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Center-of-inattention: Position biases in decision-making ☆

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Abstract

This paper examines centrality of physical position as a cue that leads to systematic biases in people's decisions to retain or eliminate a participant from a group. Termed the "center-stage" effect, we argue that people use their belief that "important people sit in the middle" as a schematic cue that they substitute for individuating performance information for individuals who occupy central positions when the goal is to eliminate all but one of the group members. This leads to the errors of those in center-positions being overlooked: or making them the "centers-of-inattention." Study 1 examines people's lay beliefs regarding positions using two stylized placement tasks (a group interview and classroom seating scenarios). These suggest that people believe that more attention is paid to those in the center than those on the extremes. Study 2 tests the center-stage effect using observational data from a real television show, *The Weakest Link*. Results show that players assigned at random to central positions are more likely to win the game than those in extreme positions. Study 3, a laboratory experiment manipulating attention paid to the game shows that observers overlook the errors of players in the center to a greater extent than the errors of players in extreme positions. Study 4 replicates the game in the laboratory with direct process measures to show that players playing the game make the same error. Study 5 shows that in a stylized group interview setting, participants who believe that "important people sit in the middle" find the performance of candidates in the extreme position easier to recall than the performance of those in the central position, and are more likely to choose them. Study 6 shows that the "center-stage" effects are weaker when the end-game rule allows for two (vs one) contestants to be retained. Overall results converge to show that the use of the "center-stage" heuristic substitutes for the effortful processing of individuating information, leading to a biased (favorable) assessment of people in the center. Implications for decision-making are discussed.

Keywords: Perceptual biases; Salience effects; Performance appraisal; Visual information processing

Have you ever wondered whether you are more likely to call on a student sitting in one side of a classroom as opposed to another? Whether your choice of candidate in a group interview was affected by who was sitting where? Or whether your child was evaluated as worse than s/he was on the sports field or stage audition during tryouts because of where s/he was standing or when s/he tried-out? The study of location effects is an important question because a number of evaluations (e.g., class participation grades) and decisions (e.g., choice of person) are made about a specific object located in the spatial context of a larger group.

To the extent the location of an object or individual confers a systematic advantage or disadvantage on the object's or individual's chances of being chosen or evaluated positively, there may be a bias in decisions as di-

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verse as hiring, retention, and promotion. This paper examines the relative advantage or disadvantage of central positions versus extreme positions in an array. We investigate whether the physical position of an individual in a group affects the manner in which the individual's performance is assessed, and how it affects decisions to retain or eliminate the individual. The three theoretical questions we ask are: (i) Does the position of a person in an array affect a person's chances of retention; (ii) Does the central position have an advantage over the extreme position; and (iii) Why does a center-effect exist, if it does? These questions are framed in a decision context, where the goal is to identify the best performing individual in the group and eliminate the others.

Across studies, there is evidence that people believe that those in central positions are better—a heuristic we refer to as the "center-stage" heuristic. It does not appear that this heuristic operates because people in the center are paid more attention: in fact, their performance level is no more accurately reflected in judgments about them than any other position. It also does not appear that the errors of people in central positions are more likely to be discounted by being attributed to situational constraints. However, it appears that people use the "center-stage" heuristic as a substitute for directing attention at aspects of individual performance. As the task goal is to identify the strongest of a group and eliminate the weaker member of the group, this translates into people paying less attention to the errors committed by people in central positions. We argue that this is not a non-contingent expectancy disconfirmation effect, where the errors of a person with a more positive prior are more salient than the errors of a person with a less positive prior as they are inconsistent with prior expectancy. Instead, we propose that it is a "schema substitution" pattern where stereotype consistent information is used instead of individuating information about a person (Fiske & Neuberg, 1990). This pattern implies that those who believe in the "center-stage" heuristic appear to substitute their beliefs that those in the center are good performers (their "schema") for individuating information regarding the players' actual performance.

The primary theoretical contribution of the paper is to document that there exists a location advantage of being in the central versus extreme position in a group: the "center-stage" effect. More importantly, it identifies that the cause of this bias is due to limited attention to the errors of those in the center because assessors are more likely to substitute their "center-stage" schema for individuating information. When the goal is to eliminate all underperforming players but one (i.e., to focus on players' errors), the substitution of the schema for individuating attention leads to overlooking the errors of those in the center and confers them with an advantage. They are the "center-of-inattention."

Following a brief literature review, we summarize the various routes through which a center-stage effect could manifest and develop the "center-of-inattention" hypothesis. We then describe the six studies conducted to test the effects. Theoretical implications for how people process visual information and the effect of location on salience and attention are discussed.

Literature review

Prior research on people perception has not only shown inconclusive results but has also not disentangled why these effects occur when they do (e.g., McArthur, 1981; Taylor & Fiske, 1975). There are a number of possible reasons why a position effect on people perception (favoring the center) may exist, if it does. These are grouped under "salience effects," "attributional effects," and "social norms" and are described below in the context of a task where the goal is to identify the best performer in a group.

Salience effects

Human beings are notorious for being imperfect observers (for a review see Fiske & Taylor, 1989). A rich literature in cognitive and social psychology and behavioral decision theory has listed numerous biases in perception of events and others' behaviors, causes, and correlations. The overarching explanation for processing errors is effort-accuracy tradeoffs that mitigate the need for an observer to undertake comprehensive processing under conditions of low motivation, ability, or opportunity (Fiske & Taylor, 1989). For instance, sampling individually salient cases allows for task simplification more than the use of the entire population of information available to make a judgment.

Vividness and salience of stimuli are defined as the aspect of a stimulus that makes it stand apart from other similar stimuli due to either its inherent characteristics or its context. There is a large literature in social psychology on the antecedents and consequences of salience effects (Fiske & Taylor, 1989). Fiske (1980) found that negative behaviors were more salient than positive behaviors, and extreme behaviors were more vivid than moderate behaviors (see also Skowronski & Carlston, 1989). This salience makes the behaviors more likely to be attended to, recalled, and used in an information aggregation task such as attitude formation on the basis of multiple sources of information. For example, manipulations of the salience of a subject's behavior compared to the situation surrounding that behavior affects judgments of a victim's blame for a robbery (Graves & Lowe, 1983), degree of coercion behind a confession (Lassiter & Irvine, 1986), an actor's achievements (Banzai, 1983) and the meaning of people's social

behavior (Dovidio & Ellyson, 1982; Ellis & Holmes, 1982).

It has been argued that the salience of the actor's environment has a greater influence than the salience of the actor himself/herself in attracting attention (McArthur & Post, 1977). Some of the environmental factors that have been shown to be attention-getting include movement, brightness, warm-colors, and complexity, as well as how near the stimulus is to the perceiver (Berlyne, 1970; McArthur & Post, 1977). Variations in the level of attention appear to alter the meaning of another person's behavior.

