Mental Simulation and The Individual Preference Effect.

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Abstract

Purpose - The "Individual Preference Effect" (IPE: Faulmüller *et al.*, 2010; Greitemeyer & Schulz-Hardt, 2003; Greitemeyer *et al.*, 2003), a form of confirmation bias, is an important barrier to achieving improved group decision-making outcomes in Hidden Profile tasks. Group members remain committed to their individual preferences and are unable to disconfirm their initial suboptimal selection decisions, even when presented with full information enabling them to correct them, and even if the accompanying group processes are perfectly conducted. This paper examines whether a mental simulation can overcome the IPE.

Design/Methodology/Approach – Two experimental studies examine the effect of a mental simulation intervention in attenuating the IPE and improving decision quality in an online individual Hidden Profile task.

Findings – Individuals undertaking a mental simulation achieved higher decision quality than those in a Control condition and experienced a greater reduction in confidence in the Suboptimal solution.

Originality – To the authors' knowledge, no study has examined whether mental simulation can attenuate the IPE.

Research limitations/implications – Results suggest a role for mental simulation in overcoming the IPE. The test environment is an online individual decision-making task and broader application to group decision-making is not tested.

Practical Implications – Since mental simulation is something we all do, it should easily generalise to an organisational setting to improve decision outcomes.

Keywords: Hidden Profiles, Individual Preference Effect, Decision-making, Mental simulation.

Introduction

We make thousands of decisions every day, alone or in tandem with others (Latham, 2015; Ryan, 2018). Yet research shows that human decision-making is unreliable at best and our cognitive biases can significantly prejudice decision quality (Arnott, 2006). These biases can be compounded when the information used to make decisions is imperfect, or not uniformly distributed in instances where decisions are being made with others, for example, where one party to the decision knows something different to the other party[ies] (Information Asymmetry: Akerlof, 1970), as in group decision-making.

The Hidden Profile

In social psychology, asymmetric information has been conceptualised in group decision-making research using Hidden Profile (HP) decision tasks (Stasser & Titus, 1985). Such tasks always have an "optimal" answer, however, information is distributed asymmetrically between group members: some being shared amongst all members, whilst other information is partially shared or unique, known to only one group member. Groups may arrive at the optimal solution only by pooling and integrating information well enough to highlight the unique information, positive or negative, each member possesses, which is critical to an optimal decision outcome. Information integration has been identified as particularly important in many organizational contexts, including new product quality and development (White *et al*., 2008; Xiao *et al*., 2013)

The decision task is further complicated since the individual information sets held by each group member point to a different decisional outcome than the group's full information set (Brodbeck *et al.*, 2007), with individual group members being oriented towards an initial, suboptimal solution. Research shows HP groups have a difficult time finding the optimal answer: in a meta-analysis of 65 studies covering 25 years of HP research, Lu *et al.* (2012)

concluded HP groups were eight times less likely to find the solution than groups having full information ('Manifest Profile' groups).

Numerous reasons linked to biases and heuristics operating amongst individual group members, and within the group, have been advanced for the failure of HP groups, influencing what, and how, information is shared. Brodbeck *et al.* (2007) categorised these into: (i) negotiation focus; and (ii) discussion bias, operating at the group level of information processing; and (iii) evaluation bias, operating at the individual processing level. In negotiation focused processing, group members share only information that will help them identify and achieve the majority group verdict, even when that verdict is suboptimal. Information shared is largely based on individual (suboptimal) preferences and opinions (Gigone & Hastie, 1997) and shared information supporting those preferences. Discussion bias leads groups to spend more time discussing shared versus unique information (Larson *et al.,* 1996). Evaluation biases favour (i) shared information; and (ii) preference consistent information (Brodbeck *et al.,* 2007). Such information provides social validation as it can be corroborated by others (Wittenbaum *et al.,* 1999). Finally, individuals evaluate information as more credible when it is consistent with their personal opinions (Greitemeyer & Schulz-Hardt, 2003).

The Individual Preference Effect

The "Individual Preference Effect" (IPE: Faulmüller *et al.*, 2010; Greitemeyer & Schulz-Hardt, 2003) has been identified as an important barrier to decision quality in Hidden Profile tasks. The IPE manifests itself such that group members are unable to disconfirm their initial suboptimal selection decisions, and remain committed to these, even when presented with full information enabling them to correct them, and even if the accompanying group processes are perfectly conducted.

