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Citation

Bogdescu, O., Biskjaer, M.M., and de Rooij, A. (2022) Implementation intention as a debiasing intervention for a bias blind spot among UX practitioners, in Lockton, D., Lenzi, S., Hekkert, P., Oak, A., Sádaba, J., Lloyd, P. (eds.), *DRS2022: Bilbao*, 25 June - 3 July, Bilbao, Spain. https://doi.org/10.21606/drs.2022.155

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Implementation intention as a debiasing intervention for a bias blind spot among UX practitioners

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doi.org/10.21606/drs.2022.155

Abstract: When designing digital products that millions of people use, User Experience (UX) practitioners are prone to typical cognitive biases that might threaten the quality of their work. A barrier for mitigating such biases is the bias blind spot: People are more likely to detect bias in others than in themselves. Since practitioners have no standard means to diminish the bias blind spot, this paper investigates the prospect of implementation intention, designed as a commitment to consider how one evaluates others when evaluating oneself, as a debiasing intervention. As a preliminary study, an online experiment was conducted among 123 UX practitioners to examine whether implementation intention could yield a short-term bias blind spot diminution. The results suggest that the UX practitioners perceived more cognitive bias in the 'average UX practitioner' than in themselves, and that implementation intention served to diminish this bias blind spot short-term for novices and experts alike.

Keywords: bias blind spot; debiasing; implementation intention; user experience (UX) practitioners

1. Introduction

User experience (UX) design is now an integral part of the research-and-development (R&D) strategy of most major corporations and organizations (Gray et al., 2015). Through a user-centered design approach, UX practitioners develop digital products that convey meaningful and relevant experiences to millions of users (Norman & Nielsen, 2020), help build brand loyalty, reduce cost, and increase profit (Kambala, 2019; O'Brien, 2018). These digital products inform (e.g., news), entertain (e.g., streaming services), stimulate productivity (e.g., file-sharing systems), facilitate education (e.g., learning management systems), and keep track of physical and mental health (e.g., bio-monitoring systems) (Yalanska, 2017). UX is therefore woven into the digital infrastructure of society.

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The impact of UX on our everyday lives entails an ethical responsibility for *UX practitioners* (Gray, 2016): They should aim to maximize the perceived benefits of the users they design for. Human judgment, however, is often distorted by irrational, yet consistent erroneous tendencies, inclinations, or prejudice. Such systematic error in thinking is called *cognitive bias* (e.g., Tversky & Kahneman, 1974; Tversky & Kahneman, 1996; Kahneman, 2012). Although bias introduces an evolutionary advantage such as quick decision-making in high-pressure situations, bias also frequently causes erroneous and inappropriate decision-making (Haselton et al., 2009). Diminishing cognitive bias would thus enable UX practitioners to better avoid such potential errors and, in turn, elevate the quality of their work.

Efforts have been made in the UX professional community to articulate and moderate cognitive biases (e.g., Subramanian, 2018; Whitenton, 2016; Sun, 2017). In design thinking, a practical approach has been to address this by involving users and colleagues and, more generally, by adopting an empathic lens in the design process (e.g., Wright & McCarthy, 2008; Kouprie & Visser 2009; Köppen & Meinel, 2015). Such attempts, however, face a critical challenge: UX practitioners, just as everyone else, might be subject to a *bias blind spot* where "they are less likely to detect bias in themselves than in others" (Scopelliti et al., 2015, p. 2468). The result is a tendency to ignore where and how one's own types of bias could be addressed despite the potentially harmful effects of bias-induced errors during design-based decision-making. This entails a similar ethical responsibility for *design researchers*, namely to provide UX practitioners with the relevant knowledge and the applicable tools they need to help mitigate this bias blind spot.

A novel and promising *debiasing intervention* is known as an *implementation intention*. This refers to a tailored 'if-then' plan specifying a situation and a desired behavior to be performed, which the person must then commit to (Brandstätter & Gollwitzer, 2001; Adriaanse et al., 2011). Speculatively, the bias blind spot could thus be targeted simply by asking UX practitioners to consider how they evaluate others when they evaluate themselves. If they seriously commit to this debiasing intervention, UX practitioners should be able to become as aware of the bias in their own decision making as they are about the bias in others', thereby effectively mitigating their own bias blind spot. This, however, is conjecture, since implementation intention has not been studied as a debiasing intervention for the bias blind spot, neither within nor outside the UX domain.

To address this lacuna, this paper contributes a preliminary study: *Can implementation intention yield a short-term bias blind spot diminution among UX practitioners?* Focusing on short-term effects serves to probe if more extensive research on this topic is warranted. The paper first expounds this motivational conjecture before reporting on the method and results of an online experiment among 123 UX practitioners. The paper discusses the results and limitations and proposes future research on how implementation intention might mitigate the bias blind spot among UX practitioners both long-term and in-situ.