If people pay more attention to the salient center position, their judgments should best reflect these candidates' performance (Fiske & Taylor, 1989). This could translate into a position effect favoring the center if people in central positions performed as well as (or worse than) those in other positions, but their good performance was attended to more, leading to it translating into more favorable evaluations. If salience of a position increases attention to actual performance, and this is the route through which position effects manifest, recall measures should show that the performance of players in the center is easier to recall than the performance of players in non-central positions.

Our findings do not support this account. Study 4 shows that the closer the position is to the center, the greater the recall estimation error. Study 5 shows that people find it more difficult to recall test scores of people in the center position. Study 6 shows that the performance of players in the center is overestimated while that of players in the extreme positions is accurately estimated.

Attributional effects

Prior literature has documented that a target's relative location in a group context matters. Silverstein and Stang (1976) examined the effect of seating position in natural interactions between people. They found that subjects with greatest visual centrality spoke most often. Location preferences have also been shown to be non-random. For example, a study of 4th grade children's choices showed that those who chose to sit on the instructor's right hand side performed better on a spelling test than those who chose to sit on the left (Morton & Kershner, 1987). These effects could be a manifestation of a self-selection bias (i.e., those who performed better chose the "better" positions). However, it may also be a self-fulfilling effect if, as a consequence, the better performers chose positions that were more salient, were evaluated more favorably, leading to centrality of position being identified with better performance.

The effects also manifest when random assignment to positions eliminates any self-selection effect. Prior research indicates that there is a strong tendency for people observing a social interaction to perceive a given individual as increasingly influential or causal as he or she becomes more visually salient. One of the most pertinent experiments on this topic manipulated seating arrangement of a group of individuals (Taylor & Fiske, 1975, Study 1). They found that a participant in the group (in reality the player was an experimental confederate) was perceived as more causal to the group outcome to the extent s/he faced the subject. In a similar study, Taylor, Crocker, Fiske, Sprinzen, and Winkler (1979) found that highly salient actors who were sitting facing a perceiver were evaluated as friendlier and received higher rating than a non-salient actor whose back was to them (Study 1), and that highly involved perceivers found the actor facing them to be more prominent than another actor who was less salient (Study 2). On this basis, we expect individuals in the center of an array to have an advantage over those who are not in central positions.

If people attribute failures (or poor performance) by candidates in the center to situational constraints rather than personal ability more so than they do to players in other positions, this would lead to these positions having an advantage. This would imply that poor performance was accurately encoded, but discounted while making an evaluation. If the reverse attribution error occurred, that is, people attribute that those in central positions are less affected by situational constraints then a position advantage favoring the center could exist if the good performance of people in central positions was translated into evaluations to a greater extent than the good performance of people in non-central positions (Taylor & Fiske, 1975). If attributional errors were to account for position effects, this would suggest that there would be no difference in the estimation accuracy of players by positions, or in the ease with which such information comes to mind, but merely in the extent to which such information is integrated into judgments. Studies 3–5 show that these conditions do not hold.

Social norms (direct) effects

An interesting finding across studies examining position effects is that attitude effects were only weakly mediated by subjects' recall, implying that higher attention to perceptually salient stimuli may not necessarily lead to higher recall of those stimuli. The weak effects of recall in these position studies led McArthur and Post (1977) to speculate that attention may not mediate these effects at all. They suggested that position effects may instead be due to cultural norms and schemas as in the real world, prominent people occupy center-stage (i.e., people facing an audience are more prominent than those with their backs to an audience and those who sit at the center of a table are typically the most important individuals at the table).

If people believe that the center position has better candidates, this should lead to a direct effect in preferring those candidates (McArthur, 1981). Such a mechanism would not necessarily implicate biases in information processing as we see from the results of Studies 3–6, but merely be the direct application of a heuristic that "Important [or good] people sit in the middle."

The next section develops our "center-of-inattention" hypothesis based on the indirect processing effects associated with having a schema regarding the "center-stage" heuristic (i.e., "that important people are in the middle"). This involves how the schema affects which people attention is directed to contingent on the goals of the task.

The center-of-inattention hypothesis

We revisit the issue of attention as a potential antecedent of position effects and suggest that differential levels of attention paid to players' errors in different positions affects their likelihood of being retained. The key issue of importance is that in certain tasks (such as promotions, retention, and hiring) observers or participants must attend to the errors of players (rather than just aspects of their good performance) to make decisions regarding which person to retain and which person to eliminate. When accurate recall is difficult due to the potential for information overload (large amount of information to be kept track of), attention level may be inferred by analyzing the judgments made on the basis of this potentially inaccurate recall. We propose that attention does affect position effects, but that the route through which it does is social norms regarding the placement of important people. The way in which social norms affect the manner in which attention is directed, could take either of the following forms:

Expectancy disconfirmation effects

When candidates do not conform to a prior positive expectancy, their errors loom large and this leads to unfavorable evaluations. This would imply that people in the center (who are believed to be better) would be penalized to a greater extent for errors committed (as this is inconsistent with the prior expectancy) than those in other positions. This would make them less likely to be selected. Study 2 shows the opposite pattern of results.

Stereotype consistency expectations and schema substitution

If people believe that those in the center are better than those in non-central positions, then they may substitute this schema instead of spending the resources to process individuating information about each of the candidates (Fiske & Neuberg, 1990). This implies that errors of players in the center may attract less attention. Candidates placed in the center may have their errors overlooked to a greater extent as compared to people in other positions who perform at the same level. This would lead to people occupying central positions to be more favorably evaluated, and be more likely to be retained rather than removed. This can be thought of as a "schema substitution" effect where people substitute a scheme that the "center is better" for individuating attention, overlook their inaccuracies, and confer them with an advantage.

This reasoning is in line with prior research (Fiske & Neuberg, 1990; Taylor & Thompson, 1982). Taylor and Thompson (1982) argue that vividness effects may occur only under conditions of differential attention. If attention affects position effects, then the effects should be ameliorated when attention is focused on all players in a group, rather than differentially allocated to certain positions within the group.

To test this, in Study 3, we hypothesize that under conditions when players are motivated to pay greater attention to other players' performance, the position advantage enjoyed by the center positions will be attenuated. Attention manipulations should not, however, affect the accuracy of performance recall for players whose errors are appropriately identified. Thus, if the pattern of data shows that higher levels of attention increase the accuracy of estimated performance for players in the central positions, but not in the extreme position, this would support an account that differential attention is an antecedent of position effects. Study 3 supports this account.

In Study 4, we show that the effects also occur when players are actually playing the game. In Study 5, we show that people who believe that "important people sit in the middle" are more likely to choose a person in the center for a job, but find that their actual test scores are more difficult to recall. Finally, in Study 6, we change the "end-game rule" to allow for two winners. We expect that this would reduce the need for observers to focus on the errors of players as compared to a situation when there is just one winner. Results show that the center-extreme advantage is attenuated when the objective of the game is not to identify the single best performer.