Faulmüller *et al*. (2010) suggested the IPE is largely driven by preference consistent evaluation of information. Individual group members enter the group discussion with an initial (usually suboptimal) preference, which leads to biased evaluation of the information emerging during the group discussion, (i.e. group members prefer information consistent with their initial preference). Research emphasizes the importance of the initial preference and its subsequent effect on group decision outcomes. Faulmüller *et al*. highlighted, through a comparison against real interacting groups, that almost half of all groups would fail to solve the HP as a consequence of the IPE, even when all information was exchanged and no co-ordination losses occurred.

The adverse impact of all group members entering the group discussion favouring the suboptimal solution may go beyond just poor decision outcomes to more serious organizational consequences. For example, Glebovskiy (2018) noted that "social cascades", whereby other group members begin to coalesce around the same opinion, identifying and aligning with other group members' values and perceptions, may be a contributing factor to group polarisation and groupthink. Glebovskiy highlighted such cascades may have informational antecedents if group members lack full information and are making their decision based on the opinions of others or the majority (as often happens in group HP tasks).

Faulmüller and colleagues speculated an underlying cause of the IPE was differing amounts of cognitive resources being allocated to processing preference consistent versus inconsistent information: preference consistent information matches with prior beliefs: there is no need to challenge it - it can be accepted easily and quickly. Conversely, information which is not congruent with prior beliefs requires more cognitive resources to examine and, consequently, the acceptance process is more difficult.

In HP tasks, individual group members are, generally, firstly oriented towards a suboptimal solution. Consequently, the majority enter the group discussion favouring a

suboptimal solution, which then biases the ensuing group discussion in an unfavourable direction. Individuals are also very confident in the accuracy of that suboptimal solution. This research tests whether a mental simulation can reduce individuals' confidence levels in their initial suboptimal preference, which may cause them to interrogate it and revise it.

Cognitive Biases, Confidence and Mental Simulation

Cognitive biases and group member confidence

Cognitive biases - cognitions or mental behaviours that can lead to prejudiced decision-making (Arnott, 2006, p.59) - are inherent in human reasoning. Arnott highlighted *confidence biases* as particularly damaging: they increase a person's belief in their own ability as a decision-maker and curtail the search for new information relating to the decision task. Block and Harper (1991) noted that "cognitive conceit", including overconfidence in ones decision-making abilities, could decrease the likelihood of an individual seeking out potentially important information. Both could adversely affect the search for unique information, so important to optimal decision outcomes in HP tasks. Thus, reducing confidence may be one key to attenuating the IPE, if it can lead to improvements in information search and application.

Mental Simulation

Our research tests a mental simulation intervention in an HP hiring task in two individual online studies. Mental simulation - "imitative cognitive constructions of an event or series of events" (Gaglio, 2004. p.537) - has been shown to have important psychological and behavioural effects. Crisp *et al.* (2011) noted, "mental simulation is an essential element of the human experience and . . . a correspondingly critical component of behavioural change strategies" (p.261). The use of mental simulation gained prominence in the sports fields (e.g. Feltz & Landers, 1983) and health domains (e.g. Greitemeyer & Würz, 2006) and it has

proven effective across many psychological domains, for example, prejudice, (e.g. Crisp & Turner, 2012); and social judgments (e.g. Hopthrow *et al.*, 2017).

Counterfactual thinking

In Hidden Profile group decision-making, counterfactual thinking, (i.e. thoughts of what might have been, invoked by an event that nearly occurred), has achieved some positive results on decision quality, (e.g. Galinsky *et al.*, 2000; Galinsky & Kray, 2004). A "what-if" scenario, wholly unconnected to the decision task the group and its members faces, is the mechanism through which a Counterfactual Mindset ("CFM") has been induced in this research. Typically, participants read about "Jane", who goes to a rock concert and sits in a designated seat. At some point she moves, a raffle is then drawn and either Jane wins a prize on the basis of her new seat number or does not win a prize but *would have* won had she remained in her original seat. Participants are asked to write down some of the "what-if" thoughts Jane might experience after the concert. The underlying theory maintains that perception and explanation of counterfactual alternatives (i.e. what if Jane had moved/not moved), primes a mental simulation mindset where converse alternatives are considered. This establishes a CFM that can be transferred to subsequent, unconnected tasks, bringing beneficial outcomes as a consequence of the ability to consider alternative outcomes. It is the *process* of thinking counterfactually, not the content/direction of counterfactual thoughts, that affects information sharing during [group] decision-making.

