav (2022) examined the effect of video conferencing vis-à-vis face-to-face communication on the generation of creative ideas. The study revealed that participants in video conferencing settings spent more time focusing on their group partners than on their partners' surrounding environments, in comparison to those in face-to-face settings. Additionally, when participants were asked to recall their partners' surroundings, which contained visible items in the background, participants in video conferencing settings had significantly poorer recall of their partners' surroundings compared to those in face-to-face settings. Brucks and Levav (2022) suggest that the lack of a shared physical space in video conferencing forces individuals to narrow their visual and cognitive focus towards their interaction partner because their visual field is confined to computer screens.

Moreover, Brucks and Levav (2022) found that participants in video conferencing settings exhibited higher levels of verbal dominance (i.e., speaking more and displaying dominant verbal and non-verbal behaviours, such as reaction to the partner and use of body language) compared to those in face-to-face settings. These findings hint at the possibility of gender being salient and status-provoking in video

conferencing. Although Brucks and Levav did not directly examine this aspect, they speculated that the narrowed visual and cognitive focus in video conferencing could have “exacerbated the effect of status cues” (Brucks & Levav, 2022, Suppl. J. p. 40). Similar patterns have been documented in ‘real-world’ virtual settings, where men continue to speak more, ask more questions, and assert themselves more frequently during discussions at virtual academic conferences (Jarvis et al., 2023; Zhang et al., 2023). Women continue to report greater fears of backlash for talking too much, negative audience reaction, and low self-confidence, factors that may stem from their lower status position (Correll & Ridgeway, 2003; Schmader et al., 2008). While men’s verbal dominance is well-documented in in-person settings (e.g., Aries, 2006; Brescoll, 2011), emerging evidence from virtual settings supports the idea that gender remains a salient and status-relevant characteristic in video conferencing settings.

The salience of status characteristics constitutes a key assumption of status characteristics theory (Berger et al., 1977; Correll & Ridgeway, 2003). When gender becomes salient in an interactional setting, hegemonic gender beliefs are implicitly activated, influencing individuals’ performance expectations, which in turn impact their actual performance (Ridgeway & Correll, 2004). If gender remains salient in video conferencing, as we assume, we should expect the presence of gender differences in performance, just as in in-person settings.

2.2. Heightened self-focused attention in video conferencing

Other relevant features of video conferencing are the excessive amount of close-distance eye gaze and the default setting of seeing a mirrored self-view, which continuously exposes people to their reflections. In contrast, in in-person settings, people do not typically stare at a speaker constantly as direct eye gaze occurs sporadically, and they do not stare at themselves. Video conferencing may thus lead to status processes through heightened ‘self-focused attention’: “attention directed internally toward thoughts and feelings as opposed to outwardly toward the external environment” (Ingram et al., 1988, p. 967). When individuals experience heightened self-focused attention, they engage in a process of self-evaluation (Duval & Wicklund, 1972; Morin, 2011; Yao & Flanagan, 2006), which in turn affects individuals’ sense of self-worth and relative social standing compared to others. These processes can activate stereotype threats (Spencer et al., 1999; Steele, 1997) or social-evaluative threats (Dickerson et al., 2004, 2009) to the extent that they may affect women’s performance disproportionately compared to men’s. This is because such threats may magnify negative self-judgments stemming from cultural beliefs that perceive women as less competent. In contrast, the general expectation that men are expected to be more competent may minimise the social evaluative threat when comparing oneself to others, resulting in increased performance and over-persistence.

Beyond its potential to activate status processes, self-focused attention can also deplete mental resources and impair task performance. Building on objective self-awareness theory (Duval & Wicklund, 1972) and the strength model of self-control (Baumeister et al., 2007), Abramova et al. (2024) propose that as individuals with heightened self-focused attention from the mirrored self-view engage in self-evaluative process, they also experience increased demands for self-control, as they attempt to adjust their behaviours or emotional states to social expectations. This regulatory effort consumes limited mental resources by redirecting attention inwards and away from the primary task at hand in video conferencing. As a result, individuals may experience reduced cognitive capacity for task-related processing, impairing their performance. If women experience higher levels of self-focused attention than men in video conferencing, as we argue, the exposure to the excessive close-distance eye gaze and mirrored self-view may disproportionately impair women’s performance in video conferencing than men.

Gender differences in self-focused attention and their consequences

have been documented in previous research. For example, studies on Zoom fatigue found that women reported greater fatigue than men due to excessive eye gaze and mirror anxiety caused by self-view in video conferencing (Ratan et al., 2022; Fauville et al., 2023). These two mechanisms heightened women’s self-focused attention, which led to negative emotional distress (Fejfar & Hoyle, 2000; Ingram et al., 1988). Similarly, a field experiment by Shockley et al. (2021) reported that women experienced more fatigue than men when they used the camera during video conferencing. The gender differences in fatigue were attributed to higher levels of self-focused attention among women when they used the camera during video conferencing, likely due to the higher social cost of self-presentation for women than for men. Recent evidence on how individuals cope with heightened self-focused attention and Zoom fatigue offers further insights into which features of video conferencing may contribute to status processes. Lim et al. (2025) found that women, particularly with higher social interaction anxiety, are more likely to turn off their cameras or use self-view touch up, to reduce discomfort from self-representation concerns. These behaviours suggest that heightened self-focused attention in video conferencing stems from specific features that increase perceived visibility and evaluative pressure, such as close-distance eye gaze and mirrored self-view.

