"I'm a Woman First, Pilot Second" : Communication Breakdowns and Low Psychological Safety due to Privilege Hazards on the Flight Deck

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1 INTRODUCTION

Many modern-day systems are synergistic combinations of complex technologies operated by one or more skillful individuals, and the overall success of the system depends on the "joint optimization of the social and technical systems" [9]. Such an approach, also called a sociotechnical systems approach, places human operators at its center and elevates the importance of the safety of those humans. A significant amount of research has been dedicated to workers' safety in sociotechnical systems, both generally [e.g., 39, 54] and by applying specific safety measures to specific systems [e.g., 35, 57].

In this paper, we focus on a complex, multioperator sociotechnical system – the flight deck of a large aircraft. Through a sociotechnical systems approach, we examine the role of synergy between the pilots and the flight systems in the safety of the aircraft. Within the world of aviation, safety is paramount and while significant research exists on the safety of the aircraft in terms of technical factors [e.g., 8, 30, 41], much of the human factors aviation research focuses primarily on 'human error' in operating the aircraft. However, it has been shown that breakdowns in communication between pilots can jeopardize the safety of the aircraft [1, 47]. In this study, we dive deeper into the reasons for breakdowns in communication, focusing on pilots' *psychological safeties* [19]. Through first-hand accounts from currently active commercial and corporate professional Captains and First Officers (FOs), we examine instances where low psychological safety results in pilots being unable to effectively do their jobs, which might threaten the overall safety of the aircraft.

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Through our findings, we detail a pattern of *privilege hazards* [18] where those with higher privilege may treat others unfairly due to some aspects of their identities.

2 RELATED WORK

2.1 A Sociotechnical Systems Perspective in the Flight Deck

The term 'sociotechnical system' was coined by Emery and Trist [50] to reflect systems that combine "humans, machines and the environmental aspects of the work system". Such an approach measures the overall performance of the system based on both the technical and social aspects [7], arguing that failing to consider either system would lead to an inaccurate assessment and miss opportunities for design improvement [4]. Within CSCW, a sociotechnical approach was first explicitly introduced by Bowker et al. [7], in their book about healthcare systems. Since then, sociotechnical approaches have been applied in ~~several~~ CSCW environments ~~such as~~ care work [49], astronomy [2, 42] and ~~musuems~~ [52], and been a broader study site for topics such as algorithmic fairness [46], research ethics [23], social responsibility [43] and coordinated action [29].

The flight deck of an aircraft fits the definition of a sociotechnical system~~,~~ because it is a complex combination of various technical systems required to fly the aircraft, which ~~are~~ operated by two or more pilots on the flight deck. In addition, the flight is also supported by other technologies, such as radars at Air Traffic Control stations, and humans, such as pre-flight technicians. The safety of the flight depends on all technologies and humans executing their jobs effectively, and any assessment of the safety of the flight must evaluate all these components. Prior researchers [25, 26] have advocated for such a sociotechnical view of aviation, particularly aviation safety, a view that became popular within the industry following incidents such as the United 173 disaster in 1978. As a recognition of the importance of a sociotechnical approach to aviation safety and the importance of good communication patterns between pilots, the Federal Aviation Administration in the US mandates that all airline pilots undergo Crew Resource Management training programs and other human factors training.

Our research contributes to the body of work that emphasizes ~~on~~ the importance of effective communication between pilots for the overall safety of the aircraft. While previous work has examined reasons for breakdown such as different English proficiencies or not speaking the same language [20, 47, 55], pilots' workloads [33], lack of shared backgrounds and contexts between pilots [17], we explore whether pilots' psychological safeties play a role in ~~their~~ effective communication ~~with each other~~.

2.2 Psychological Safety in Teams

Psychological safety was first defined by Schein and Bennis [44] as "a person's anxiety about being basically accepted and worthwhile." In team settings, the seminal work of Amy Edmondson [19] extended this definition to "a shared belief held by members of a team that the team is safe for interpersonal risk taking". She proposed a 7-item scale of evaluating psychological safety in team settings, a metric which has been widely adopted by several organizations across different fields. At its core, psychological safety emphasizes an individual's ability within a group setting to freely express their own opinions and feelings without risk of repercussions from anyone within the group.