Other research has, however, cast doubts on the positive efficacy of priming a CFM in HP tasks. For example, Liljenquist *et al.* (2004) found activating a CFM at the individual level negatively correlated with decision accuracy in HP groups and did not increase the number of shared and unique clues mentioned. Ditrich *et al*. (2019) found the interaction of a CFM X interpersonal focus prime led participants to display stronger bias in communication and preference towards their initial candidate preference, (i.e. effectively *amplifying* the IPE).

This highlights a continuing need to research more and effective mental simulation interventions in HP decision-making, providing the rationale for our studies.

Mental simulation versus counterfactual thinking

The mental simulation we introduce differs from priming a CFM in several key ways, making it a new, untested approach to solving Hidden Profile tasks. Our mental simulation is *not* disconnected from the decision task, as with a CFM; participants mentally simulate *directly* about the Hidden Profile decision task itself. Mentally simulating the experience directly serves as a substitute for the corresponding experience (Kappes & Morewedge, 2016), evoking similar cognitive, physiological/behavioural consequences as having the real experience.

Our mental simulation also relies on prospective hindsight (Mitchell *et al*., 1989). In this, it resembles a Premortem (Klein, 2003, p.98-101), a form of mental simulation previously identified as a way to overcome bias in organizational decision-making (Hunt *et al.*, 2015), (although not, to our knowledge, empirically tested). Participants are asked to generate an explanation for a future event as if it had already happened – they go forward in time and then look back – unlike a CFM, which requires past reconstructions of unconnected events. In our mental simulation, the future event is also made certain – participants are told that the hiring decision they made has been a failure and asked to identify reasons why. The explanation is about what *actually* happened – rather than what *might* have happened. Mitchell *et al.* asserted that this could possibly engender more effort, since participants worked harder to explain a sure event more thoroughly than an uncertain one.

As highlighted, participants in our studies are told that the hiring decision they have made has been a failure. This approach differs from many mental simulations, which invoke a positive outcome. Simulating the achievement of a desired outcome/behaviour can make people feel better and *less likely* to work towards difficult goals or outcomes (e.g. Kappes &

Oettingen, 2011). Kappes and Morewedge (2016) noted that "simulating an undesired action may sometimes do more to prevent than produce it" (p.415). Simulating failure may make decision-makers work harder to avoid it.

Klein (2003) notes that when people scrutinize their own plans, they are usually *not* looking to find any problems and are already biased in favour of the plan – confidence biases are rife (i.e. the plan is "ours", so it must be good (Brown, 1986)). Russo and Schoemaker (1992) suggested a number of mechanisms to combat overconfidence: (i) *accelerated feedback*: using a known outcome to get immediate feedback on the decision; (ii) *counterargumentation*: thinking up reasons why initial beliefs might be wrong; (iii) *paths to trouble*: identification of all paths to a specific fault or problem, including listing additional causes of the problem; and (iv) *paths to the future*: explicit scenario analysis setting out how the future might play out in one or other specific direction. The mental simulation tested here incorporates all of these mechanisms: having asked decision makers to look into the future: they are given immediate feedback (i.e. *accelerated feedback*) that their anticipated decision has failed and are asked to generate reasons for this (i.e. *counterargumentation*; *paths to trouble*) and potential solutions (i.e. *paths to the future*). Applying this to individual decision-making, we anticipate that mental simulation will have a significant positive effect on overconfidence in individual decision-makers by leading them to interrogate and reconsider their initial Suboptimal Candidate selection. Specifically, our studies test whether the mental simulation attenuates the IPE by: (i) improving individual decision quality, so participants switch their selection to the Optimal Candidate; and (ii) reducing confidence in the individual participants' initial Suboptimal Candidate selections.

Overview and hypotheses

Study 1 introduces and tests an entirely new approach to solving the Hidden Profile, examining whether a mental simulation intervention can attenuate the IPE. Study 2 replicates

Study 1, but with a participant sample required to be in full-time employment (not specified for Study 1). Both studies deployed a mixed design, involving a candidate selection task, with two information (between) conditions: (i) Manifest Profile (MP); (ii) Hidden Profile (HP); and two intervention (between) conditions: (i) Mental Simulation (MS); and (ii) Control (see Procedure below). Time was the within condition, for candidates in both conditions. Participants in the MP condition had two decision points: Final Decision Point (MP1), based on viewing full candidate information, aggregated in one bullet-point list, *prior* to the MS/Control task; and Final Decision Point (MP2), f*ollowing* the MS/Control task. Participants in the Hidden Profile Condition had three decision points: Initial Decision Point – based on viewing partial candidate information; Final Decision Point (HP1), based on viewing full candidate information distributed across four separate lists *prior* to the MS/Control task; and Final Decision Point (HP2) *following* the MS/Control task. (Table 1 below).