The discussion has highlighted arguments for both weakened and strengthened status effects in online settings. However, the stronger theoretical arguments and more abundant empirical evidence lead us to assume that the strengthening effect is stronger than the weakening effect. As a result, our general conjecture is that gender differences in performance will be observed in both in-person and video conferencing settings. Specifically, we expect men to also perform better than women in a video conferencing environment, as the absence of physical copresence and heightened self-focused attention are likely to offset the reduced visibility of gender cues.

3. Experiment

Our experiment closely follows the design used in a series of recent studies investigating status ranking effects on gender differences in performance in in-person settings (Schram et al., 2019; De Dreu et al., 2021; Gërkhani, 2020; Gërkhani et al., 2023). This design typically distinguishes between two types of status ranking: implicit and explicit. Implicit status ranking, central to status characteristics theory, refers to situations where individuals rely on status characteristics such as gender to infer their own and others’ performance expectations (Correll & Ridgeway, 2003). There is thus no explicit ranking of performance or comparison with others.

In the explicit status ranking, on the other hand, “own versus others’ performance is made known, that is, explicitly given” (Gërkhani, 2020, p. 3). This refers to situations where one’s standing in a hierarchy is socially recognised by others or where rankings are made public (Ball et al., 2001), thereby involving an explicit ranking of relative performance. The latter introduces a competitive dimension that acts as an environmental trigger, activating gendered psychological mechanisms, such as ‘stereotype threats’ (Steele, 1997) and ‘social evaluative threats’ (Dickerson & Kemeny, 2004). As shown by Gërkhani et al. (2023), these mechanisms contribute to observable gender disparities in performance.

To provide a comprehensive analysis of gender status effects in both in-person and video conferencing settings, we look at both implicit and explicit status ranking effects on gender differences in performance—measured as the number of correct summations in a cognitive task, and in attempts—measured as the number of summation attempts made within a fixed amount of time (more details are provided in the experimental design below). This enables us to investigate how gender status bias manifests in video conferencing, examining its relationship with both implicit cognitive gender bias and contextual triggers of competition. We achieve this by (1) replicating the in-person experimental design employed in recent research and (2) conducting it in a novel context—a video conferencing setting. Replication in the in-

person setting implies that we should observe significant gender differences in performance and attempts only when status ranking is explicit (Schram et al., 2019).

For the video conferencing setting, our preregistered hypotheses are formulated to confirm a positive effect of both implicit and explicit status ranking, predicting that men will perform better than women. The rationale is that, due to the salience of gender and heightened self-focused attention in a video conferencing environment, we assume status ranking to be implicitly inferred from gender and thus expect a gender difference when gender status ranking is implicit. We expect the same outcome when competition is introduced by making status ranking explicit, as competition alone is sufficient to activate status beliefs and stereotypes, leading to men performing better than women (Niederle & Vesterlund, 2007, 2011; Gërçhani et al., 2023). Hence:

Hypothesis 1. When status ranking is explicit, men will perform better than women in virtual interaction.

Hypothesis 2. When status ranking is explicit, men will make more task attempts than women in virtual interaction.

Hypothesis 3. When status ranking is implicit, men will perform better than women in virtual interaction.

Hypothesis 4. When status ranking is implicit, men will make more task attempts than women in virtual interaction.

3.1. Experimental design and procedures

The experiment was pre-registered on the Open Science Framework¹ and approved by the European University Institute. The experiment was conducted in the Bologna Laboratory for Experiments in Social Sciences (BLESS) at the University of Bologna in 2022. Participants were recruited from the BLESS participant pool through the recruitment software ORSEE (Greiner, 2015). All participants were voluntarily recruited. After recruitment, we randomly assigned participants to either an in-person or a video conferencing condition (our first treatment variation). In the in-person condition, participants were invited to a laboratory session. In the video conferencing condition, participants were invited to a Zoom session. Our second treatment variation consists of some participants being subjected to implicit status ranking, while others to explicit status ranking, in both in-person and video conferencing settings (i.e., a 2x2 factorial design). Before randomising participants into different status ranking types, we stratified participants by gender to ensure that groups within each session had a balanced gender composition.² An overview of participants' characteristics is provided in the Supplementary Material (Table A1).