2. Theoretical background

2.1 Cognitive bias in UX

UX practitioners must make numerous decisions that affect the quality of the products they help create—from prioritizing user needs to how form factors, interactions, and content can support these user needs (Gray, 2016; Gray et al., 2016; Norman & Nielsen, 2020).

Kahneman's (2003) dual-process theory suggests that people process information via an intuitive (system 1) and a deliberative system (system 2). System 1 is fast and enables people to process information automatically and subconsciously, while system 2 is slower and supports conscious reflection on information (Kahneman, 2003; see also Pennycook et al., 2016). System 1 relies on shortcuts, so-called heuristics. These cognitive 'rules of thumb' help the individual attain a good-enough outcome quickly and without too much effort. The problem, however, is that heuristics frequently lead to errors in thinking. Their automaticity renders these errors systematic when relying on system-1 thinking. Such errors are referred to as *cognitive biases* (Evans, 2008) and apply to all people in all professions, including UX practitioners.

External factors such as working under time pressure or high cognitive load can promote reliance on system-1 thinking (Fennis et al., 2009). In UX practice, such strain can be intensified by stakeholder pressure and expectancy of financial gain, which are both elementary in UX design (Teixeira & Braga, n.d.). Considering the many constraints that UX designers must comply with in their creative thinking and decision-making, it would seem plausible to assume that UX practitioners could be particularly susceptible to cognitive biases (NNgroup, 2019) given the many types currently demonstrated (Mumford et al., 2006, see Figure 1 for examples). Diminishing cognitive bias would enable UX practitioners to reduce systematic errors in their work, which would ultimately benefit the users of the products and services these specialists help design and develop.

2.2 The bias blind spot

Attempts to raise awareness of and mitigate cognitive bias already exist in the UX professional community (Subramanian, 2018; Whitenton, 2016; Sun, 2017). One cognitive bias, however, might eclipse the focus on addressing the many types that impact the quality of UX practitioners' work.

The *bias blind spot* is a systematic information-processing asymmetry where people are less likely to detect bias in themselves than in others (Scopelliti et al., 2015). Several other biases are thought to contribute to the bias blind spot. At its core lies a general tendency toward self-enhancement, i.e., the motivation to maintain, pursue, or intensify one's positive self-image even when indicators such as one's actual performance and other people's opinions suggest otherwise (Sedikides & Alicke, 2018). Self-enhancement drives a variety of self-related superiority biases. Central among these are the better-than-average bias in which people tend to rate themselves higher than the average person (Hoorens, 1993; Alicke et al.,

2001) and the self-serving bias where people attribute success to their own abilities and failure to external factors (Sedikides & Alicke, 2018; Hoorens, 1993; Pronin & Kugler, 2007). Other biases such as the introspection illusion and naïve realism can also contribute to the bias blind spot (Pronin, 2009; Pronin & Kugler, 2007; Yan et al., 2016).

Previous work suggests that the bias blind spot is persistent in the general population (Pronin et al., 2002). How the bias blind spot manifests itself among UX practitioners has not been studied. This special bias would entail that these professionals are less likely to see where and how their own types of bias impact their creative thinking and, conversely, more inclined to detect them in others. Reducing the bias blind spot would therefore elucidate the UX practitioners' own proneness to cognitive bias. The resulting awareness of the types of bias that a person is in fact susceptible to marks a necessary first step toward addressing this error in thinking. Unduly considering one's own decisions as less biased than those of others could also harm the benefits of collaboration with stakeholders and peers, as one would tend to prioritize one's own assumedly 'less-biased' decisions. If this bias blind spot is also discernible among UX practitioners, this would warrant further development of so-called debiasing interventions for application in UX practice.

2.3 Implementation intention as a debiasing intervention

Debiasing interventions refer to procedures for mitigating human fallibility in judgment and decision making in general. Although some have questioned their effectiveness (Oliver et al., 2017), most studies suggest a positive effect of debiasing interventions (Arkes et al., 1988; Shaffer et al., 2016; Ludolph & Schulz, 2018), for instance as video games (Morewedge et al., 2015) and direct warning (Lewandowsky et al., 2012). The challenge with such interventions is that people might be oblivious (blind) to their own susceptibility to cognitive bias (Scopelliti et al., 2015).