Thus, using different contexts, tasks, measures, and manipulations, six studies triangulate to the "schematic substitution" reason for position effects. Each of these studies is now described. Study 1 shows that people have lay beliefs consistent with the "center-stage" effect. Study 2 shows the favorable effect of being in the center for a real life situation: the television show "*The Weakest Link*." Studies 3–6 develop an explanation for the ef-

fect: they counter-intuitively show that a "center-stage" advantage is not because central positions attract greater attention but it is because they are believed to be occupied by good (or important) people, leading to the errors committed by people in these positions being overlooked: making them "centers-of-inattention."

Study 1: Stylized choice experiments: The "center-stage" schema

The purpose of these stylized choice experiments was to examine people's lay beliefs regarding the advantage of certain positions in different situations. Participants were undergraduates at two west-coast universities, University of California at Berkeley, and San Francisco State University, who undertook the study for partial course credit ($n = 188$). All participants were told to imagine a scenario and then make a choice regarding which position they would occupy or which position they believed another person would occupy. We used two different scenarios: one a choice of which seat to occupy during a group interview task. The other was a choice of which seat to occupy in a classroom under different goals (wishing to be called on, remembered, or not called upon). Despite the artificiality of the actual task, these scenarios closely resemble the decisions that the study participants make on a regular basis. Due to partial non-response to selected questions, some results may be based on a sample of less than 188.

Scenario 1

In this scenario participants were informed:

"You are taking part in a group interview. There will be three of you across the table from a group of interviewers, including the Chairman of the company, two brand managers, and two assistants. They are all of the same age, and dressed similarly. You do not know them from earlier, or recognize who is who. Below is a seating chart. (1) Place an X in the seat you will choose. (2) Place a C in the seat you think the Chairman will be sitting in. (3) Place two P's in the seats you think the two product managers are sitting in." We provided them with a configuration of five seats facing another three seats.

We expected the modal configuration chosen to be:

	P1	C	P2	

	X	

A total of 72 respondents (38.3%) chose this exact entire configuration of all the other possible configurations available ($^8C_4$ or 70 total configurations possible). Note that once a seat has been chosen for oneself out of the eight seats, there are only seven seats remaining that can be chosen for the CEO, and once a seat has been chosen for the CEO, there are only five seats remaining that can be chosen for the two product managers. Thus, later choices reflect dependency in the data. Despite this data limitation, results are as predicted.[2] Ninety-one of 185 participants (49.19%) chose to sit in the middle of the interviewee seats, facing a chairman whom they had placed in the middle of the interviewer seats (one of a possible 56 configurations). The choice of the product managers' seats also reflects this overall pattern[3].

To summarize, this stylized choice experiment shows that people have lay beliefs that the most important people are placed in the middle of a horizontal (or frontal view) display, and accordingly choose to leverage this by placing themselves in the middle of the array as well.

Scenario 2

In this scenario participants were informed:

"You are a student who has to decide where to sit in class. Below is a seating chart. (1) Place an X in the seat you will choose if you have not studied for the class. (2) Place a Y in the seat you will choose if you have studied well for the class and want the Professor to call on you. (3) Place a Z in the seat you will choose if you want to make sure the Professor will remember you in class.

Figs. 1A–C shows results for the three scenarios. These show that students prefer to choose the middle seats when they have prepared well for class, and would like the professor to call on them, but choose seats in the back and at the extreme ends of the classroom when they have not studied well for the class (all χ^2's > 100, p's $< .001$). This second stylized choice experiment uses a different domain to show that people have lay beliefs that central positions attract more attention than extreme ones.

Discussion

To summarize, results of the two stylized choice experiments show that people have lay beliefs that the

[2] Results show that 101/186 (54.3%) of the study participants chose to sit in the middle of the three interviewee seats. As many as 132/187 believed the Chairman would be sitting in the middle of the interviewer team (70.6%). The two positions flanking the middle interviewer seat were the modal seats chosen for the two product managers (116/178 or 65.2% and 108/171 or 63.2%).

[3] One hundred of 177 participants (of whom 125 had placed the CEO in the center), chose to place the first product manager on the immediate right hand side, and 99 (of 170 respondents, of whom 122 had chosen the CEO to be in the center) chose to place the second product manager on the immediate left hand side.

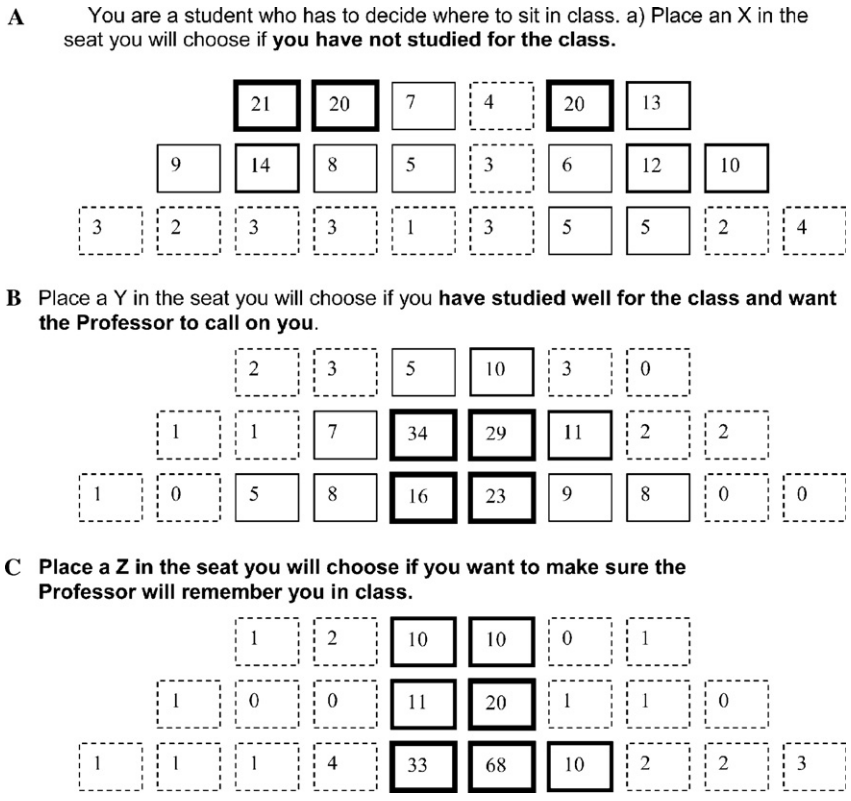

Fig. 1. Stylized choice task II: student seating chart.

more important/better performer a person, the more centrally positioned they will be; and the more attention they will attract. The next study examines the implications of such an effect using a real life scenario: a TV game show.