Upon arrival, participants assigned to the in-person setting came together in the designated waiting area of the laboratory. In the video conferencing setting, they were instructed to wait about 5 min in the main Zoom 'room'. This was intended to encourage natural interaction among participants and to make participants' gender salient in both settings. Each session in both in-person and video conferencing conditions consisted of 11 participants. In case of excess participants, we randomly selected participants whom we asked to leave after compensating them with a show-up fee. At the start of each session, participants were randomly assigned to function as players of type A, B, or C. There

were five players A, five players B, and one player C.³ Players A were subjected to the *explicit* status ranking condition, while players B were subjected to the *implicit* status ranking condition. That is, players B were simply asked to perform a cognitive task, while players A were informed—before performing the task—that they would report their scores and ranking among other players A to a peer. Players C played the role of the peer, who was the only one able to compare players A's scores and rankings in a session. Players B's performance could only be affected by their own implicit ranking of all players B's performance expectations inferred from their gender vis-à-vis that of others. Players A's performance, on the other hand, could also be affected by the anticipation of the explicit status ranking established by sharing their performance relative to other A players with a third party (Ball et al., 2001). After the random assignment of participants to different player types, players C were taken to another room close to the laboratory in the in-person condition, and to a separate Zoom room in the video conferencing condition. The instructions for all players were computerised, except those for players C in the laboratory setting, who followed paper-based instructions (English translation in the Supplementary Materials). There were no differences in instructions between the in-person and video conferencing settings, except that in the laboratory setting, it was specified that players C were in a separate room close to the lab, whereas in the video conferencing setting it was specified that players C were waiting in a separate Zoom room. See Fig. 1 for a timeline of the experimental procedure.

Players A and B were instructed to perform a real-effort task, taken from Weber and Schram (2017), while players C were not informed about the task. Players C were instructed to remain seated in a separate location or in a breakout room and wait for five participants (players A) to arrive to report their scores and ranking. Players C were instructed to freely occupy themselves with something while waiting but were not allowed to talk or interact with the reporting participants (i.e., players A). The real-effort task presented to players A and B consisted of a pair of 10x10 matrices filled with two-digit numbers in each cell. They were asked to find the highest number in the left and right matrices and enter the sum of these two numbers in a designated area (see Fig. 2).⁴ Two new matrices were generated each time the players entered a score, irrespective of whether the score was correct or incorrect. The task was limited to 15 min. As in Schram et al. (2019), participants were told that performing well on this task correlates positively with success in professional life.

There were two stages for players A and B (see Fig. 1). The first stage started after all players had read the instructions: those in the laboratory in their cubicles; those in Zoom behind their computers while being present in the main Zoom room. In the first stage, players A were individually brought to the player C by an experimenter, whose gender was randomly drawn in the case of the laboratory condition, to read out loud a prepared statement by the experimenter. In the video conferencing condition, the experimenter who individually 'brought' players A to the player C in the Zoom breakout room, was not visible to the participants. The statement indicated that the player A would perform a task and afterwards would come back to report their task score and ranking among other players A in the session (see Supplementary Material). This

¹ https://osf.io/mwv9n/?view_only=938030e1f2194bf8a16448bb62707b8

² Although participants were stratified by gender within each session, this does not guarantee identical gender composition across conditions (e.g., between in-person and video conferencing sessions). To address this, we conducted a regression analysis on the outcome variables, using the proportion of women per session (See Table A4 in the Supplementary Material). The results suggest that gender composition had no significant effect on the outcome variables.

³ The number of players A and B differed from Schram et al. (2019), where there were six A players and six B players. This difference, which was preregistered, is due to the expected longer video conferencing sessions than in-person settings with potential technical issues (e.g., participants joining to Zoom). This change aimed to maintain the experimental sessions around 1 h in both laboratory and video conferencing conditions.

⁴ To avoid a high probability of obtaining a very high sum, the numbers in each cell were randomly generated from a two-step process. First, a random number X was drawn from a list between 40 and 99. Second, another random number between 10 and X was drawn, guaranteeing a more balanced set of possible sums.

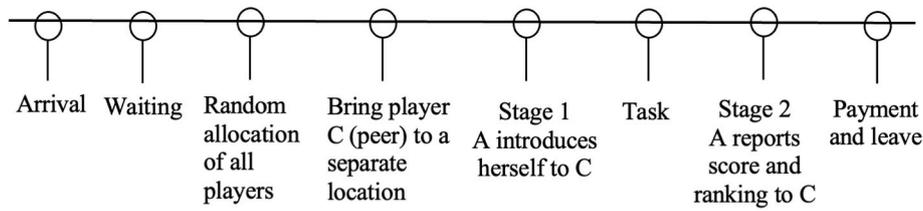


Fig. 1. Timeline of experimental procedure.

Two matrices summation task

Time left to complete this page: 14:47

Your task is to first find **the largest number in each of the two Matrices** and then **add up the two numbers**. Submit your answer in the box below.