As an example of a debiasing intervention, *implementation intention* can be designed to help diminish the bias blind spot. It refers to an 'if-then' plan that a person commits to (Brandstätter et al., 2015; Adriaanse et al., 2011). It is tailored to a situation that needs change and specifies the current situation and the desired behavior to be performed. By intentionally creating a conscious link between the (unsatisfactory) current situation and the desired behavior, the anticipated goal situation becomes activated and accessible. Although requiring conscious intent in the short term, sufficient repetition automatizes the behavior in the long term, leading to habit formation of the desired behavior (Bayer et al., 2009; Gollwitzer, 1999). With the 'if-then' plan as ingrained behavior, encountering the specific cue to act (recognition of the situation) triggers an automatic, pre-determined behavioral response performed without the conscious intent initially needed (Parks-Stamm et al., 2007; Aarts & Dijksterhuis, 2000; Achtziger et al., 2008).

Implementation intentions have been shown to help reduce racial bias (Stewart & Payne, 2008) and stereotyping and prejudice (Mendoza et al., 2010; Devine et al., 2012). In the case of the bias blind spot, the undesired situation is the systematic error in detecting bias in oneself as compared to others. The desired behavior is to become able to detect cognitive bias as competently in oneself as one can in others. An implementation intention designed to reduce the bias blind spot among UX practitioners could therefore be: *"*If *I need to evaluate myself,* then *I will consider how other UX practitioners would evaluate me."* By committing to this implementation intention, UX practitioners should be able to offset the asymmetry in the detection of bias in themselves versus in their peers. This leads to the first hypothesis:

H1: Employing an implementation intention, compared to non-application, diminishes the bias blind spot in the short term among UX practitioners.

People who rely strongly on system-1 thinking have a relatively higher risk of being biased and are thus less inclined to correct their initial self-assessment through introspection (Pretz, 2011). Among UX practitioners, this might represent an issue when experts, given their experience, rely on system-1 thinking more often than their less-experienced peers (Salas et al., 2010; Shanteau, 1992). Through experience, knowledge increasingly becomes tacit via internalization (Pretz, 2011), so increased reliance on fast judgment might have become the norm, insofar as experts' intuition begin to resemble recognition (Ericsson, 1996). Compared to their less-seasoned colleagues, experienced UX practitioners could thus potentially be more inclined to act based on their cognitive biases. Experienced UX practitioners, who are arguably more 'set' in their ways, might therefore benefit most from implementation intention as a debiasing intervention. This leads to the second hypothesis:

H2: The effect of implementation intention on the bias blind spot is moderated by years of professional UX experience.

Guided by these two hypotheses, this paper contributes a preliminary study on the short-term effect of implementation intention on UX practitioners' bias blind spot when still driven by conscious intent.

3. Method

To test the two hypotheses, an *online experiment* was conducted among UX practitioners conceived inclusively as creative professionals working with UX design (Norman & Nielsen, 2020). The materials and data are available at DataverseNL (de Rooij, 2022).

3.1 Participants

Two hundred eight participants initially participated (see 3.5 for the recruitment process). Seventy-six did not complete the study, six failed the manipulation check, and two were not UX practitioners. Data from 123 UX practitioners was used in the analysis (M_{age} = 29.86, SD_{age} = 5.45, 65 self-identified females, 53 males, 5 did not say). Sixty-eight percent of the participants were UX designers, 17% UX researchers, 8% UX strategists, 4% others (UX Team Lead, UX Manager, SEO), and 3% did not fill in their professional role. Nationalities included 42% Dutch and 18% Romanian, while 40% represented 32 other nationalities. Participants had various levels of UX experience. Nineteen percent had less than one-year of experience, 29% had one-three years of experience, 18% three-five years, and 36% had more than five years of experience. Two percent did not say. The study was approved by the TSHD Research Ethics and Data Management Committee, Tilburg University.

3.2 Manipulation of implementation intention

Participants were randomly asked to undergo an implementation intention treatment (experimental group) or not (control group). The experimental group was asked to read silently to themselves: "If I need to evaluate myself, then I will consider how other UX practitioners would evaluate me" (see above for the underlying rationale). They then ticked a box with the commitment to act upon this intention (Achtziger et al., 2008). Given the short duration of the study, the effect of this commitment was assumed to be driven by conscious intent rather than habituation (Gollwitzer, 1999). To check if participants committed to the implementation intention during the study, they were asked to respond to this follow-up question: "At the beginning of the study you were asked to read and commit to a statement. What was that statement?". Data from participants who failed this manipulation check was not included in the analysis (see 3.1).

3.3 Establishing and assessing the bias blind spot

To establish and later assess a possible bias blind spot, participants were presented with five hypothetical situations (randomized) in which a cognitive bias occurred. The cognitive biases were the *anchoring bias*, *sunk cost fallacy*, *status quo bias*, *confirmation bias*, and *framing effect* (explained in Figure 1). The relevance and selection of these biases and situations were based on anecdotal evidence from the UX domain (Subramanian, 2018; NNgroup, 2019) and confirmed in an informal pilot study with five UX practitioners. The bias stimuli were designed as follows: 1) each situation would state the existence of the given cognitive bias as confirmed by the research that this study builds on to support construct validity; 2) an assumingly typical UX design process situation was described to support external validity; and 3) a consequence of the bias was described regarding the previous situation to support both construct and external validity (see Figure 1 for details).