Study 2: Weak links in human performance perceptions

This study examines biases in voting behavior in a TV game show where players are assigned at random to different starting positions. The use of the television game serves as a natural laboratory to examine tenets of rational decision theory, which has strong precedents in the analysis of economic behavior with games such as *Jeopardy*! (Metrick, 1995), *The Price is Right* (Bennett & Hickman, 1993; Berk, Hughson, & Vandezande, 1996), *Card Sharks* (Gertner, 1993), and *Let's Make a Deal*, which was hosted by Monty Hall (Friedman, 1998). *The Weakest Link* is an ideal scenario to examine biases in the likelihood of a player making it to the final rounds of the game. As players are assigned at random to starting positions, the game allows for a truly experimental examination of the effect of player position on the likelihood of winning. In the context of *The Weakest Link* TV show, we propose that there will be a systematic position effect, such that those players in positions toward the center of the array will be less likely to be voted out and will have a higher likelihood of being in the final round.

Description of the game show

The Weakest Link context allows for a real-life assessment of the biases in people's on-line assessment of the performance of others due to (i) the random assignment of players to positions; (ii) the presence of objective accuracy measures; (iii) the presence of actual voting data per person voted out; and (iv) the importance of actual outcomes of the game of substantial economic value. *The Weakest Link* is a TV game that consists of an initial eight contestants, arranged in a semi-circle, answering trivia questions to achieve a maximum dollar prize amount. Only one player in each show receives a final prize. The other seven players go home empty-handed as they are consecutively voted out in rounds one through six of the eight-round game. The 7th and 8th rounds are played by the two finalists, with the money earned in the 7th round doubled and added to the accumulated winnings of rounds one through six to arrive at the overall pot of money that the player who wins in the 8th round will collect.

Contestants have to answer consecutive questions during a limited amount of time. The initial time in the 1st round is 2:30 min, and is reduced by 10 s per round. A string of eight correct questions allows for a

maximum reward of a quarter million per round that goes up in the following denominations (in $ '000's): 1, 2.5, 5, 10, 25, 50, 100, and 250. However, if the string of correct answers is broken, the team must start again at the $1000 level and lose the amount built up by the consecutive correct answers of previous players. At any stage, a player can say the word "bank" for the amount of money "earned" up to that point in the string to go towards the final amount of the winnings. However, if they say "bank," a new string starts again at $1000. For example, if there are three consecutive correct answers, then the kitty has built up to $5K. The player can "bank" the $5K and start building up the kitty from the $1K point, or they can attempt to answer the question directed to them. If they answer correctly, the value of the string of consecutive correct answers goes up to $10K (and the 5th player has to decide whether to say "bank" or not). If they answer incorrectly, the team has lost a possible $5K in "bank-able" winnings, and they start again at the $1K level.

At the end of rounds one through six, each contestant has to vote for a player that s/he wishes to remove from the team, hence the name of the show "*The Weakest Link*." The player that receives the maximum number of votes is removed from the game and cannot continue to the next round. In the case of a tie, the "statistically strongest player" (determined by number of correct answers and amount banked) from the previous round is allowed a tie-breaking vote. The next round continues with one player less. Following a description of the coding methodology, we present the results.

Measures

Analysis is based on the first 20 episodes of *The Weakest Link* that ran on NBC in the United States in the spring and summer of 2001. We captured the following variables:

1. *Starting position*. This was the primary independent variable. The players were in positions 1–8 in a semi-circular arrangement. These were re-categorized as:
   a. Central positions: positions 4 and 5 occupying the middle of the semi-circle.
   b. Extreme positions: positions 1 and 8 occupying the extreme right and extreme left ends of the semi-circle.

2. *Playing length*. This was the primary dependent variable capturing how long a player remained a contestant in the game. The variables were operationalized as:
   a. Maximum number of rounds played by a player: This could take values from 1 to 6, and 8. However, observations within an episode are statistically interdependent: the more rounds one player plays means the fewer the rounds another player plays.[4] We examine the differences in the number of rounds played per player as a function of whether they were placed in the extreme positions (1 and 8) or in the two central positions (4 and 5).
   b. Whether or not the player was a finalist coded as a 0–1 variable ($n = 40$).
   c. Whether or not the player won the game coded as a 0–1 variable ($n = 20$).
   d. The correlation between the performance of the player (percentage of answers correct per round) and the number of votes the player received from the remaining contestants to be eliminated in that round for the first five rounds. Round 6 data were excluded as strategic reasons may come into play leading to stronger players being voted out in this round.[5] In the first round, there are a total of 8 votes. In the second, 7 votes, and so on for a total of $8 + 7 + 6 + 5 + 4 = 30$ votes per episode. Across the 20 episodes this leads to a total of 600 data points of number of votes per player and player performance.

Results

We expected that the number of rounds played by a player would be higher when the player was assigned to a central versus extreme position, and such players would be more likely than chance odds to make the final round, and therefore, win the game. To address issues of interdependency between positions, analyses focus on the comparisons between the center and extreme positions.

Likelihood of reaching the finals

Across the 20 episodes, players in the central positions reached the final round 42.5% of the time while those in the extreme positions reached the finals 17.5% of the time ($p < .05$, one-tailed binomial test of proportion).

Likelihood of winning the game

Players in the central positions won the game almost half the time (45%), while those in the extreme positions won only 10% of the time ($p < .05$, one-tailed binomial test of proportion).

[4] As the number of rounds is fixed, the statistical interdependency problem can be, at least partially, dealt with by only examining the mean number of rounds played by players in a subset of the four positions, and ignoring one or more of the positions.

[5] We thank an anonymous reviewer for this suggestion.

Number of rounds played

A 2-level (central/extreme position) ANOVA on the effect of position on the maximum number of rounds a player played across the 20 episodes showed that those in central positions played more rounds on average ($M = 5.63$) versus those in extreme positions ($M = 4.10$; $F(1, 78) = 7.97$, $p < .01$).

Correlation between performance and votes

The percentage of correct answers per round and the number of votes cast to eliminate the player were correlated to assess whether differential attention to poor performance could explain the position effect. There is support for the "center-of-inattention" hypothesis if the absolute value of this correlation is lower for players in the central positions as compared to the extreme position. The number of votes received by each player in the first five rounds of the game was correlated by that player's performance separately as a function of their position. The lower the correlation, the less likely it is that votes reflect actual performance. If the correlations are different across positions, this shows that people's performance is differentially utilized to make judgments regarding their retention.