Matrix 1										Matrix 2									
45	59	38	79	49	31	68	15	54	60	12	43	44	55	42	18	59	22	41	42
61	13	57	53	43	41	79	24	39	76	47	26	37	21	45	34	63	14	16	45
62	40	50	82	59	60	82	33	57	56	50	24	87	39	47	20	14	38	42	42
89	23	33	51	54	21	21	28	49	15	28	78	42	34	14	27	47	46	84	20
68	52	31	80	42	13	66	43	31	10	47	50	47	32	46	23	25	77	71	35
85	44	32	47	36	21	51	24	64	37	57	23	56	30	12	73	41	21	60	41
15	90	28	33	42	33	70	21	26	29	19	14	42	53	52	27	51	19	44	40
17	34	13	50	43	24	59	32	64	27	44	11	84	74	48	24	37	81	50	39
16	15	53	51	70	18	60	24	55	69	50	53	84	71	17	64	14	53	80	40
56	35	32	10	26	17	61	83	47	15	39	29	49	72	81	41	19	77	82	11

Your answer is:

Answer

Tasks attempted so far: 0

Tasks correct so far: 0

Fig. 2. Screenshot of the experimental task.

first encounter between players A and C was done to create the anticipation of explicit status ranking. Meanwhile, players B were asked to wait quietly, with their cameras on, until all the players A in the session were brought to the player C. Note that in the laboratory setting, players B would remain seated in their own cubicles, while in the Zoom setting, they would see all other players A and B (except for the one ‘brought’ to the breakout room) while waiting. When all players A and B were back in the same physical or Zoom room, they started to do the cognitive task: those in the laboratory in their own cubicles, while those in Zoom in their computer screens.⁵ After completion, the second stage started,

⁵ Even though all players A and B were connected to the main Zoom room when performing the task, they were actively engaged in doing the task behind their computer screens which automatically covered the Zoom screen and limited eye-gazing while doing the task. Additionally, considering that participants would want to maximise their earnings, we doubt their inclination to observe others during the task. We could not check whether they were connected to more than one device, but consider it unlikely.

where once again players A were individually brought to player C. Players A were instructed to read a prepared statement that included their (truthful) personal score and ranking from the task. Players B learned their task scores privately, without reporting to player C. They were asked to wait quietly until the end of the experiment. The same procedures were followed in both laboratory and video conferencing conditions. As indicated above, the key difference was that these procedures were conducted in a physical space versus a virtual one. See Fig. 3 for an overview of the experimental design.

The experiment was designed in oTree (Chapkovski & Kujansuu, 2019; Chen et al., 2016), which is an open-source online software for interactive experiments. The experiment took roughly 1 h to complete. It consisted of 10 sessions in the laboratory, for a total of 110 participants and 16 sessions in the video conferencing, for a total of 176 participants. As said, there was one ‘passive’ player in each session, namely the player

C, whose behaviour we do not study. Moreover, seven participants in the video conferencing condition were excluded from the analysis due to irregularities occurring during the experimental sessions.⁶ Thus, our analysis is based on 252 individuals. Given the greater commitment of on-site participation (i.e., having to physically go to the laboratory), we paid participants in the video conferencing condition less than those in the laboratory condition, to keep compensation commensurate across conditions. Each correct score was rewarded with a piece rate of €1 in the laboratory condition and €0.8 in the video conferencing condition. The show-up fee was €5 for the laboratory and €3 for the video conferencing condition. Player C received a flat fee of €15 in the laboratory condition and €12 in the video conferencing condition. On average, participants earned €16.2 in the laboratory condition and €13.9 in the video conferencing condition, including the show-up fee.

4. Results

4.1. Pre-registered analysis⁷

We used a two-sided permutation (randomisation) test estimated by Monte Carlo resampling with 5000 repetitions (at $\alpha = 0.05$), as pre-registered. First, we report whether our findings from the in-person condition replicate the results of previous studies (Schram et al., 2019; Gërkhani, 2020). Next, we report the novel findings from the video conferencing condition.

The top two graphs in Fig. 4 present our findings from the in-person condition. The top left-side bar graphs show that when the status ranking was explicit, that is participants were explicitly compared to others and the ranking was socially recognised, a significant gender difference in performance was found, with men performing significantly better than women ($p < 0.001$, $N = 50$). By contrast, when status ranking was implicit, meaning they simply did the task, no gender difference was found in performance ($p = 0.238$, $N = 50$). Regarding attempts, when status ranking was explicit, men made significantly more attempts than women ($p < 0.001$, $N = 50$). By contrast, when status ranking was implicit, no gender difference was found in attempts ($p = 0.284$, $N = 50$). These results replicate those reported by Schram et al. (2019) and Gërkhani (2020) who similarly found no gender differences for implicit ranking and a male advantage for explicit ranking in in-person settings (see the bottom two graphs in Fig. 4).