After being presented with a situation, participants rated the following statements on a seven-point Likert scale (1 = extremely unlikely; 7 = extremely likely): "To what extent are you likely to exhibit this tendency?"; 2) "To what extent is the average UX practitioner likely to exhibit this tendency?" This approach, which follows Scopelliti et al. (2015), enabled testing of any difference in the cognitive bias detected in the participants themselves versus in others. This difference served as a proxy to indicate the degree of a bias blind spot that a participant might have. Given the many possible types of bias one might be susceptible to (Mumford et al., 2006), no reliable 'gold-standard' approach exists for accurately measuring broad constructs such as the detection of cognitive bias in the self and others. Latent variables based on the selected five biases were therefore assumed to be a domain-relevant proxy to assess cognitive bias and the bias blind spot among the UX practitioners.

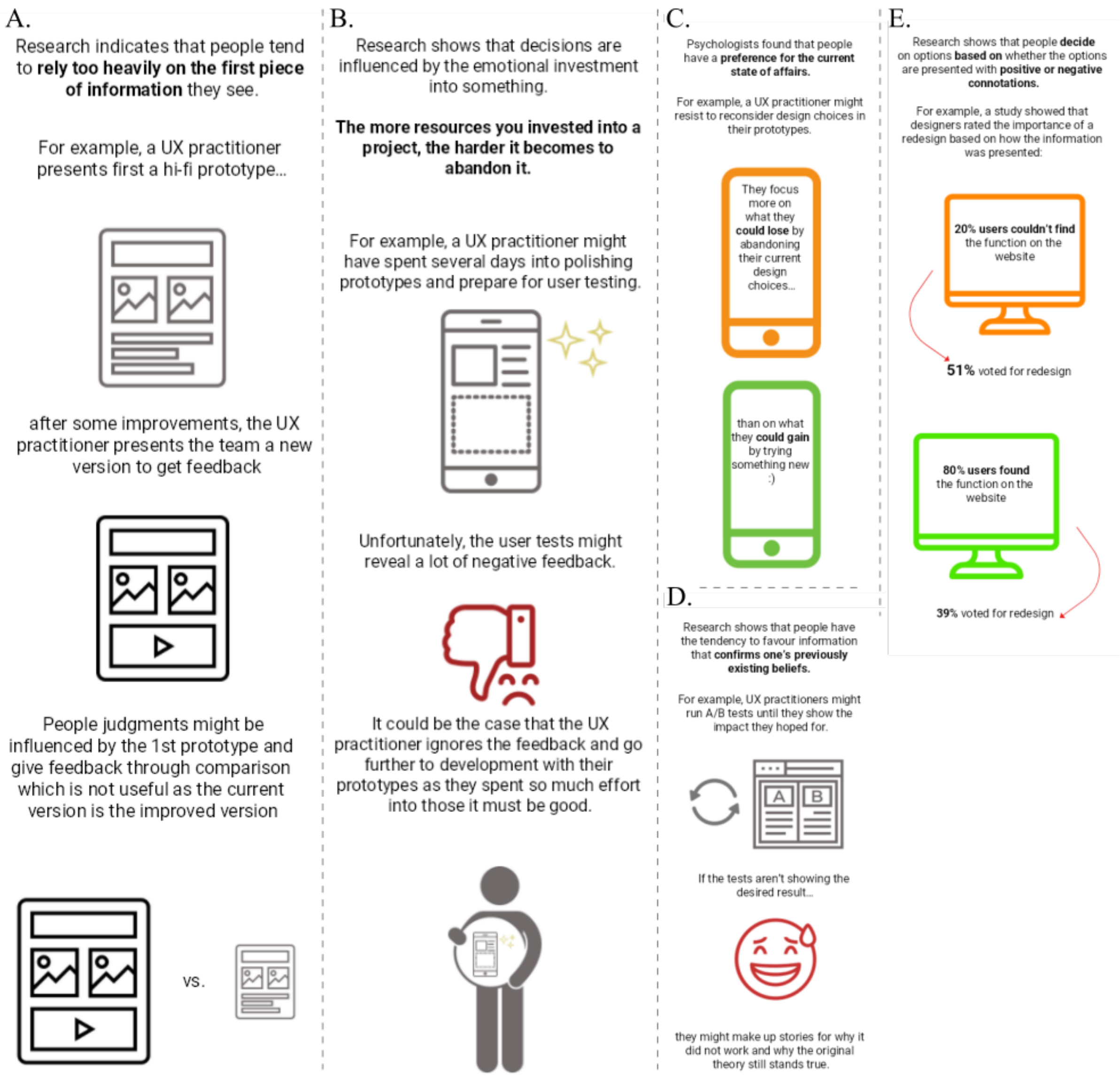

Figure 1. The five situations of the five cognitive biases including definitions (top) in a UX context, presented in random order to the participants: A) Anchoring bias (Sugden et al., 2013), B) sunk cost fallacy (Arkes & Ayton, 1999), C) status quo bias (Samuel & Zeckhauser, 1988; Kahneman et al., 1991), D) confirmation bias (Tversky & Kahneman, 1981), and E) framing effect (Tversky & Kahneman, 1981).