Fostering a psychologically safe environment for employees has a direct impact on cultivating positive attitudes towards uncertainty [27], supporting inclusive leadership models where leaders are open and easily approachable [11], and building high-quality relationships and networks of social support among employees [10]. Many organizations have

shown strong interest in fostering psychological safety in their workplaces, since it is integral to employee performance and learning.

On the flight deck, psychological safety is particularly important in cultivating *safety voice* i.e. the "act of speaking up to prevent physical harm from hazardous situations." [6]. A lack of psychological safety can result in pilots not speaking up when they should, for fear of damaging interpersonal relationships or receiving punishment. Such instances could lead to catastrophic accidents, and there has been a growing body of research [e.g., 37, 38] advocating for increasing psychological safety on the flight deck. Our study examines how individual pilots can create psychologically unsafe environments on the flight deck for other pilots, and how such situations can endanger the safety of the aircraft.

2.3 Privilege Hazards in Aviation

D'Ignazio and Klein [18] define *privilege hazard* as the phenomenon by which those with higher power fail to recognize instances of oppression of those with lower power. They position privilege hazards at the individual level of Patricia Hill Collins' matrix of domination [13], but state that it becomes much more harmful when individual hazards aggregate and become systemic. While individuals exhibiting privilege hazards and being impervious to the harm or discomfort they cause to individual people is a problem on its own, an aggregate of such harm on the same individual or a group of individuals creates a system of those in power imposing their privilege on those with lower power.

Power differentials are baked in to a multiperson flight deck, because it involves a Captain with higher institutional power over a First Officer. However, this division of power is accounted for in flight training, and even though the Captain holds higher power, they cannot smoothly operate a large aircraft without the help of a proficient FO. While differences in institutional power on the flight deck might not lower psychological safeties on the flight deck, the same cannot be said for differences in social power.

Like several other professions in the US, flying planes began as the domain of white men. When women were introduced, they were "strategically deployed to ensure the commercial viability of aviation," [14] in the 30s, to market flying as something "so easy that even a woman could do it."

In 1939, with the Second World War raging in Europe, the Civilian Pilot Training Program (CPTP) was initiated in the US. It allowed all Americans in the age group 18-25, irrespective of sex, gender, or race, to participate in free, government-sponsored flight training. However, in 1941, women were banned from this program as it shifted its focus toward military aviation [31]. The number of women training as pilots dropped significantly. During the 40s and 50s, although women were allowed to fly in some races and airshows, they were still required to pay for the planes they flew, while men could use them for free [16]. In this same time period, men were able to access free flight training programs, while women faced both high costs and social resistance to obtain the required flight training and experience [14]. The preferred 'Mr. General Aviation' [31] was seen as a young white man, the pursuer of a gallant and heroic profession, with femininity ill-suited to it [36].

Thus the US government laid the groundwork for a demographic uniformity in the pilot community that still persists to this day. Commercial airlines began hiring a few women pilots in the 70s. However, aviation continued to provide limited opportunities for women and people of color, abetted by discriminatory hiring practices in airlines in the 80s and 90s, coupled with an internal culture that sought to emphasize the masculinity of flying [5].

There have been well-publicized but ineffective efforts to increase women's participation in aviation in the US, but little has been done to address or even acknowledge that the airline cockpit culture may sometimes be hostile to women or people of color. As of 2021, women make up only 5.6% of all US airline pilots, according to a survey conducted by the US Bureau of Labor Statistics [40], which also did not give respondents the option to identify themselves beyond

the gender binary. There is a persistent belief in the aviation community [e.g., 48] that women simply don't want to be airline pilots, perhaps because of the danger or physical discomfort. However, as a comparison, the percentages of women in the long-haul trucker and astronaut workforces are significantly higher at 17.8% and 19.1% respectively, according to the same US Bureau of Labor Statistics survey [40] mentioned above.