The two graphs in the middle of Fig. 4 show the gender difference in performance and attempts in the video conferencing condition. When status ranking was explicit, no significant gender difference was found in performance ($p = 0.340$, $N = 74$). Thus, the preregistered hypothesis 1 was not supported. However, when status ranking was implicit, a significant gender difference was found in performance, supporting

⁶ The irregularities included the following: 1. Two participants did not follow the instructions thoroughly (two men in explicit status ranking). 2. One participant experienced a software issue due to using Internet Explorer (one man in implicit status ranking). However, these three participants did not affect the experimental procedures or other participants. 3. Despite the clear requirement of having a laptop, four participants joined the video conferencing via phone or tablet (two women in explicit status ranking, one woman in implicit status ranking, and one man in implicit status ranking). This may not have affected how other participants saw these four participants, but it may have affected how these four individuals saw the other participants and task results due to screen size differences. Moreover, one outlier was excluded in the analysis due to its significantly higher value of 80 attempts, compared to the average of 19 attempts among other participants. Including this may skew the results. Note that we did not anticipate such irregularities and hence did not preregister how we would deal with them in our analysis. However, our main analysis remains robust when including these irregularities (see Supplementary Material Table A3).

⁷ Data and reproduction files are available on the OSF: https://osf.io/mwv9n/?view_only=938030e1f2194bf8a16448bb62707b82

preregistered hypothesis 3: men performed significantly better than women ($p = 0.002$, $N = 76$). The middle right-side bar graph, which presents the findings for gender differences in attempts, displays a similar pattern as for performance. When status ranking was explicit, no gender difference in attempts was found ($p = 0.899$, $N = 75$), providing no support for preregistered hypothesis 2. However, as indicated in the middle right-side bar graph, when status ranking was implicit, we did find a significant gender difference in attempts, with men making significantly more attempts than women ($p < 0.001$, $N = 77$), supporting preregistered hypothesis 4. These results remain robust when we include the seven subjects who displayed irregular behaviour in the analysis (See Table A3 in the Supplementary Material).

4.2. Exploratory analysis (not pre-registered)

Overall, our results indicate that men performed significantly better and made more attempts than women in both in-person and video conferencing conditions. However, the magnitude and significance of the gender differences in performance and attempts vary with the type of status ranking activated in each condition. Specifically, while gender differences in the explicit ranking condition are larger in magnitude in in-person settings than in video conferencing, gender differences in the implicit ranking condition are larger in video conferencing settings than in in-person. To ensure robust findings, we examined whether gender differences in performance and attempts between explicit and implicit status ranking conditions significantly differ within each treatment. The results presented in Table 1 show that the gender differences between explicit and implicit status rankings are significant in both the in-person and video conferencing conditions. However, note that the gender differences in attempts in the in-person condition and the gender differences in performance in the video conferencing condition are significant only at the 90 % confidence level.

Furthermore, our overall results raise questions about whether the magnitudes of gender differences in performance and attempts differ significantly between in-person and video conferencing settings. Table 2 presents the gender differences in performance and attempts for each treatment arm, along with randomisation tests for significant gender differences between the in-person and video conferencing conditions. We found all differences to be significant at the 90 % confidence level and all but one difference significant at the 95 % level. These findings suggest that the observed patterns of effect sizes are not incidental but rather systematic.

4.3. An attempt at reconciliation through qualitative interviews

The results from the video conferencing condition revealed an unexpected pattern between explicit and implicit status ranking conditions. We expected that gender differences in performance would be observed in both explicit and implicit status ranking conditions. However, we found the gender differences in performance only in the implicit status ranking type. This finding is puzzling as competition alone is sufficient to activate gender status bias (Gërkhani et al., 2023). Moreover, as we argued, certain features of video conferencing were theoretically expected to lead to gender differences in performance, as they can preserve the salience of gender and the status-inducing working of gender. However, it appears that these effects are attenuated in the explicit status ranking condition.

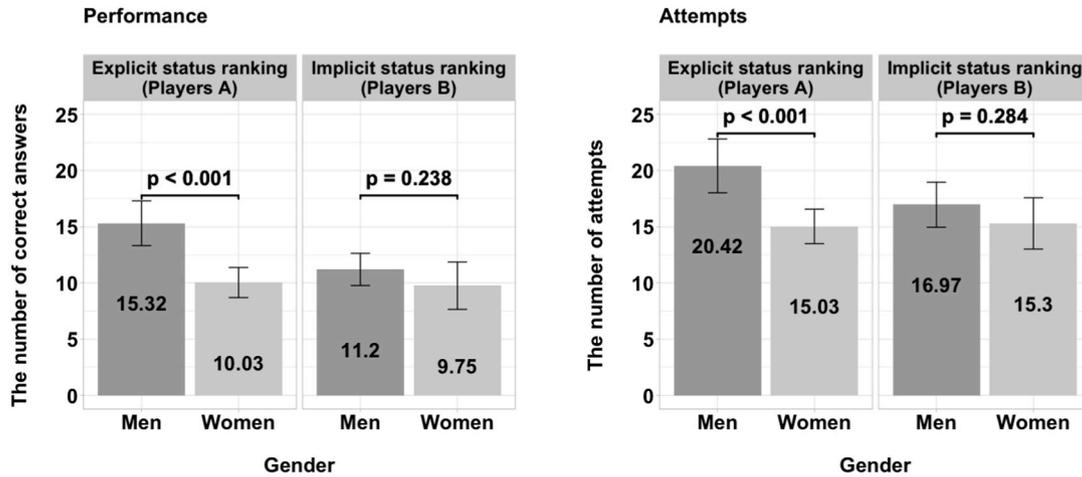
To gain a better understanding of the experimental findings, one of the authors conducted additional qualitative interviews. While the experiment examined gender differences in performance based on assumptions about certain features of video conferencing, the interviews aimed to explore how these features are experienced by individuals in real-world contexts. This was intended to provide deeper insights into the unexpected patterns of gender status effects in video conferencing and to identify which features might help explain these patterns.