As predicted by the "center-of-inattention" effect, the absolute correlation between performance and votes was higher for players in the extreme position ($r = -.55$), than it was for the center position ($r = -.43$); Fisher's z transformation to examine differences in correlation shows ($z = 2.04$, $p < .05$). This pattern suggests that votes more closely reflect performance errors in the extreme position than in the central position. This is consistent with the "center-of-inattention" hypothesis.

The results cannot be explained in terms of those in the center performing better. An analysis of the actual number of correct answers per player per round showed that those in central positions did not perform significantly better than those in other positions over all the rounds of the game (see Fig. 2).

Discussion

This study supports the center-stage effect. Players assigned at random to the center positions played more rounds, were more likely to reach the final round and win it. Due to the limitation of observational data, there were no direct measures of recall of performance and the study could not test the underlying reason for the phenomena. The next four studies examine whether the center-stage effect is due to greater salience of the central position, a differential attribution of the errors of the central position to situational exigencies, a direct effect of more favorable evaluations of people in the center, or indirect processing effects (expectancy disconfirmation vs stereotype confirmation based schema substitution) due to beliefs regarding the people occupying central positions.

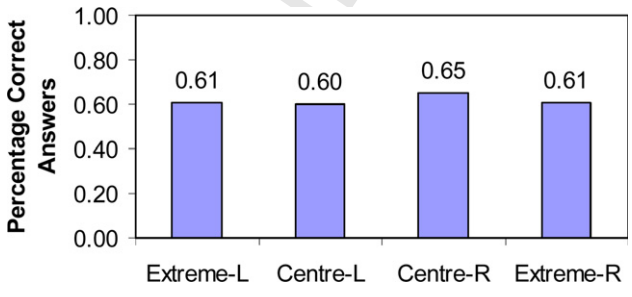

Fig. 2. Performance by position by player: Study 2.

In the next study, we experimentally manipulated observers' attention to an episode of "*The Weakest Link*" to assess how it affected recall of performance of the players in central versus extreme positions. A direct assessment of recalled performance will show whether people's estimation errors are in a stereotype confirmation direction (leading to those in favored positions being recalled as performing better than they actually did) or an expectancy disconfirmation direction (leading to errors of people in the middle looming larger).

Study 3: Attention as an antecedent of position effects

Method

Procedure

Experimental participants were undergraduates at the Haas School of Business at U.C. Berkeley who undertook the study during a class on experimental design ($n = 22$). We used a one way 2 level between subjects design manipulating attention (low/high). Participants observed selected segments of an episode of *The Weakest Link*.[6] After watching the introductions of the players, all participants saw round 1 of the game. At this stage, we introduced a manipulation of attention. In the high attention condition, participants were told to "carefully observe" round 2 of the game since their accuracy would determine their participation grade. In the low attention condition, they were told to "watch the game as though you are watching television at home in the evening with your friends and family." Subsequent to this manipulation they were shown round 2 of the game until just before the votes were revealed. All respondents estimated the number of questions answered correctly per respondent in round 2. This data was recoded by the position of the player (center or extreme). The procedure took approximately 20 min. All participants were debriefed along with the results during the next class session.

The divergence of the estimate of performance from actual performance was used as the direct measure of re-

[6] A copy of the episode is available upon request.

call accuracy to test whether the performance of players in central positions will be overestimated more than (or underestimated less than) the performance of players in extreme positions. As there is no issue of inter-dependency of the four positions in this task, all positions can be analyzed.

We examined the accuracy level by ignoring the direction of estimation error and only capturing the extent of divergence of an estimate from the actual performance level. A main effect of attention on this variable would imply that different levels of overall attention are associated with higher or lower levels of accuracy. The "center-of-inattention" hypothesis would predict that increased levels of attention would reduce the errors associated with the central position (to a greater extent than it would reduce any errors associated with the extreme positions).

An estimation bias score was also constructed as the difference between the estimated percentage of correct answers and the actual percentage of correct answers. The score could range from -1 to $+1$, with positive numbers indicating overestimation and negative numbers indicating underestimation. We predicted that observers would over estimate the performance of those in the center to a greater extent than they would for those in the extreme positions.

Results

Accuracy in performance recall

A 4×2 (position $\times$ attention) ANOVA on absolute levels of accuracy (i.e., absolute differences between estimated and actual percentage of correct answers) revealed an interaction effect between attention and position ($F(3, 60) = 3.20$, $p < .05$). Higher levels of attention increase the level of accuracy for those in center positions (Means = .21 vs .10 for low and high attention, respectively, with lower numbers signifying greater levels of accuracy, $F(1, 20) = 3.79$, $p < .05$).[7] Attention did not affect the estimation errors for the extreme position (*M*s = .19 vs .15 for low and high attention respectively, $F < 1$). This is consistent with the account that the errors for the central positions were originally due to lower levels of attention.

Bias in performance recall

In terms of estimation bias (the direction of inaccuracy), viewers overestimated the proportion of correct answers for the central positions ($M = .08$), and underestimated it for the extreme positions ($M = -.06$: $p < .05$).

Discussion

To summarize, a direct measure of the recall of players' performance by position shows that performance of players in the central positions was overestimated while that of players in the extreme positions was underestimated. Further, as predicted, increased attention reduced the extent of estimation errors for those in central positions but did not affect those of the extreme positions. This implies that those errors were initially due to lower levels of attention being paid to the performance errors of players in central positions, and supports the "center-of-inattention" hypothesis.

The next study, Study 4 directly assesses whether a player's estimated performance deviates systematically from their actual performance as a function of their position when they are actually playing the game. It also examines attributions for voting off people as a function of their position.

Study 4: Give me the money

This study replicates the game *The Weakest Link* in the lab and collects process measures of recall of performance of players to directly test the assertion that position effects are due to biased recall of the performance of players in different positions when one is actually playing the game.

Method

Procedure

We ran four sessions with eight participants per session ($n = 32$, males = 17, females = 15) recruited from an introductory marketing class at U.C. Berkeley. Each session involved a simulated game based on *The Weakest Link*, called "*Give me the Money*." The moderator was blind to the hypotheses and repeated the instructions of the original game.[8] Questions were chosen from the trivia game "*Who wants to be a Millionaire*." Participants could win a maximum of $1000 overall with increments based on the original game ($1-$2-$4-$8-$16-$32-$64-$125 per round $\times$ 8 rounds).

At the end of the game, participants completed a debrief questionnaire where they described why they believed each person was voted out in each round. They also estimated each player's correct and total responses

[7] They also increase the level of accuracy for those in the peripheral positions (Means = .2674 vs .1483 for low and high attention respectively, $F(1, 20) = 3.82$, $p < .05$), and increase the inaccuracy for those in the off-center positions (Means = .1667 vs .2667 for low and high attention respectively, $F(1, 20) = 4.34$, $p < .05$; see General Discussion.)