[Insert Table 1 Here]

For Study 1 and 2 we hypothesized the effects of the MS Intervention as follows:

H1: HP participants in the mental simulation condition making an initial Suboptimal Candidate selection will evidence significantly better decision quality, selecting the Optimal Candidate (A), following a mental simulation intervention. No significant difference for HP Control participants.

H2: HP participants in the mental simulation condition will be significantly less confident in the Suboptimal Candidate (C) as 'best for the job' following a mental simulation intervention. No significant difference for HP Control Participants.

H3: HP participants in the mental simulation condition will be significantly more confident in the Optimal Candidate (A) following a mental simulation intervention . No significant difference for HP Control Participants.

Study 1

Method

Participants and Design

One hundred and sixty participants recruited from Prolific Academic took part in the experiment in return for a small monetary payment (78 males, 81 females, one undeclared; age range 18-63, M_{age} = 34.14, SD = 10.22). The only stipulated criterion was that participants should be minimum age 18. Power analysis for a one-tailed chi-square test was conducted in G-POWER and determined a sufficient sample size of 36 using an alpha of 0.05, power of 0.80 and a medium effect size (w = 0.3) (Faul *et al.,* 2013). Note: we recruited for a larger participant sample in *both* studies to allow for the expected number of exclusions of participants in the Hidden Profile condition who failed the manipulation check (i.e. by not selecting (or maintaining their selection of) the Suboptimal Candidate (C)).

Design was a mixed 2 (Information Condition: Manifest Profile (MP) *vs.* Hidden Profile (HP)) X 2 (Intervention Condition: Mental Simulation (MS) *vs.* Control) X (2) (Time: Final Decision Point (1), Final Decision Point (2) experimental design, with Decision Point as the within participants factor.

Materials

The HP decision task material was adapted from Baker (2010). Participants were asked to choose between three candidates – (A), (B) and (C) - for the position of president of a new campus of a university. Participants received a brief description of the job and key selection criteria: each candidate had 16 items of information drawn from interviews, references, personal observations, etc. Information described Candidate (A) as the optimal candidate for the role (eight favourable, four neutral, four unfavourable characteristics); Candidates (B) and (C) each had four favourable, eight neutral, four unfavourable

characteristics. All participants received full information on each candidate before making their final candidate choice.

Procedure

The study was presented online, using a specially designed individual online decision-making tool created within the survey software (Nicholson *et al.,* 2019 (unpublished)).

Manifest profile (MP).

Participants in the MP condition viewed a one-page list setting out full candidate information in bullet form, beginning with information about Candidate (A), then (B), then (C). Participants were told their information was identical to their fellow, (fictitious) group members and asked to make one individual candidate selection decision based on the full information held by them (MP1).

Hidden profile (HP).

Participants in the HP condition firstly made an initial selection, based on viewing partial candidate information on one single list, either W, X, Y, Z (presentation was randomized). Following this, they viewed their own information again, plus the information of their 'fellow group members' (they were told this information was not necessarily the same) – all lists W, X, Y Z (randomized presentation) - and were asked to review their initial candidate selection, specifically whether they wanted to maintain or change that selection. This constituted their Final Decision Point before the Intervention (HP1).

Intervention/Control task.

Participants then undertook an online MS or Control task. In the MS condition, participants were firstly asked to imagine they had proceeded with the hiring of their chosen candidate and that we were "fast-forwarding" to the candidate's 12-month probationary review. They were told the last year had gone badly, resulting in poor organizational outcomes. Participants were asked to identify all of the reasons they could think of as to why

this had occurred, based on the candidate attributes, and to briefly note these, typing their responses directly into the online survey. Next, participants briefly noted any potential solutions to the situation they could derive from the candidate information (again, typing responses directly into the online survey). They were told these solutions could be based on the attributes of their chosen candidate, for example, management training, presentation training, etc., or that they could also consider attributes which the other two candidates (who, they were told, were both still available for hire) might better bring to bear on the problems identified.