The interviews were conducted with individuals currently working

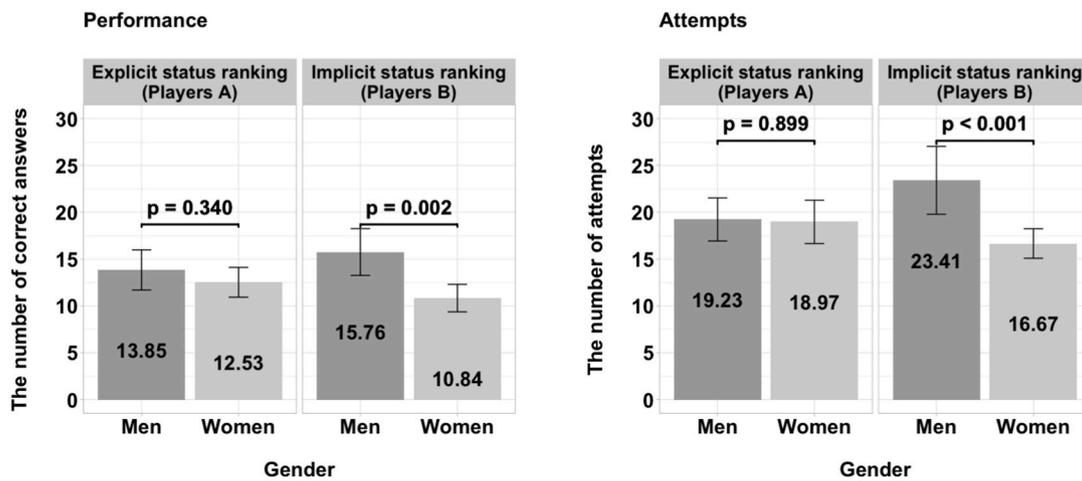
		Status ranking type	
		Explicit	Implicit
Interaction mode	In-person	<ul style="list-style-type: none"> • In-person exposure to mixed-gender group. • Stage 1: Player A is physically brought to player C. A informs C that (s)he will return to report on score and ranking after performing a task. • Stage 2: Player A completes task, then returns to Player C and reports own score and ranking with other A's. 	<ul style="list-style-type: none"> • In-person exposure to mixed-gender group. • Stage 1: Players B wait quietly in their cubicles, until players A were brought to player C. • Stage 2: Player B completes task without reporting score and ranking to Player C.
	Video conferencing	<ul style="list-style-type: none"> • Virtual exposure to mixed-gender group. • Stage 1: Player A is virtually brought to player C. Player A informs C that (s)he will return to report on score and ranking after performing a task. • Stage 2: Player A completes task, then returns to Player C and reports own score and ranking with other A's, in a virtual setting. 	<ul style="list-style-type: none"> • Virtual exposure to mixed-gender group. • Stage 1: Players B wait quietly in the main Zoom Room, until players A were brought to player C. • Stage 2: Player B completes task in a virtual setting without reporting score and ranking to Player C.

Fig. 3. Overview of the 2 x 2 experimental design.