[8] To increase the similarity of the simulated game to the original, the moderator was a British woman dressed in black. The original game show host is Ann Robinson. However, unlike the original game, the moderator was told that she need not disparage the participants.

per round, for every round of the game. This data was coded on a per estimate basis where we captured who the estimator was, whose performance they were estimating, the round, the actual performance of the player in that round (number questions asked and number of questions answered correctly), whether the estimator was playing the game (or had been voted out) at the time they made the estimate, and whether the estimate was for themselves or for another player. Each of the eight players estimated the performance of every other player for every round, leading to a total of 37 estimates per player $(8+8+6+5+4+3+2+1)\times 8$ players $\times 4$ games or 1184 observations. Note that due to partial non-response, degrees of freedom may be lower for some measures.

Results

Maximum number of rounds played

Replicating Study 2 results, players in central positions played more rounds (Mean = 4.5), as compared to those in the extreme positions (Mean = 2.25, ($F(1, 14) = 4.61$, $p < .05$)).

Estimation error

The estimation error was defined as in the previous study (multiplied by 100). Positive numbers indicate overestimates of accuracy and negative numbers indicate underestimation. The error can be between −100 and +100.

We ran a regression model with estimation error as the dependent variable and the position of the player about who the estimate was being made as the independent variable (4 positions with the extreme positions coded as 1 and the central positions coded as 4). To control for differences due to other factors, the following additional independent variables were included in the equation: game (1–4 sessions), round (values 1–8), the person making the estimate (32 players), whether or not the estimate was for oneself or not (values = 1 if for oneself, 0 for another person), whether or not the estimator was playing the game for the round the estimate was given or had been voted out and was observing the round (value = 1 if playing the round, 0 if voted out), and whether the reasons for being voted out had been elicited prior to or subsequent to the estimation of players performance. To capture any regression to the mean effects whereby low performance levels are relatively overestimated, we included the actual percentage of correct answers as another explanatory variable.

The regression model was significant ($F(8, 1067) = 94.52$, $p < .001$, $R^2_a = .41$). The key coefficient associated with position was positive and significant ($\beta = .064$, $t = 2.68$, $p < .01$) suggesting that the closer the position was to the center, the greater the estimation error. The positive and significant coefficient associated with the position variable suggests that the poor performance of players in the central positions is more likely to be overlooked than similar poor performance by players in other positions.

These results replicate Study 3 findings from the point of view of a participant rather than just an observer of the game. This finding eliminates the explanation that greater attention is directed to players in the center leading to their performance being most accurately recalled. Instead, it supports the view that players recall the performance of players in the center less accurately than that of players in extreme positions. As the task goal is to identify the strongest of a group and eliminate the weaker member of the group, this translates into players overlooking the errors committed by those in central positions to a greater extent than the errors of those in the extreme positions.

There were two other significant effects in the regression: order and the percent of actual correct answers ($ps < .05$). The latter coefficient was negative ($\beta = -.64$, $t = -26.98$, $p < .001$) implying that the lower the actual performance, the greater the overestimation. The fact that the regression model shows a significant coefficient for the position variable while controlling for actual performance level suggests that the position effect is robust.

Reasons stated for voting out different players

Two researchers coded the reasons described by participants why each person was voted out in each round. Regardless of player position, respondents initially named "poor performance" as a reason they believed a player was voted out (87.5, 96.87, 84.37, 68.75, and 62.5% for the 1st five rounds) while this percentage reduced to chance levels in the last voting round—the 6th round (46.87%). Instead, they assessed that players were increasingly voted out because they were a threat as the game progressed (from 0% in the first two rounds, 3.12% in the 1st round to 75% in the 6th round, binomial p's $< .05$ for 1st three, and 6th round). There was little evidence of any situational attribution.

Similar results obtain with the reasons provided at the time of voting out a player ($n = 131$, non-response = 1, inter-rater agreement = 90.91%, differences resolved through discussion). A total of 9.2% (12/131) reasons were strategy related (to reduce a potential threat by eliminating a strong player or break collusion); while the majority were poor performance related (78%). Thus, there was no evidence in this data for an attributional account for center-stage effects.

Discussion

Although these results are consistent with the hypothesis that the "*center-of-inattention*" effect could be due to a stereotype confirmation effect, they do not directly test that attention is redirected due to people substitut-

ing their schema that people in central positions are better for the actual performance data. Stronger evidence for that claim would imply that those people who hold the schema should be more likely to favor a central-position, and have greater difficulty in recalling the actual performance data of people in the central position than others who believe in the "center-stage" schema to a lesser extent. The next study tests this piece of the puzzle directly.

Study 5: Interview selection

Method

Study participants

Study participants were 111 students enrolled in an introductory marketing class at San Francisco State University who completed the study for partial course credit.

Procedure

We used an interview paradigm. Study participants were told "You are a manager that has just opened a sales office in Hong Kong. You are now looking to hire a business student to work in your Hong Kong sales office as an intern during the summer semester. You have posted an announcement at HKUST for the job. Five students applied for it. A week later, you are conducting an interview with the five students that applied for the internship. The five students applying for the summer internship have taken similar classes at HKUST and have similar working experience. These five students are (descriptions are fictional)": They were then shown a group photograph of the five students.

The five students were photographed in a semicircular seating arrangement. There were five conditions manipulating seating order, so that each candidate was in each of the five positions. Two candidates were women ("Victoria" and "Jenny") and three were men ("Patrick," "Robert," and "Thomas"). Information regarding their academic performance (CGA and TOEFL scores) was provided below each candidate's name, below their photograph. The CGA (similar to GPA) scores and TOEFL scores were chosen so that there was no candidate who was expected to be clearly superior or inferior to the others.[9]

Study participants first made a choice regarding who they would choose for the job. This was followed by a surprise recall task where they were asked to recall the CGA and TOEFL scores of the five candidates using an open ended format (without going back to the description). The key process measure was their rating of how easy it was to recall the information for each of the candidates. Specifically, respondents were asked to rate "ease of recall" using a 5-point scale anchored at 1 = Not at all/5 = very easy. At the end of the questionnaire participants were asked for their assessment of the performance potential of each of the candidates, their level of motivation while answering the questionnaire (Not at all = 1/Very = 7 "Motivated") and their rating of realism for the task (Not at all = 1/Very = 7 "Realistic"). They then responded to the extent to which they agreed to the statement "Important people sit in the middle," (Disagree = 1/Agree = 5), and indicated their gender. This statement was chosen after a pretest ($n = 188$) showed agreement with the statement: "Important people sit in the middle of the table" where 1 = Disagree and 5 = Agree (Mean = 3.99, Median = 4, Mode = 5).

Results

Sample characteristics

The sample consisted of 51 men and 60 women. None claimed to know any of the students. The levels of motivation (Mean = 4.14) and realism (Mean = 3.82) were around the scale midpoints. Due to partial non-response to some questions, many analyses are conducted on a sample smaller than 111.