Participants in the Control condition undertook a word task and were asked to type into the online survey as many different words as possible summarising their experiences of providing data as a participant in psychological studies.

Participants were then asked to consider carefully whether they wished to approve and retain their candidate post-probation, or amend their selection.

Measures

Decision quality.

Decision quality was a dichotomous measure, based on whether participants selected the Optimal Candidate (A) (coded 1) or a Suboptimal Candidate (coded 0).

Participant confidence in suboptimal/optimal candidate.

The second dependent variable was participant confidence in the Candidates. Participants were asked to record their level of confidence in each candidate immediately prior to and after the Control/MS Intervention, responding to the statement "*I think Candidate A/B/C would be the best person for the job*", on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). We included this measure to understand how (i) the IPE and; (ii) the MS intervention, might affect participant confidence levels in the Optimal and Suboptimal Candidates.

Following completion, participants were thanked and debriefed in the survey software.

Results

Pre-Intervention/Control Task

The Suboptimal Candidate (C) manipulation was successful for participants in the HP condition. After viewing partial information, 80.95% of HP participants initially preferred Candidate (C), χ^2 (2, N = 84) = 86.86, p <.001 over Candidate (A) (4.76%) and Candidate (B) (14.29%.)

Participants in the MP Condition overwhelmingly selected the Optimal Candidate (A) (82.89%) after viewing the full candidate attribute list, χ^2 (2, N = 76) = 84.94, p <.001, over Candidate (B) (3.95%) and Candidate (C) (13.16%).

Finally, we examined the Final Candidate Selection for Hidden Profile (HP) participants - after viewing *all* candidate information across the four separate lists. The Chi-square test remained significant, χ^2 (2, N = 84) = 16.36, p < .001. The Optimal Candidate (A) was preferred by 39.29% of HP participants following viewing all candidate attributes, versus Candidate (B) (13.10%) and Candidate (C) (47.62%).

These findings were as anticipated: most participants in the Manifest Profile condition selected the Optimal Candidate (A), whereas in the Hidden Profile condition, most selected the Suboptimal Candidate (C) as suggested by the initial presentation of information, and maintained that suboptimal selection, even after viewing full information.

Following the analytic approach of Faulmüller et al. (2010) and Toma & Butera (2009), 16 participants in the HP Condition were excluded from the individual analysis because they failed the HP Suboptimal Candidate manipulation after viewing only partial information, (i.e. they did not select Candidate (C)). This left 144 participants in the analysis, split between experimental conditions as follows: MP: N = 76; HP: N = 68. .

In order to assess the effectiveness of the online decision-making tool in triggering the IPE and successfully orientating participants towards the Suboptimal Candidate (C), we firstly ran a series of pre-tests in both Study 1 and 2, to answer the following questions:

1) Did more participants in the MP Condition select the Optimal Candidate (A) than in the HP condition, after viewing full candidate information?

2) Did more participants in the HP Condition select the Suboptimal Candidate (C) than in the MP condition, after viewing full candidate information?

3) Were HP participants significantly less confident in the Optimal Candidate (A) as 'best for the job' versus MP participants, after viewing full candidate information?

4) Were HP participants significantly more confident in the Suboptimal Candidate (C) as 'best for the job' versus MP participants, after viewing full candidate information? Findings from these pre-tests for both studies are summarised in Table 2.

[Insert Table 2 Here]

Pre-testing supported our premise that our online decision-making tool induced the IPE and was a suitable task to test the efficacy of the mental simulation intervention.

Post Intervention/Control Task

We tested our specific directional hypothesis regarding improvements in decision quality for participants in the Hidden Profile condition following the Mental Simulation, isolating the effect to participants who initially preselected and maintained their Suboptimal Candidate (C) selection after viewing full candidate information. Since we are interested in testing the ability of the intervention to attenuate the IPE, we argue this is a reasonable approach: participants who made the correct selection having viewed all information cannot be operating under the influence of the IPE. Nor are participants in the Manifest Profile condition, who viewed all candidate attribute information presented on one page. This left 39

participants for analysis: 20 and 19 in the Control and MS conditions respectively. This subset of the data was used to test H1-H3.