a. In-person condition



b. Video conferencing condition



c. Data from Schram et al. (2019): In-person setting

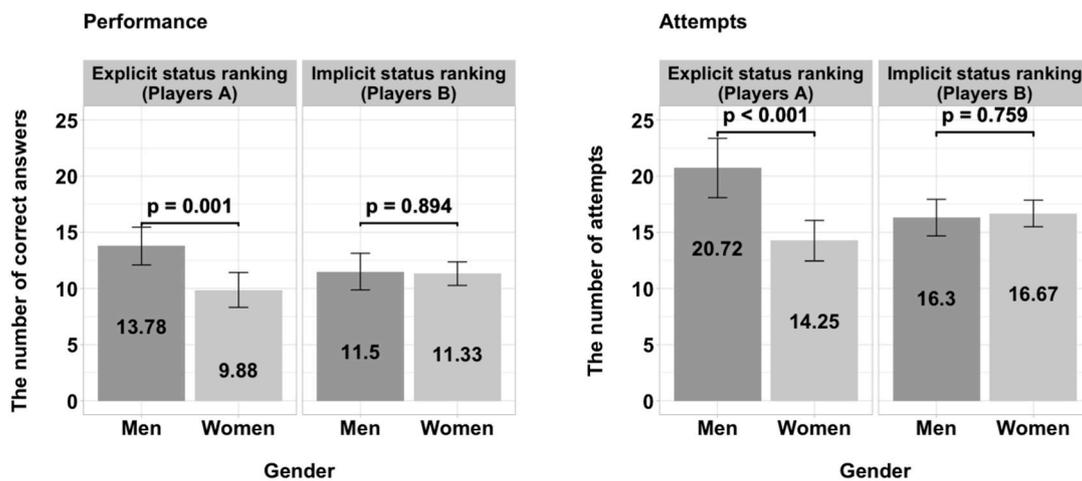


Fig. 4. Gender differences in performance and attempts across experimental groups. The top graphs illustrate the in-person condition, the middle graphs represent the video conferencing condition, and the bottom graphs represent the original results from Schram et al. (2019). The graphs on the left side illustrate the gender difference in performance, while the graphs on the right side represent the gender difference in attempts. The error bars indicate a 95 % confidence interval. The p-values are taken from two-sided permutation (randomisation) tests estimated by Monte Carlo resampling with 5000 repetitions. See Fig. A1 and A2 in the Supplementary Material for the cumulative distribution function of performance and attempts across treatments.

Table 1
Gender differences in performance and attempts between explicit and implicit status ranking within each interaction mode treatment.

In-person condition	Explicit status ranking (50)	Implicit status ranking (50)	p-value
Gender difference in Performance	5.28	1.45	0.03
Gender difference in Attempts	5.39	1.67	0.08
Video conferencing condition	(75)	(77)	
Gender difference in Performance	1.32	4.93	0.07
Gender difference in Attempts	0.26	6.74	0.01

Note: Each cell represents the gender difference in performance and attempts (men – women). The p-values are taken from two-sided permutation (randomisation) tests estimated by Monte Carlo resampling with 5000 repetitions. Parentheses indicate the sample size.

Table 2
Difference in Difference: gender differences in performance and attempts between in-person and video conferencing conditions.

Gender difference in Performance	In-person	Video conferencing	p-value
Explicit status ranking (125)	5.28	1.32	0.03
Implicit status ranking (127)	1.45	4.93	0.07
Gender difference in Attempts			
Explicit status ranking (125)	5.39	0.26	0.02
Implicit status ranking (127)	1.67	6.74	0.04

Note: Each cell represents the gender difference in performance and attempts (men – women). The p-values are taken from two-sided permutation (randomisation) tests estimated by Monte Carlo resampling with 5000 repetitions. Parentheses indicate the sample size.

in Germany who reported engaging in video conferencing “often” or “very often” on a 5-point Likert scale (ranging from never to very often).⁸ A phenomenological approach was adopted, which aims to understand how individuals consciously experience a phenomenon (i.e., social interactions at workplaces), what they think and how they perceive their experiences (Creswell & Creswell, 2022; Hesse-Biber & Leavy, 2011; Moustakas, 1994). The interviews were semi-structured, which not only provides a structure for addressing specific themes but also permits the development of unexpected insights by enabling people to engage in natural conversations and speak on their own terms (May, 2011). The interview questions covered topics such as general experiences with video conferencing and in-person settings at workplaces, general experiences or observations of gender differences in interpersonal behaviours (e.g., participation, dominance, and interruptions) between video conferencing and in-person settings, and the impact of various features of video conferencing on interpersonal behaviours. In total, 26 interviews were conducted.

The findings reveal that the mirrored self-view is the most significant feature prompting status processes in video conferencing, particularly among women. Women interviewees consistently reported that the mirrored self-view heightens their self-focused attention, prompting them to engage in social evaluation processes, which in

turn affect social status dynamics in their workplaces. For example, women interviewees described the mirrored self-view as “awful”, and it makes them “judge” themselves about their appearances and how they are perceived by others. As one exemplary interviewee put it: “I find it very irritating to see myself ... Obviously while looking myself, I reflect on what do other people see”. Similarly, another interviewee shared: “What irritates me a lot is seeing myself on the screen as well and sort of I am observing myself in a way whole time and it’s something we’re not used to do as humans. And that sort of brings a bit the self-critical part of like, oh, should I just [have] looked that way? And you know, it is very weird for me”. This feeling of discomfort from the mirrored self-view extended to behaviour, as one interviewee expressed the following: “I actually avoid if I can avoid it. I will not turn on my camera simply because I hate sometimes catching a glimpse of myself and getting distracted”. Interestingly, despite the option to hide self-view on some platforms, several women choose to keep it visible, reporting a desire to monitor “how people see me”.