Research has shown that women Captains and First Officers "believe that they need to work harder and demonstrate a higher standard of work within their career field to be accepted and appreciated by their male co-workers" [56], causing stress and anxiety [53] which might increase the likelihood of accidents [3].

Significantly less attention is paid to non-binary individuals, with reliable numbers of LGBTQIA+ pilots not being readily available and not much research going into promoting their voices. Until 2016, transgender pilots in the US were characterized as having a 'disorder', and this presented a significant barrier for both current and aspiring transgender pilots [28].

People of color have also been traditionally marginalized in the aviation space, with the same US Bureau of Labor Statistics survey [40] identifying that only 3.4% airline pilots were Black and 5% were Hispanic. Minoritized individuals on the flight deck also have to deal with a culture of micro and macroaggressions where they are constantly under a microscope. Evans and Feagin [22] found that Black pilots self-suppressed their emotions to avoid coming off as angry or threatening to other pilots. Their interviewed pilots reported feeling unfairly treated because they were Black, and faced unfair performance reviews or additional scrutiny that had nothing to do with their qualifications as pilots. Such experiences were worse for individuals with multiple marginalized identities, as they experienced 'double-discrimination' [15]. Women of color who wanted to fly were pushed into the armed services, where they experienced widespread racism and sexism which made it difficult for them to maintain lengthy careers [24].

On the other hand, when minoritized individuals are not being treated unfairly, they are often invisibilized when they are celebrated only because of their marginal identity. An example of this was Delta Airlines' feature of Captain Johnson on their website in 2017, celebrating her promotion to become Delta's first Black female Captain and advocating her as a role model for other Black female pilots. While her achievements were indeed exemplary, Delta's portrayal of her promotion as if it was because of her identity as a Black woman in a bid to increase its diversity, thus erasing her long years of hard work to earn her promotion [21, 34]. Such erasure allowed Delta to celebrate their diverse practices, without investigating what about their own community culture prevented other pilots with minoritized identities from achieving what she did [34].

While these marginalizations are by no means exclusively an American phenomenon, we choose to focus on the American aviation industries in this paper due to the authors' familiarity with the American context over others. We build on the work of other scholars [e.g., 3, 32, 34, 37] in advocating for a better culture on the flight deck where pilots with marginalized identities can feel psychologically safe to effectively do their jobs, and ensure a safe flight for them and their passengers.

3 METHODS

3.1 Data Collection

To explore our research question, we conducted 12 semi-structured grounded theory interviews [12] with currently active commercial and corporate professional Captains and FOs. Interviewees were recruited using pilots' Facebook groups and listservs. Prior to beginning recording and asking questions, we informed participants that some questions might be uncomfortable to answer, and encouraged them to refuse to answer such questions if they wanted to.

Table 1. Table 1: List of interviewed Captains and FOs, along with their years of experience and self-identified sexes and genders

Participant #	Designation	Experience	Sex	Gender
P1	Captain	24 years	Female	Transgender woman
P2	First Officer	5 years	Female	Genderqueer
P3	First Officer	3 years	Female	Genderqueer
P4	Captain	40 years	Female	Transgender woman
P5	First Officer	2 years	Female	Did not mention
P6	Captain	20 years	Female	Transgender woman
P7	First Officer	5 years	Female	Did not mention
P8	First Officer	3 years	Female	Did not mention
P9	First Officer	<1 year	Female	Did not mention
P10	Captain	23 years	Female	Did not mention
P11	First Officer	4 years	Female	Did not mention
P12	First Officer	4 years	Female	Did not mention

In the interviews, we asked participants about their experiences working on multi-pilot flight decks, and if they had experienced any communication breakdowns. In line with the grounded theory approach, we adapted our interview protocols to include themes that came up in our first few interviews, leading us to ask future interviewees whether they felt any power dynamics at play on the flight deck due to their identities and the identities of the other person, and if so, whether they had experienced discrimination from a person with higher social power. We also asked about specific instances where they felt unfairly treated because of some aspect of their identities, how they dealt with such situations, both in the moment and afterwards, and the impacts of such experiences on their ability to effectively do their jobs.