3.4 Years of professional experience

Participants were asked to report their number of years of professional UX experience using a four-point ordinal scale (1 = less than 1 year; 2 = 1-3 years; 3 = 3-5 years; 4 = 5 years or more). This categorization supported the ease and speed of participation online to prevent increasing attrition.

3.5 Procedure

To recruit participants, a personalized invitation was sent to LinkedIn users who self-identified as UX designers, UX researchers, or UX strategists in their profile text. They were also asked to share the study within their network. Additionally, an advertisement was posted on three Slack UX groups (MediaMonks2, UX Goodies, BetterUX Community) and one LinkedIn group (UX Professionals). The experiment started when participants opened a Qualtrics survey link provided to them in the invitation or advertisement. Informed consent was established, and instructions were provided without revealing the true purpose of the study. Participants were randomly assigned to the control or the experimental group. The experimental-group participants underwent the implementation intention procedure. All participants were presented with the five cognitive biases and self-reported to which degree each bias applied to them or the assumed 'average UX practitioner' (others) (Figure 2). Demographics were reported and the manipulation check was completed. The survey ended with a full debriefing and a note of thanks for the participants' time and effort.

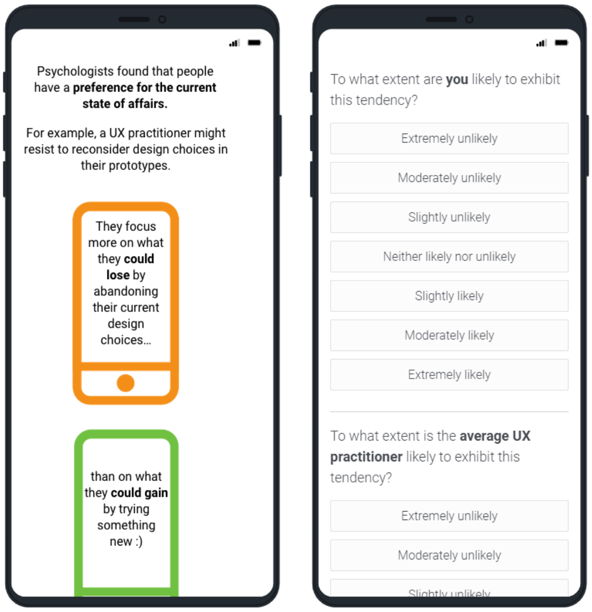

Figure 2. Example of the stimulus (left) and assessment of the bias blind spot (right) as presented during the online experiment.

3.6 Analytical strategy

The data were analyzed with R 4.0.2 and Lavaan 0.6-7 (Rosseel, 2012). Two structural equation models (SEM) were calculated. SEM provides a flexible framework for testing the effects of the manipulation (implementation intention) and moderator (experience) on a latent variable drawn from the bias-related measurements. Normality of the data was checked by visually inspecting histograms. If a deviation from normality was suspected, the appropriate corrections for the test statistics were applied to prevent type I and type II errors (Rosseel, 2012). Models were only accepted for presentation if the model fit indices would indicate an acceptable model fit or were adapted accordingly (Kenny, 2020). The first

SEM was calculated to test a potential difference in detected bias between the self and the 'average UX practitioner.' If a bias blind spot among the UX practitioners was confirmed, this would justify calculating the second SEM to further test any effects of the implementation intention (H1) and experience moderation (H2) on the bias blind spot.

4. Results

To test if the UX practitioners perceived more bias in others than in themselves, a *multilevel structural equation model* was calculated on the non-debiased control group data (n = 64). The within-subject level was specified to test for any difference between the perception of cognitive bias in the self or in others (coding self = 0; others = 1). Cognitive bias was specified as a latent variable that comprised of the anchoring bias, sunk cost fallacy, status quo bias, confirmation bias, and framing effect. The between-subject level was saturated by co-varying all cognitive bias measures since no hypothesis was tested at this level with this model (Rosseel, 2012). Visual inspection of the histograms of the measures of these five biases suggested that their distribution deviated from normality. Therefore, the Huber-White corrected test statistics were reported (Rosseel, 2012). Model fit indices suggested a good model fit (Table 1, Note) (Kenny, 2020). All bias measures significantly and positively loaded onto the latent variable cognitive bias (Table 1, latent variable). The results showed that the participants perceived significantly more bias in others than in themselves, $b = .715$, $p < .001$ (see Figure 3 and Table 1 for details). These findings justified further investigation of whether implementation intentions might be deployed to mitigate UX practitioners' bias blind spot.