These findings are consistent with the theoretical mechanism we outlined earlier in the paper, which suggests that mirrored self-view heightens self-focused attention and social evaluative threat. The findings also offer an explanation for the gender differences observed in the implicit status ranking condition. Participants in implicit status ranking remained in the main Zoom room throughout the session with continuous exposure to their mirrored self-view. In contrast, participants in the explicit status ranking condition were individually moved to breakout rooms to interact with Player C in two stages of the experiment. The act of being virtually moved from one space to another, combined with the task of reading a scripted statement aloud, may have reduced their exposure to the mirrored self-view. This decreased exposure could have weakened the effect of self-focused attention, potentially accounting for the lack of gender differences observed in the explicit status condition.

5. Discussion and conclusion

In this study, our main objective was to examine whether the gender status biases observed in in-person settings carry over to the increasingly prevalent social and workplace environment of video conferencing. We conducted an in-person experiment in a laboratory and a separate experiment in a Zoom setting to examine gender differences in performance and attempts. In the in-person laboratory condition, we found that men performed significantly better and made more attempts than women only when the status ranking was explicit. These findings align with previous research (Schram et al., 2019; Gërxhani, 2020), providing evidence of successful replication and further supporting the evidence that women face disadvantages in competitive environments in in-person settings. In contrast, the video conferencing condition revealed that men performed significantly better and made more attempts than women only when the status ranking was implicit. We found no gender differences under explicit status ranking.

While we lack a robust explanation for why explicit status ranking in video conferencing results in significantly smaller gender differences in performance and attempts, we speculate on a potential mechanism: reduced exposure to the mirrored self-view in the explicit status ranking condition. Our qualitative evidence suggests that the mirrored self-view is the most significant feature activating status processes in video conferencing. By design, our participants in the explicit status ranking condition had shorter and less intense exposure to the mirrored self-view. Recent research supports this possibility, showing that the effect of mirrored self-view depends on the communication role: listeners are more likely to be affected by the mirrored self-view than speakers, who are simultaneously occupied with talking (Abramova et al., 2024). The more active role that participants played in the explicit status ranking condition may have similarly left them less impacted by the mirrored self-view.

This paper is not without limitations. We implemented the in-person

⁸ The focus on Germany was for practical reasons. Yet, Italy—where the experiments were conducted—and Germany—where interviews took place—rank similarly in both Hofstede’s masculinity index (Italy: 70 and Germany: 66) (Hofstede et al., 2010) and European Union’s gender equality index score (Italy:69.2 and Germany:72) (European Institute for Gender Equality, 2023). Thus, we assume comparable status-related gender effects.

design in a video conferencing format to the best of our abilities. However, the conditions inevitably differed due to several factors that affect communication online compared to in-person interactions. These include the ability to see oneself, limited visibility of others, the option to mute, potential technical issues, and distortions in video quality, among others. It is difficult to say which of these various simultaneous factors were instrumental in producing the variability in effect sizes we observed. Furthermore, in our video conferencing setting, participants connected from their private locations. While this setup reflects many real-world situations and aligns with the increasing trend of remote work, it raises the question of whether participants in the video condition may have been more distracted during the experiment due to the home environment. Ideally, assigning participants to separate laboratory rooms for video conferencing could have provided a higher level of control. Unfortunately, standard laboratories, including ours, do not have multiple rooms, making such a setup infeasible. However, it is important to note that the lack of control from off-site access cannot explain the inverse pattern of performance effects compared to the in-person setting. If anything, we would expect this lack of control to weaken the effects across all conditions rather than strengthen them in the implicit condition, as observed. Additionally, the varying degree of exposure to the mirrored self-view across status ranking conditions remains a limitation, as it may have influenced the unexpected pattern of gender differences in performance observed in the video conferencing setting.

Despite these limitations, it is clear that some features of the video setting weaken the competitive effect of explicit status ranking. Identifying this feature and proposing a plausible theoretical mechanism presents a valuable avenue for future research. For instance, researchers could develop a custom video-conferencing interface designed to isolate specific features of video conferencing. Moreover, methods such as eye-tracking or video analysis of interaction patterns could help clarify the underlying mechanisms, such as how attention is allocated and how individuals may perceive and respond to status cues in video conferencing settings. Additionally, in line with previous studies (Cook et al., 2023; Reiter et al., 2024), future research could investigate how much background cues interact with status characteristics in video conferencing settings.

In conclusion, the gender differences we observe in both in-person and video conferencing settings are noteworthy because they shed light on the persistent role of gender in shaping social interactions online. As the use of video conferencing in lieu of in-person interactions continues to grow, particularly in professional environments, our findings suggest that gender status biases are likely to persist, perpetuating gender inequalities in performance. Nevertheless, given that the mirrored self-view seems to play a crucial role in this gender gap, adjusting or redesigning the mirrored self-view feature in various video-conferencing platforms could potentially help mitigate gender-based disparities in virtual interactions and performance.

CRediT authorship contribution statement

Tae Kyeong Meixner-Yun: Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Klarita Gërkhani:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Funding acquisition, Conceptualization. **Arnout van de Rijt:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Funding acquisition, Conceptualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chbr.2025.100815>.

Data availability

The link to the data and code is provided in the manuscript.

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