Choice for job

The basic hypothesis is that the central position should have a positive effect for those individuals who have stronger beliefs regarding the "center-stage" heuristic: viz., the belief that "Important people sit in the middle of the table." We conducted a median split for the extent of agreement to this statement. Those who marked a "1" (strongly disagree) were categorized as "lower believers" ($n = 45$) and those who marked a 2 or higher (on a 5 point scale) were categorized as "higher believers" ($n = 65$).

A cross-tabulation of the effect of position by whether participants had a lower or higher belief in the "center-stage" heuristic, revealed a significant interaction ($\chi^2(4) = 9.79$, $p < .05$). When participants believe that important people sit in the middle, then the candidate in the middle position was chosen for a job 28% of the time, while the candidates in the two extreme positions were chosen only 14% of the time (χ^2 (1) = 3.33, $p < .06$). However, when participants did not have this belief, then being in the center conferred no advantage (Middle position = 15% vs 22% for the two extreme positions together; χ^2 (1) = .60, $p > .40$).

Ease of performance recall

A 5(positions) × 2 (schema belief: lower/higher) repeated measures ANOVA on the participants' ease

[9] The CGA and TOEFL scores for each of the five candidates were: Patrick: 11.2 and 232; Robert = 9.4 and 270; Victoria: 10.9 and 264; Thomas = 9.8 and 267; and Jenny = 10.5 and 250.

of recall of the candidates' test scores revealed a main effect of position ($F(4, 424) = 2.54$, $p < .05$). Participants found it easier to recall the performance of the candidate in the extreme position (Mean = 2.7) than the candidate in the middle position (Mean = 2.3; $t_{110} = 2.57$, $p < .05$).

Incorporating the extent to which people believe in the "center-stage" heuristic moderated this effect ($F(8, 420) = 2.97$, $p < .05$). The form of the interaction is participants who hold the belief have the most difficulty recalling the performance level of the middle position (M's = 2.3 vs 2.9 for central vs extreme, $t_{110} = -2.20$, $p < .05$). However, this is not true of participants who do not hold the "center-stage" belief (M's = 2.4 vs 2.6 for central vs extreme, $t_{110} = -.61$, $p > .40$). Therefore, the stronger the belief that important people sit in the middle, the more difficult it is to recall their actual performance and the greater their chance of being selected.

Discussion

To summarize, we replicate position effects using a different task, a different array length, and different measures. The primary effect is that those in central positions enjoy a relative advantage over those in extreme positions, but only when people have a "center-stage" schema. This advantage is due to people who believe in the "center-stage" heuristic finding it easier to replace individual attention with the overall schema while processing information about people in central positions.

We have discussed throughout the paper that the "center-of-inattention" effect is due to differential attention to players' errors. However, an observer's motivation to attend to errors depends on the task goal. We believe that a "winner take all" competitive situation enhances attention to errors since the goal is to eliminate low performing players and keep the best performer. Given this, one would expect that the "center-stage" effect may not hold as strongly if we the context is more cooperative—that is, when there is more than one possible winner. In other words, we predict that the relative advantage of the central position over the extreme position will be attenuated when task demands reduce the need to attend to errors, which is operationalized as a context where there can be more than one winner. The last study tests this prediction.

Study 6: The moderating effect of end-game rules on the center-stage advantage

Method

Procedure

Experimental participants were undergraduates at U.C. Berkeley who undertook the study for partial course credit ($n = 81$). The design was a 2 (end-game rule: cooperative/competitive) between subjects design. Participants observed selected segments of an episode of *The Weakest Link*.[10] After watching the introductions of the players, all participants then saw round 1 of the game and round 2 of the game, until just before the votes of round 2 were revealed. All respondents estimated the number of questions answered correctly and in total per respondent in round 2.

At the end of the study, we introduced an end-game rule manipulation that made the final round of the game either competitive (as in the original) or cooperative. In the competitive condition, participants' read:

"REMEMBER how the rules of the game WORK: Winner takes all and the loser gets nothing. Only one person can win. However, the group must work as a team to maximize the earnings from the game right up to round 6 of the game. In the 7th round of the game only two finalists play and overall earning are doubled. However, in round 8, only one of the two finalists gets it all. The loser goes home with nothing. Remember these rules, and imagine that YOU are playing the game and have perfect information about the other players' performance."

In the cooperative condition, participants read:

"IMAGINE the rules of the game are DIFFERENT: The two finalists are both winners. Each gets 50% of all earnings. The group must work as a team to maximize the earnings from the game right up to round 6 of the game. In the 7th round of the game the two winners play and overall earnings are doubled. The same happens in round 8. After that round, total earnings are split equally between the 2 winners. Remember these rules, and imagine that YOU are playing the game and have perfect information about the other players' performance."

Participants designed their game strategy next: choosing whom they would vote for in each round, and describing why. This data was recoded by the position of the player and analyzed in terms of what the average round number was when a player was voted out. The procedure took approximately 1 h.

Results

Estimated percentage correct per position

A 7 position ANOVA on the estimate of the percentage of correct responses per player in round 2 showed a main effect of position ($F(6, 516) = 27.93$, $p < .001$).

[10] A copy of the episode is available upon request. The game is characterized by an equal male-female start, a female-female final, and the "strongest link" being voted out in round 6 of the game. The episode was the same one used in Study 3.

Combining across the four positions of interest and comparing these estimates with actual correct performance ratios showed that viewers overestimated the proportion of correct answers for the central position (Estimate = .38 vs Actual = .33) with estimates tracking actual performance for the extreme positions (Estimate = .48 vs Actual = .50).[11] This is consistent with the data reported in Study 3.

Moderating effect of end-game rule on the round a player is voted off by the position of the player

A 2 (endgame: cooperative/ competitive) × 4 (positions: 2 extreme positions and 2 central positions) ANOVA where the first factor was between-subjects and the second factor was within-subjects, revealed a main effect of position ($F(3, 264) = 26.84$, $p < .001$), qualified by an interaction with the endgame rule ($F(3, 264) = 5.59$, $p < .001$). The main effect of end-game rule was also significant ($F(1, 88) = 20.26$, $p < .001$). The means show that players in extreme positions were voted off in earlier rounds than players in the central positions when there was just the single winner (Mean for average round number in which player is voted out = 1.68 vs 2.58 round number for extreme vs central, $t_{80} = 1.80$, $p < .05$), but this was no longer true when there were two winners possible (Means = 2.46 vs 2.53 round number for extreme vs central, ns). Said differently, the disadvantage for the extreme position is greater when the game is competitive rather than cooperative while players in central positions enjoy an advantage in both scenarios.