Information processing: decision quality

H1 was supported by the data: 31.57% of HP Intervention participants switched from the Suboptimal (C) to Optimal Candidate (A) after the MS, solving the Hidden Profile, compared to 0% in the Control condition. We analysed the difference in decision quality pre and post the Intervention in a McNemar's test. There was a significant difference in the MS condition, $p = .031$. The intervention attenuated the IPE, evidencing a positive effect on individual decision quality.

Decision quality – manifest profile condition.

For completeness, we examined the effect of the intervention on decision quality in the MP condition, comparing the number of participants who selected Optimal Candidate (A) prior to and after the MS/Control task. In the MP/MS condition, 31 participants selected the Optimal Candidate prior to the Intervention and 26 participants afterwards, a non-significant reduction, $p = .125$. In the MP/Control condition, 32 participants selected the Optimal Candidate prior to the Control task and 34 afterwards, $p = .500$.

Decision Confidence

Participant confidence in suboptimal candidate (C) – HP condition.

H2 was supported by the data. HP participants in the MS condition were significantly less confident in Suboptimal Candidate (C) as 'best for the job' following the intervention. A paired samples t-test was significant, $t(18) = 5.14$, $p < .001$. There was no significant difference in the HP Control condition, $t(19) = -.70$, $p = .494$.

Participant confidence in optimal candidate (A) – HP condition.

H3 received only very weak support in the data: HP participants in the Mental Simulation (MS) condition were marginally more confident in Optimal Candidate (A)

following the intervention. A paired samples t-test was marginally significant, $t(18) = -1.79$, $p = .090$. There was also a marginally significant difference in the HP Control condition, $t(19) = -2.04$ $p = .055$. (See Figure 1).

[Insert Figure 1 Here - Landscape

For completeness, we also analysed and summarise in Table 3 results for the MP condition for these same measures (Study 1 and 2):

[Insert Table 3 Here]

Study 2

Overview and hypotheses

In Study 2, we wanted to test whether the effect of the mental simulation intervention could be replicated and generalized to a sample population *required* to be in full-time employment. This was not a requirement in Study 1- although of course, we recognise that some participants in that Study may have been in full-time employment (employment data was not gathered).

Furthermore, although the primary aim of Study 1 was to test the mental simulation intervention against the IPE in the Hidden Profile condition, analysis of results in the MP condition suggested an unintended consequence of the intervention (Table 3): MP participant confidence in the Optimal Candidate (A) was significantly reduced and a [non-significant] number of MP participants switched their selection from the Optimal to Suboptimal Candidate following the intervention. Given that the intervention borrows from the Premortem (Klein, 2003) which has achieved success as a confidence reduction technique (Veinott *et al.*, 2010), this result is, perhaps unsurprising. We therefore wanted to test whether the intervention would have a similar effect in a second study.

Hypotheses for Study 2 were identical to Study 1.

Method

Participants and Design

Two hundred and eighty participants recruited from Prolific Academic took part in the experiment in return for a small monetary payment (142 males, 133 females, five undeclared; age range 20-64, M_{age} = 34.29, SD = 9.26, one undeclared). Minimum age was stipulated as 18; exclusions were participants who undertook the previous studies and we specified eligible participants must be in full-time employment. We applied the Study 1 power analysis augmented as before. Design, materials, procedure and measures were as Study 1.

Results

Pre-Intervention/Control Task

Results replicated Study 1:

(i) The Suboptimal Candidate (C) manipulation was successful for participants in the HP condition. Following partial information: 76.87% of HP participants initially preferred Candidate C, χ^2 (2, N = 147) = 125.43, p <.001 over Candidate (A) (12.24%) and Candidate (B) (10.88%).

(ii) Participants in the MP Condition overwhelmingly selected Optimal Candidate (A) (80.45%) after viewing the full candidate attribute list. The Chi-square test was significant, χ^2 (2, N = 133) = 132.92, p <.001. Candidate (B) = 9.02% and Candidate (C) = 10.53%.

(iii) Finally, we examined the Final Decision Point Candidate Selection for Hidden Profile (HP) participants - after they had viewed all candidate information across the four separate lists. The Chi-square test remained significant, χ^2 (2, N = 147) = 34.16, p < .001. Optimal Candidate (A) was preferred by 41.50% of HP participants, versus Candidate (B) - 10.88% and Candidate (C) - 47.62% (by chance, this was identical to Study 1).

As in Study 1, 34 participants in the HP Condition were excluded from the individual analysis for failing the HP suboptimal candidate manipulation. This left 246 participants in the pre-test analysis, split as follows: MP: N = 133; HP: N = 113.