Our participants are described in Table 1, with their designation (Captain/FO) and hours/years of experience, as well as their voluntarily self-identified genders and sexes. We mention participants' genders and sexes because all of our participants referenced those aspects of their identities in recounting their experiences of being treated unfairly on the flight deck. We do not assume or report sex or gender identities of participants who did not voluntarily self-identify.

3.2 Research Positionality Statement

In researching questions of identities and unfair treatments based on such identities, we believe that author positionalities are important in understanding how this study was motivated, and how authors used their own experiences to interpret participants' responses [45]. Two authors are women in aviation in the US, with one of them being a currently active female Captain. Four of the authors hold marginalized identities in their own domains, and have personally experienced others' privilege hazards towards them.

4 FINDINGS

TW: This section contains mention of harassment and sexual assault. Some of the participants' responses presented in this section mention harassment and sexual assault. Though the authors have tried to omit any graphic details which might be triggering, readers' discretion is advised.

4.1 Communication Breakdowns: FOs Hesitating to Speak Up

We began with examinations of FOs hesitating to speak up about safety concerns due to something the Captain did or said that made them uncomfortable. This is despite formal airline training that has identified the FO' willingness to speak up as a major factor in airline safety [6].

4.1.1 Receiving Targeted Comments Because of Their Identities. One reason that our interviewed FOs mentioned feeling uncomfortable speaking up was because they were at the receiving end of inappropriate comments or were put in inappropriate situations because of their Captains' words or actions.

> *I was told way too often that I was too pretty a girl to be locked up in the front of the plane, and had Captains that literally would not let me fly, just have me sit and shut up.* - P2.
> *I flew with a Captain who kept talking about how as a woman, I was useless one week of the month, so I'm really hired for 9 months a year and not 12.* - P7.
> *I had a Captain just make inappropriate comments at me and put his hand over my chair and rub my shoulder, and when I spoke up about it, I was told, 'well, what do you expect when you come in looking like that?' I quickly realized that there was no point trying to fix that with him.* - P8.

P2, P7 and P8 are all early-career female FOs, and narrated their experiences of being put in uncomfortable situations due to things their Captains said or did. Such situations had immediate impacts on their abilities to effectively do their jobs, and made them hesitate to speak up in those settings.

4.1.2 Being Made to Provide Extra Justification for Suggestions. Another reason that FOs mentioned hesitating to speak up on the flight deck is because of their experiences of having to over-justify and explain themselves more than other colleagues with higher privilege.

> *I had this Captain who, instead of taking my words at face value, made me explain and quantify things even in crunch situations. And I know that he didn't do this with other male FOs because if they said something, it was done and accepted as correct.* - P3.
> *It was like every query and everything I'd say was brought into question and I had to know where in the manual I got that from.* - P7.
> *He [the Captain] didn't enjoy being corrected by a young woman and made me justify all my calls in ways that I know he didn't make his male FOs do.* - P9.

Female FOs (P3, P7, and P9) spoke about their experiences having to painstakingly justify their callouts on the flight deck to Captains who they knew had track records of not subjecting their male FOs to such rigor. Such experiences weighed heavily on P3, P7, and P9 and caused them to hesitate in speaking their mind around those Captains.

4.2 Requiring Additional Emotional Energy

4.2.1 First Officers. Because they have to deal with the situations mentioned above, our participants mentioned that they had to spend additional emotional energy in order to remain mentally focused on doing their jobs on the flight deck.

> *When I'm trying to do something flight-related or I'm trying to program something into the computer, I'm like trying really hard to focus and not think about the inappropriate situation the Captain created 2 minutes ago.* - P12.

> *People like me have to work twice as hard to be taken seriously and achieve the same goals as some other people, and that comes off as pushy or overly committed or whatever. Sometimes I feel like I change myself to satisfy them [Captains who they fly with].* - P5.
> *I mostly end up shutting myself up and nodding my head or going on my iPad, it's important to compartmentalize or I would lose my mind.* - P7.