General discussion

In this paper, we proposed that there exists a location advantage of being in the central positions in a group and that such an advantage is caused by limited attention to performance inaccuracies of the player in that position. We tested these propositions with different studies using different methods and measures. Based on prior research that argued that position effects were either due to attention with central positions being more vivid (Taylor & Fiske, 1975), or attribution or social norms suggesting that important people sit in the middle (McArthur, 1981), we argued that the presence of social norms leads to attention being differently directed to the errors of players in the center. People substitute their schema that important [or good] people sit in the center, for individuating information about those in the center, leading them to direct less attention to their performance. When the task involves identifying performance failures, this confers those players in the center with a position advantage due to their errors being overlooked. We term this the "*center-of-inattention*" effect.

Study 1 using stylized placement tasks showed that people believe that more important people sit in the middle of an array, particularly if they wish to be recalled or favored, but not when they wish to be overlooked. Study 2, based on observational data from the television show, *The Weakest Link*, shows that players in central positions are more likely to be game finalists and winners. Study 3, a lab experiment, shows that observers tend to overestimate (underestimate) performance of the players in the center (extreme), except when they allocate specific attention to the game. Study 4 provides additional evidence for the role of attention and finds that performance level of players in the center is underestimated to a lesser extent than that of players in other positions. Study 5, using a "group interview" paradigm, shows that people who believe that "important people sit in the middle" are more likely to choose a candidate in a central position over one in an extreme position and find it more difficult to recall their actual performance levels. Finally, Study 6 shows that when more than one winner is allowed, the center-effect is attenuated. Overall, the pattern conforms to the "center-of-inattention" hypothesis, which suggests that people overlook the errors committed by those in the centers as they substitute their beliefs regarding the greater ability of people in these positions for their actual performance.

Implications for decision-making and visual salience

This paper adds to the literature on the errors and biases in on-line assessments of others. On-line assessment of performance is ubiquitous: whether it is a peer who is judging the performance of a colleague in a business meeting, a professor assigning class participation grades to students, an ice skating judge who is rating skaters' ability or a basketball coach identifying the top players from his/her team. We show that such assessment is inaccurate, with the errors biased in favor of specific spatial positions.

Biases against a target individual being judged may be due to the differential ability required to assess the performance of each individual. Assessment difficulty could be due to the differential salience of the target to the observer, including their physical salience (due for example, to the viewing angle, centrality, or extremity of their physical position), sociological salience (due for example, to their being a part of a demographic minority, such as a different race or profession), and physiological salience (due for example, to the presence of salient attributes in appearance like unusual dress, weight, height, or hair). This paper shows that target

[11] Performance was underestimated for the off-center position (Estimate = .62 vs Actual = .67) and was appropriately tracked for the peripheral positions (Estimate = .51 vs Actual = .50: see General Discussion).

biases may also be due to the spatial position of a target individual within a group context.

Our results add to the literature on vividness effects. This stream of research indicates that there is a strong tendency for people observing a social interaction to perceive a given interactant as increasingly influential or causal as he or she becomes more visually salient. For example, a participant in a group would be perceived as more causal (Taylor & Fiske, 1975), friendlier, and receive higher ratings (Taylor et al., 1979) simply because s/he was positioned in front of the rater, and were, thereby, more salient. We find support for the prediction that it is the difference in attention that leads to these biases in judgments (Taylor & Thompson, 1982). This finding is also consistent with McArthur and Post's (1977) suggestion that position effects may be due to norms and schemas as in the real world prominent people usually occupy the center-stage.

Visual cues have been generally identified as interfering with evaluator's objective judgments. Visible features of competing participants such as their physical attractiveness (Dipboye, Arvey, & Terpstra, 1977), clothing (Forsythe, Drake, & Cox, 1985) and non-verbal cues such as smiles, gestures and postures (Forbes & Jackson, 1980) can have affect the favorability of evaluative judgments. Their pervasiveness suggests that such effects could persist even when process rules direct evaluators to ignore them. We identify a biasing cue in objective judgments: the target's position. These results have implications for selection interviews and performance assessment tasks such as grading, auditions or any evaluation of individuals competing in groups.

Study limitations and areas for future research

There is an alternate route through which the center-stage effect may manifest. It may be that players in central positions try harder: the "centrality-produces-efficacy" explanation. This hypothesis (or an analogous "extremity-produces-underperformance" hypothesis) may be a potential explanation that requires future research.

Some researchers have found that priors regarding the level of influence of an individual in an interaction do not moderate the effect of the person's salience on judgments of causality. For example, Briggs and Lassiter (1994) manipulated the level of influence of a person in an interaction. They expected that greater salience would increase the estimated causality of a high-influence individual, but would decrease the estimated causality of a low-influence individual. Results revealed the typical salience effect pattern regardless of whether the observed individual was highly influential or not. Banzai (1983) found similar results. An actor's positive or negative outcome did not moderate the effect of changing points of view in achievement behavior judgments. This implies that irrespective of a player's actual performance, central positions may confer an advantage over an extreme position. This literature supports the first route through which position effects manifest: that any player is considered better when they are in the center.

However, these are controversial findings. For a given individual, differently valenced behaviors may be differently affected by the person's salience. For example, Ellis and Holmes (1982) showed that different attentional perspectives led to positive behavior being rated more positively and negative behavior being rated more negatively: a polarization effect. Lambert and Hockey (1986) studied selective attention across a range of locations and forms. Across four experiments, they found that certain locations were no more or less likely to be noticed as compared to others, but location effects were contingent on the specific content of the stimuli. In our context, this implies that the location of an individual might differentially impact the attention paid to their correct responses as compared to their incorrect responses.

Although the current studies test our predictions about central positions providing an advantage in judgments of performance accuracy, they raise numerous unanswered questions that suggest directions for future research. First of all, the study should be replicated in different contexts. Besides, while our focus has been on judgments of performance accuracy, there may be a broad range of other social judgments that may also be influenced by position effects. Another interesting area to examine would be whether the effects of centrality are moderated or reversed by asking people to direct their attention to a specific position, or differently to positive or negative information. These manipulations would help uncover the antecedents of the "center-of-inattention."

While our focus was on center versus extreme positions, a puzzling empirical finding was that the position next to the extreme position (peripheral positions) also had a relative advantage compared to the positions flanking the central positions ("off-center" positions). We speculate that these effects may be visual attention driven as well, and suggest that they be systematically investigated in future research.

A managerially relevant question is whether competing demands on an observer's cognitive resources would moderate the "center-of-inattention" effect. Theoretically, this can be examined by testing if the effects increase when people are under cognitive load. Finally, the position effects studies in this paper pertained to physical position at a specific point in time. It would be interesting to examine their generalizability intertemporally, i.e., assessing whether the timing of a person in a selection process (e.g., the order in which job candidates are interviewed) would affect their likelihood of choice.

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