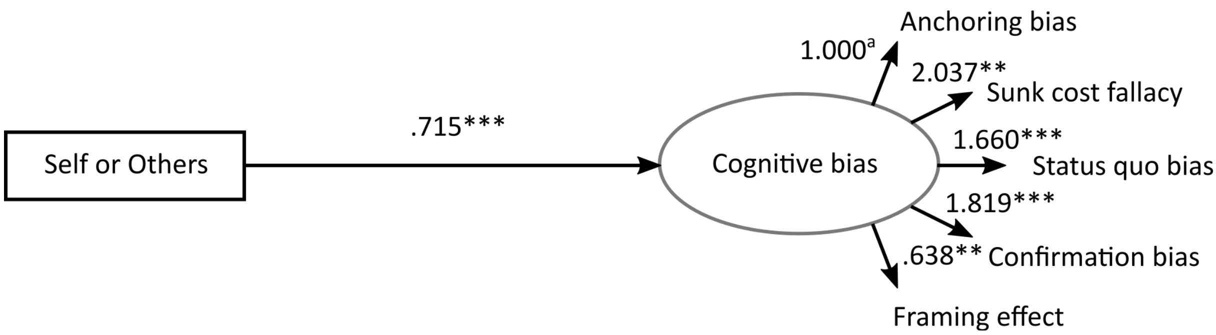

*Figure 3. Visual model of the difference in perception of cognitive bias in the self and in others—the bias blind spot. Data are unstandardized coefficients. [a] denotes a reference value. ** p < .010, *** p < .001*

Table 1. Results of the multilevel structural equation model of the difference between perceived cognitive bias in the self and in others.

	B	***SE***	***z***	***p***
Latent variable				
Cognitive bias				
Anchoring bias	1.000[a]			

Sunk cost fallacy	2.037	.593	3.435	.001
Status quo bias	1.660	.366	4.532	<.001
Confirmation bias	1.819	.409	4.447	<.001
Framing effect	.638	.224	2.844	.004
Regression				
Cognitive bias ~ Self or Others	.715	.171	4.177	<.001
Variances				
Anchoring bias	.643	.135	4.779	<.001
Sunk cost fallacy	.745	.179	4.171	<.001
Status quo bias	1.029	.230	4.478	<.001
Confirmation bias	.369	.105	3.522	<.001
Framing effect	.411	.091	4.530	<.001
Cognitive bias	.117	.082	1.423	.155

Note: Data are unstandardized coefficients (*B*), standard errors (*SE*), z-values (*z*), and p-values (*p*). Model fit indices: Comparative fit index = .965; Root mean square error of approximation = .086; Standardized root mean square error of approximation = .060. [a] denotes a reference value. The table presents the within-subjects results only for the participants in the non-debiased control group. Intercepts for the five biases are all set to zero.

To test if implementation intention diminished the confirmed bias blind spot among the participating UX practitioners, and if this was moderated by professional experience, a *second structural equation model* was calculated. The model featured implementation intention (coding control group = 0; experimental group = 1) as the independent variable and a latent variable to represent bias blind spot. This latent variable comprised of the difference scores (Δ) between the bias perceived in others and the bias perceived in the self for the anchoring bias, sunk cost fallacy, status quo bias, confirmation bias, and framing effect. The use of Δ's prevented the need for calculating cross-level interactions in multilevel SEM, which was not supported by the software (Rosseel, 2012). Professional experience was specified as a moderator of the effect of implementation intention on the bias blind spot. Although no hypothesis was formulated about a direct effect of professional experience on the bias blind spot, this was included in the model, as no acceptable model fit could be obtained without it. Visual inspection of the histograms of the bias Δ's suggested they did not meet the assumption of normality. Therefore, the bootstrap-corrected (n = 1,000) test statistics were reported (Rosseel, 2012). Model fit indices suggested a good model fit (Table 2, Note) (Kenny, 2020). All bias Δ's significantly and positively loaded onto the latent variable bias blind spot (Table 2, latent variable). The results showed a significant and negative effect of implementation intention on the bias blind spot, $b = -.663$, $p = .033$. However, the results showed no significant moderation effect of professional experience on the effect of implementation intention on the bias blind spot, $b = .166$, $p = .092$, and no significant direct effect of professional experience on the bias blind spot, $b = .003$, $p = .957$ (see Figure 4 and Table 2 for details).