P5, P7 and P12 spoke about their experiences where the actions or words of their Captains made them feel uncomfortable, and they had to expend emotional energy to recover from that discomfort and be able to effectively do their jobs in those moments. Compartmentalizing their discomforts or working harder than usual are practices that they mentioned undertaking because of such discomfort, which stemmed from an expression of privilege hierarchies within the flight deck. This is perfectly captured by an anecdote from P12.

> *I flew with a Captain who made several sexual advances towards me in the same flight, which can really be called harassment. The first few times you brush it off with humor or use diversion or fall back on your training, but as it kept on going I felt very uncomfortable and vulnerable. So like, I kept trying to do my job but it was hard to keep focused. I also had to think about how I was responding, because you don't want to incite aggression or anger when they're in control of the aircraft. So I was left managing this discomfort and trying my best to do my job while he just kept going.* - P12.

P12 went through a harrowing experience, and had to expend a massive amount of emotional energy which should not have been demanded of them. They had to balance their own discomfort due to the Captain's repeated inappropriate sexual advances, also trying to find the best ways to defend themselves while not angering the Captain, all while trying to prioritise the safety of the aircraft. Such a situation occurred because of the Captain's actions, and is an example of the unfairly high amount of emotional energy that FOs with lower social power have to expend on the flight deck.

A similar experience is narrated by P11.

> *We got into the flight and about 20 minutes in, the Captain started talking about politics and reproductive rights, and I instantly said no, I don't want to. He kept pushing and I said no again and he brought it back up a 3rd time, and at that moment, I had to make a call about whether I would stand my ground or let him get to me. I made the call that letting him speak his mind was more conducive to the safety of the flight and I kept quiet, enduring some pretty horrible things he said. The worst thing he said was at 10,500 feet and he had the last word because then we descended and entered the sterile cockpit [which is mandated below 10,000 feet].* - P11.

P11 painted a picture of having their boundaries pushed repeatedly by a Captain who really wanted to speak their mind about women's reproductive rights, a conversation that P11 did not feel comfortable having while flying. P11 ended up bending to the Captain's wishes and endured the monologue, at the cost of her own emotional safety, to ensure the overall safety of the aircraft. This incident took a toll on P11, and is perhaps emblematic of the emotional exertion and lack of comfort that our interviewed FOs spoke about throughout our conversations.

4.2.2 Captains. While the anecdotes from Section 4.1 are only from FOs, we also found our interviewed Captains to require expending extra emotional energy in some difficult circumstances, as detailed below.

> *I'm probably the first trans Captain he's flying with. Whereas, he's not the first White male FO I'm flying with. So it's my job to make him feel comfortable so that we can fly this plane together.* - P1

> *I've felt that I'm expected to meet a far higher standard than male Captains have to meet, and that took some getting used to. I had a lot of flights where I would think very hard about saying or doing something just so that I wouldn't come off as someway I didn't want to.* - P4.
> *I felt like I had to do REALLY good and not give anyone a chance to doubt my abilities, and that made me work twice as hard every time.* - P6.

P1, P4 and P6 are all experienced Captains in the industry, and yet spoke about having to expend extra emotional energy in overcoming the power differential that they found themselves on the lower side of, because of their shared identities as transgender women. Even though they held higher institutional power on their flight decks, their lower social privilege in comparison to their FOs meant that they had to spend more emotional energy to be able to effectively do their jobs.

5 DISCUSSION

5.1 Burden on those with Lower Privilege

Our findings reveal a pattern of individuals with marginalized identities on the flight deck carrying an additional burden in their minds as they are required to spend extra energy to be able to focus on their jobs on the flight deck. These burdens come out of their colleagues exercising their privilege hazards and willingly or unwillingly treating them differently because of their marginalized identities. Female and genderqueer Captains and FOs spoke about their experiences receiving inappropriate comments from their colleagues on the flight deck, and being made to offer extra explanations for every callout they made. These situations had adverse effects on their mindsets on the flight deck, making them more hesitant to speak up and expending extra emotional energy to stay focused on doing their jobs effectively. P11's experience (documented in Section 4.2.1) perfectly encapsulates this, as they were forced to put their own emotional comfort behind the Captain's wishes for the greater safety of the aircraft.