Pre-testing was completed as for Study 1 (Table 2).

Post-Intervention/Control Task

Following pre-testing, we applied the same exclusionary criteria to participants who did not maintain the Suboptimal Candidate (C) selection. This left 66 participants for analysis: 36 and 30 in the Control and Mental Simulation conditions respectively. This subset of data was used to test H1-H3.

Information Processing: Decision Quality

H1 was supported by the data: HP participants who underwent the mental simulation switched to the Optimal Candidate (A) significantly more frequently than HP participants who completed the Control task: 20% of HP MS participants switched from the Suboptimal Candidate (C) to the Optimal Candidate (A), solving the Hidden Profile, compared to 8.33% in the HP Control condition. A McNemar's test revealed no significant difference in the Control condition, p = .250, and a significant difference in the MS condition, p = .031. The Intervention attenuated the IPE, evidencing a positive effect on decision quality.

Decision quality – manifest profile condition.

As in Study 1, we examined the effect of the intervention on decision quality in the MP condition. In the MP/MS condition, 50 participants selected the Optimal Candidate (A) before the intervention and 43 following the intervention, a non-significant reduction, p = .189. In the MP/Control condition, 57 participants selected Optimal Candidate (A) before and 56 after the Control task, p > .999.

Decision Confidence

Participant confidence in suboptimal candidate – HP condition.

H2 was supported by the data: HP participants in the MS condition were significantly less confident in Suboptimal Candidate (C) as 'best for the job'. A paired samples t-test was significant, $t(29) = 3.13$, $p = .004$, with no significant difference in the HP Control condition, $t(35) = .15$, $p = .881$. (Figure 1).

Participant confidence in optimal candidate – HP condition.

H3 was supported by the data: HP participants who underwent the MS intervention were significantly more confident in Optimal Candidate (A) as 'best for the job'. A paired samples t-test was significant, $t(29) = -2.10$, $p = .045$. No significant difference was found in the HP Control condition, $t(35) = -1.54$ $p = .132$ (Figure 1).

Discussion

The experimental studies reported in this paper introduced and tested an entirely new approach to solving the Hidden Profile. Our aim was to examine whether a mental simulation intervention could attenuate the Individual Preference Effect, as a means of (i) improving individual decision quality amongst participants undertaking an online Hidden Profile decision task; and (ii) positively affecting participant confidence in the Optimal and Suboptimal Candidates. Most Hidden Profile interventions have been focused at group level, but we contend there has been insufficient focus on the individual group members, specifically, attenuating the IPE as a means of improving decision outcomes. Previous research (Gigone and Hastie, 1997) noted: "It was as if the group members exchanged and combined their opinions but paid little attention to anything else" (p.132). A 'vicious circle' is thus created, with the initial individual suboptimal decision at the start of it. The challenge is how to break this and the mental simulation tested here, against individual decision-makers, offers one way.

It seems we cannot help but reject opinions and information which contradicts our own – which may offer one explanation for the IPE and individuals' inability to shift from their initial preference in Hidden Profile tasks. A recent study of participant reaction times by Gilead *et al.* (2019) offers support for this idea. Gilead *et al.* found that the acceptance (rejection) of confirmatory (contradictory) opinions can occur rapidly and involuntarily. Participants made faster verifications of grammaticality of a statement when it matched their opinion: when a participant agreed with a stated opinion, it had a rapid and involuntary effect on how they cognitively processed it. This is particularly problematic, since the challenge in Hidden Profiles is for individuals to integrate and process *alternative and contradictory* information and viewpoints during group discussion, *despite* their pre-formed opinions. Accordingly, any intervention must find a way to allow – or force – individual group members to allocate more cognitive resources to the processing of preference inconsistent information, leading to a successful de-biasing of their opinion.

Across both studies, participants in the Hidden Profile condition who underwent the mental simulation: (i) demonstrated improvements in decision quality, selecting Optimal Candidate (A) more frequently following the intervention; and reported (ii) increases in confidence in Optimal Candidate (A), and; (iii) decreases in confidence in Suboptimal Candidate (C) as 'best candidate for the job'.

Mental Simulation – a powerful intervention?