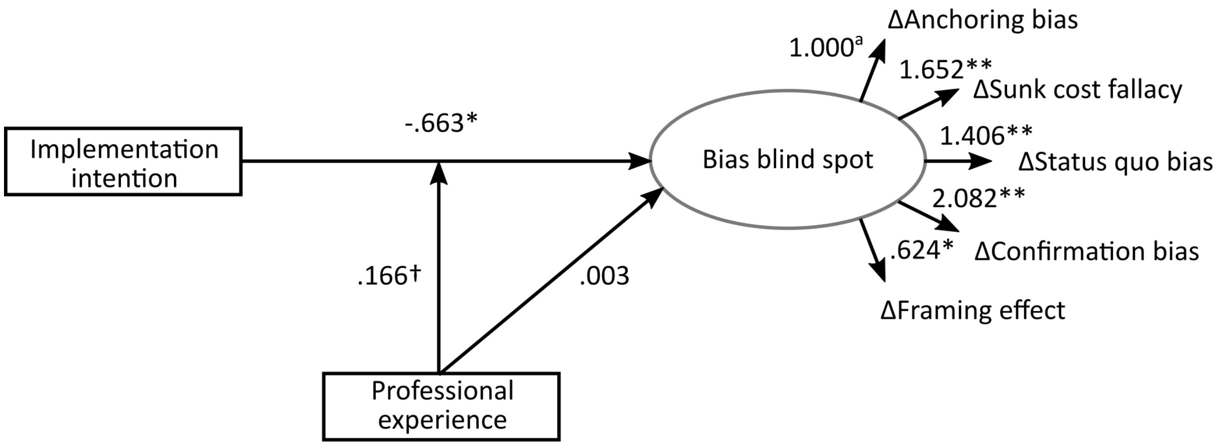

*Figure 4. Visual model and results of the effects of implementation intention on the bias blind spot, and the moderation of this effect of years of professional experience in the UX industry. Data are unstandardized coefficients. [a] Denotes a reference value. † p < .100, * p < .050, ** p < .010*

Table 2. Results of the structural equation model of the effects of implementation intention on bias blind spot, and the moderating role of years of professional experience.

	B	***SE***	***z***	***p***
Latent variable				
Bias blind spot				
ΔAnchoring bias	1.000[a]			
Δsunk cost fallacy	1.652	.503	3.283	.001
Δstatus quo bias	1.406	.478	2.942	.003
Δconfirmation bias	2.082	.607	3.432	.001
Δframing effect	.624	.272	2.298	.022
Regressions				
Bias blind spot ~ Implementation intention	-.663	.310	-2.137	.033
Bias blind spot ~ Professional experience	.003	.063	.054	.957
Bias blind spot ~ Implementation intention x professional experience	.166	.099	1.685	.092
Variances				
Δanchoring bias	.962	.140	6.888	<.001
Δsunk cost fallacy	1.501	.243	6.168	<.001
Δstatus quo bias	1.946	.282	6.908	<.001

Δconfirmation bias	.881	.235	3.748	<.001
Δframing effect	.913	.123	7.405	<.001
Bias blind spot	.192	.095	2.009	.045

Note: Data are unstandardized coefficients (*B*), standard errors (*SE*), z-values (*z*), and p-values (*p*). Model fit indices: Comparative fit index = .994, Root mean square error of approximation = .014, Standardized root mean square error of approximation = .051. [a] denotes a reference value.

5. Discussion

5.1 Main contribution

The study was conducted to preliminarily explore if implementation intention can be deployed as a debiasing intervention to diminish the bias blind spot among UX practitioners in the short term. The results suggested that the participating UX practitioners *did perceive more bias* in the so-called 'average UX practitioner' than in themselves, and that this bias blind spot *could be diminished* during the experiment by committing to the implementation intention (if-then plan): *"If I need to evaluate myself, then I will consider how other UX practitioners would evaluate me."* This finding thus confirmed the first hypothesis (H1); namely that deployment of an implementation intention, compared to non-application, can diminish the bias blind spot in the short term among these UX practitioners. However, the findings showed no evidence for hypothesis (H2); i.e., that the effect of implementation intention on the bias blind spot was moderated by years of professional UX experience.

These results align with research suggesting that the bias blind spot is prevalent in the general population (Pronin et al., 2002) and demonstrate that UX practitioners are no different in that regard. This is unsurprising. More importantly, this study may be the first to suggest that *an implementation intention can be designed to help debias UX practitioners' bias blind spot short-term*; that is, when the effect of the deployed implementation intention is still driven by conscious intent as opposed to habituation (Gollwitzer, 1999; Parks-Stamm et al., 2007; Aarts & Dijksterhuis, 2000; Achtziger et al, 2008). These results also add the bias blind spot to the list of cognitive biases alongside racial biases (Stewart & Payne, 2008) and stereotyping and prejudice (Mendoza et al., 2010; Devine et al., 2012) and others that can indeed be targeted and mitigated with tailored implementation intentions.