Our interviewees experienced the many unfortunate realities that those with marginal identities in any workplace unfortunately know all too well, such as feeling more pressure to perform at their peak, finding it harder to be considered credible, being stereotyped and facing inappropriate comments, facing more personal stress external to the job description, and being more isolated in their roles. In order to be effective at their jobs, they found themselves performing extra invisible labor in order to do the same work than others with more privilege would have to do, while facing more criticism and being held to a different standard. This is even true for the Captains whom we interviewed, with their higher institutional power in the left seat sometimes being trumped by the higher social power of their FO, as they find themselves unfairly held to higher standards than their colleagues with higher privilege. This demonstrates that those with higher social privilege may weaponize the power they hold by birthright over someone who has earned a higher position through merit or experience [51].

5.2 Impacts on Psychological Safety

As a result of expending additional emotional energy on the flight deck in order to be able to execute their roles, our interviewed Captains and FOs experienced a lowering of their psychological safeties. Repeated instances of being at the receiving end of inappropriate or targeted comments and additional unwarranted scrutiny on their actions led them to experience frustration, and expend emotional energy to hide their true selves.

By creating uncomfortable situations for such FOs, their Captains make it harder for them to freely express their opinions when they know that such expression runs the risk of receiving backlash or being asked to rigorously justify

themselves in ways that others do not have to. The flight decks that these FOs spoke about would likely receive low scores on Edmondson's [19] team psychological safety scale. These FOs might strongly agree with several statements on the scale, such as "People on this team sometimes reject others for being different," (due to experiences documented in Section 4.1.1) "Members of this team are able to bring up problems and tough issues," (due to experiences documented in Section 4.1.2) and "Working with members of this team, my unique skills and talents are valued and utilized," (due to experiences documented in Section 4.2.1). As a result, these FOs operate in environments of low psychological safety due to the words or actions of their Captains, which may jeopardize the overall safety of the aircraft [37, 38].

6 LIMITATIONS AND FUTURE WORK

One limitation of our work is that our interviewees exhibited self-selection bias in the way that they only opted in to the study if they felt that they had been unfairly treated due to their marginalized identities on the flight deck. We did not see interest from individuals with dominant identities, where they could have spoken about their retroactive realization and reflection on moments where they imposed a privilege hazard on their colleagues with marginal identities

We value such reflection and believe that individual changes and decisions from those with dominant identities to be more mindful of their privilege on the flight deck is an important step to solving this problem. In future extensions of this work, we hope to facilitate some of those conversations and drive change.

7 CONCLUSION

In this paper, we adopted a sociotechnical systems approach to the flight deck of a large aircraft, arguing that an important component of the overall safety of the aircraft is the psychological safety of the pilots. We then examined pilots with marginalized identities on the flight deck by interviewing 10 currently active Captains and FOs who hold such identities. Through our analysis, we found evidence of Captains and FOs who hold higher privilege due to some aspects of their identities imposing themselves on those with lower privilege, affecting their abilities to do their jobs effectively. This is particularly salient for early-career female or genderqueer FOs, who find themselves at the receiving end of inappropriate comments and uncomfortable conversations as they reckon with the collective effects of having lower institutional and social power. They expend extra emotional energy and work harder to be taken seriously on the flight deck, which ends up having negative effects on the level of team psychological safety.

Like most organizations and teams, the aircraft flight deck includes expressions of social power hierarchies where those with lower social and institutional power are subjected to inappropriate comments and uncomfortable situations by those with higher power. Our research demonstrates that Captains and FOs should endeavor to make their flight decks more psychologically safe for their colleagues, so that everyone feels comfortable and can fully focus on their tasks at hand. While situations of unequal power and axes of privilege may exist in almost every team setting, it is vital that such situations be mitigated in high-risk environments such as airplane flight decks.

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