There appear to be several reasons why the Mental Simulation may successfully achieve these effects. Firstly, it incorporates the cognitive remedies to overconfidence identified by Russo and Schoemaker (1992) and explained earlier in this paper. Second, imagining the failure of the Suboptimal Candidate (C) may highlight their unique (hidden) negative attributes, offsetting them against their minimal positive attributes, which are often repeated. Lightle *et al.* (2009) noted individuals were less likely to recall negative

information about their pre-discussion preferred candidate, relative to neutral information. The combination of our results on participant confidence in the Suboptimal Candidate (C) and improved decision-quality, suggests HP participants who underwent the Mental Simulation identified and applied newly acquired knowledge of the negative attributes of the Suboptimal Candidate to their decision-making processes, enabling them to disconfirm their initial suboptimal selection. Faude-Koivisto *et al.* (2009) noted that mental simulations can result in the generation and consideration of additional alternatives by enhancing open-mindedness, due to the ability of mental simulation to create an "exploratory mind set" (p.74). Future studies could untangle this through the addition of a candidate attribute recall task, occurring after the Intervention.

Third, the premise of the Mental Simulation, as applied in these studies, is that participants are asked to imagine the decision they have taken has gone badly wrong, resulting in poor organizational outcomes. This enables them to mentally simulate the failure of their decision, then solve to overcome that failure. We speculate that the impact of directly simulating a failed decision may have a more profound impact on decision-makers that priming a counterfactual mindset. Steinmetz *et al.* (2017) found that mentally simulating a visceral state (thirst) had a more profound effect than simply priming that state. By telling our decision-makers that their decision had failed, we provided them with an opportunity to mentally simulate that failure, and with an opportunity to correct it. Of course, the failure is not real – the mental simulation offers a proxy for the decision failure. Simulating possible future obstacles/challenges also provides an opportunity to plan to overcome and/or avoid them (Taylor *et al.,* 1998).

Fourth, the mental simulation incorporates "prospective hindsight", defined as "generating an explanation for a future event as if it had already happened" (Mitchell *et al.,* 1989, p.25). As noted earlier, this can lead participants to think differently when the future

event is ‘certain’ rather than ‘may be’. Mitchell at el. manipulated certainty of an outcome and found participants generated more reasons when asked to explain outcomes presented as certain, versus uncertain. They also concluded that participants thought *differently* about such events, although could not conclude that prospective hindsight led to the generation of *superior* explanations for the event. In our studies, participants were asked to specifically imagine they had proceeded with the hiring of their first ranked candidate and to look forward 12-months. They were then presented with a picture of everything that had gone wrong during that time-frame and asked to note all of the reasons why this might have happened. The generation of these reasons should lead to the emergence of more unique information.

Limitations and future directions

A limitation of these findings is the unlooked-for effect on confidence and decision quality for MP participants who underwent the mental simulation. As noted, the Premortem, on which the mental simulation is based, has achieved success as a confidence reduction technique (Veinott *et al.,* 2010). These results underscore that. Although the reduction in the number of participants in the Manifest Profile condition selecting Optimal Candidate (A) following the intervention was *not* statistically significant, it is notable and must be acknowledged as a limitation of the intervention. Furthermore, MP participants who underwent the mental simulation reported significant reductions in confidence in Optimal Candidate (A). It is possible that a group discussion could ‘soften’ the impact of the mental simulation at the individual group member level, achieving the positive benefits we are looking for, without the ‘downsides’. Similarly, more experienced decision-making groups may be less ‘shaken’ by the failure frame of the mental simulation and therefore less inclined to make a complete ‘about turn’. This could be tested in future research.

In summary, we believe our results with individual decision-makers are important in the context of interventions to improve group decision-making research. Faulmüller *et al*.

(2012) found participants showed a discussion bias favouring preference-consistent information without *any* incentive for biased communication, consistent with Gilead *et al*'s. (2019) findings regarding involuntary rejection of alternative and contradictory information and opinions noted above. The Mental Simulation attenuated the IPE, increasing the likelihood of individuals entering the group discussion favouring the Optimal versus Suboptimal Candidate. This should lead the group towards greater discussion of the Optimal Candidate, with more positive, unique information shared about that candidate, improving group decision-making outcomes. These studies open up a new and exciting line of research for the role of mental simulation in Hidden Profile decision tasks, offering a promising response to Greitemeyer & Schulz-Hardt's (2003) admonition that "interventions should . . . be directed at debiasing . . .group members' individual information processing" (p.337). Future research should build on these results by testing the mental simulation in face-to-face decision-making groups.

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