These results thus contribute new insight to the design research community and the UX professional community. Especially the latter seems to focus increasingly on cognitive biases in UX and on finding efficient debiasing interventions to help UX practitioners become even more aware of and skillful at mitigating the cognitive biases that mostly severely affect their profession (NNgroup, 2019; Subramanian, 2018; Sun, 2017; Whitenton, 2016). In our view, this enhanced attention to biases specifically among UX practitioners is not fully represented in the current body of work in the design research community.

5.2 Limitations

The study has various limitations. Firstly, as with any online experiment, there are limitations to the external validity of the results. As such, there is some uncertainty about the degree to which the results apply to situations that occur in professional practice. The results should not be taken as definitive, but as indicative as an incentive to conduct further research. Secondly, a common issue with online experiments is attrition. In this study, seventy-six people started but did not complete the experiment. Because the reasons for non-completion are unknown, selection bias cannot be ruled out. This might affect the study's internal validity. Thirdly, the ordinal scale used to capture experience could, theoretically, introduce ceiling effects due to the five+ years category. Inspection of the data, however, suggested this was unlikely. Fourthly, the use of difference scores could threaten the construct validity of the blind spot measure (Peter et al., 1993). This means that negative scores are possible, indicating the perception of more bias in the self than in others, which would comprise the opposite of a bias blind spot. However, confirming a bias blind spot among UX practitioners (Figure 3, Table 1) before further testing did largely rule out this potential limitation.

5.3 Implications and future work

The present preliminary study is conceived as a first look into ways in which UX practitioners can be equipped with the knowledge and tools they need to address their cognitive biases. Speculatively, becoming aware of and initiating proper measures to debias the bias blind spot could be seen as a *soft skill* among UX practitioners to improve investigations into and decision-making about user needs, especially when collaborating closely with stakeholders and peers, which is typical in UX. Ultimately, cultivating this soft skill would be an asset for UX practitioners when trying to maximize the end users' perceived benefits from interacting with the numerous UX-based products and services that characterize everyday life.

The results of the present study should therefore be considered an incentive to take a second and third look.

A *second look* is necessary to establish the long-term efficacy of implementation intention as a debiasing intervention for the bias blind spot among UX practitioners. A key advantage of implementation intention compared to current debiasing interventions, e.g., video games (Morewedge et al., 2015), 'considering the alternative' (Mussweiler et al., 2000), and direct warning (Lewandowsky et al., 2012), is its potential for long-term effects (see Mussweiler et al., 2000; Madva, 2017). Although the present study only points to its short-term effects driven by conscious intent, research suggests that with sufficient repetition, implementation intentions can be automatized and become habitual (Gollwitzer et al., 1999; Parks-Stamm et al., 2007; Aarts & Dijksterhuis, 2000; Achtziger et al., 2008). Therefore, the potential long-term effects of implementation intention evoke a type of debiasing skill that becomes subconscious and effortless over time. Further research should examine if this is the case.

A *third look* is equally important. A motivational factor for adopting implementation intention is that using it brings tangible benefits at a reasonable cost. Its relative ease and limited cost and time investment suit an environment where practitioners often work under time pressure and high cognitive load (Fennis et al., 2009; Teixeira & Braga, n.d.). As for the benefits, the working hypothesis is that the bias blind spot gets in the way of realistically detecting one's own susceptibility to cognitive bias. This obliviousness leaves potentially harmful cognitive biases unaddressed, which, ultimately, might be detrimental to the quality of the products and services that UX practitioners help create. Whether (literally) bringing into view one's own susceptibility to cognitive bias is sufficient for enabling UX practitioners to act upon their improved awareness remains an open scientific question and a practical problem.

The tighter an implementation intention is aligned with a situation, the larger the chance of successful debiasing (Gollwitzer, 1999). Therefore, in practice implementation intentions could be designed with further specificity regarding the human-centered UX design process (e.g., empathy, idea generation) and the people involved (e.g., peers, stakeholders, users) and integrate specific state-of-the-art design theory. Concretely, this goal could be materialized in UX design education and later as part of professional design training programs. Multiple implementation intentions tailored to specific UX situations would therefore likely be needed to become gradually more aware of one's own susceptibility to cognitive bias and to actively address the types of bias that most palpably hamper the quality of a UX practitioner's work.

With this preliminary study, we hope that the design research community might be inspired to look even closer at the bias blind spot and some of the debiasing interventions that seem most promising for mitigating this issue in contemporary professional UX design practice.

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