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Responsibility judgments of wins and losses in the 2013 chess championship

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Abstract

We report two studies on the perceived responsibility of opponents competing for a goal that can be attained by only one of them. Responsibility judgments were collected in seven samples of lay people and experts before, during, and after the World Chess Championship in 2013. Participants assessed the responsibility of the two players, their supporting teams, local conditions, and chance factors for four hypothetical outcomes (large and small loss/win for each player), along with probabilities for these outcomes, demonstrating subadditivity (sums exceeding 100%) in all samples, even among chess experts. The winner was consistently perceived to be more responsible than the loser, and more for outcomes with large than small margins. There was also an effect of focal player, as Carlsen was given more responsibility both for losses and wins than Anand, by the present (Norwegian) pro-Carlsen samples. However, this effect could be modified by describing the outcomes as Anand's (rather than Carlsen's) wins and losses. Thus the study adds to the valence framing literature by showing how responsibility judgments are affected by the way outcomes are framed.

Keywords: responsibility judgments, framing, subjective probabilities, chess.

1 Introduction

How do observers intuitively judge the responsibility of players for winning or losing an important contest? Are winners seen as more, equally, or less responsible than losers? Does it matter how the outcome is framed (as player A's win or player B's loss)?

Previous research has shown that people tend to allocate responsibility to actors in a dyad in a complementary fashion, with responsibility ratings adding up to 100% (Teigen & Brun, 2011). With more than two actors, this distributive model of responsibility is abandoned, unless participants are specifically instructed to distribute a finite number of "responsibility points" among the contributors (Forsyth, Zyzniewski, & Giammanco, 2002). Actors in these studies have been presented as partners or team members, making contributions toward a common aim. Less is known about the distribution of responsibility in zero-sum games.

An opportunity for studying responsibility in such a case arose in the 2013 World Chess Championship. A chess match may not be representative of other sports events (thus limiting the generalizability of our findings), but is well suited for studying responsibility attributions, as the outcome is believed to depend primarily on the players' expertise and mental capacity rather than on random factors or extraneous influences. It is also symmetric, in the sense that the same outcome can be described either as player A's win or as player B's loss, allowing for "strict refocusing effects" (Mandel, 2008) in the domain of responsibility attributions.

1.1 The match

The 2013 World Chess Championship was held from 9 to 22 November in Chennai, India, as a match between the reigning world champion Vishy Anand, and the rising star Magnus Carlsen, at 22 years of age the youngest player ever to qualify for the world championship. The match was scheduled to include 12 individual games or to be discontinued when one player reaches 6.5 points (1 point for each game won and 0.5 point for draws). In Norway and India, the home countries of the two players, there was a huge interest in the match. Speculations were rampant. Anand had successfully defended his title five times over the past few years, he had the routine, and was also playing in his home country with an experienced team to back him up. For Carlsen, the experience would be a novel one, he was unfamiliar with the Indian scene, had barely won the qualification tournament preceding the championship, and came from a country where chess is a marginal sport. Still, Carlsen was at the time the number one FIDE rated player in the world, had shown an amazing early career, and was the bookmakers' favorite.[1] Both players were

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[1] Unibet, one of Europe's biggest bookmakers, thought there was 66 percent chance that Carlsen would win the title. Other bookmakers gave

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backed by a supportive team, which in Carlsen's case included his manager and members of his family. The match was believed by most commentators to be a close one. As it turned out, Carlsen reached the 6.5 points criterion after 10 rounds in which he won three games and lost none, in the following sequence: ½, ½, ½, ½, 1, 1, ½, ½, 1, ½. Anand received 3.5 points based on the seven games that ended in a draw. Magnus Carlsen was accordingly hailed as the new world champion.

1.2 Causal responsibility of multiple actors

Counterfactual models of causality posit that judgments of causality are captured by the counterfactual dependencies between sets of events. Thus an event A can be said to cause another event B to the extent that B would not have occurred in the absence of A (Halpern & Pearl, 2005; Woodward, 2003). Chockler and Halpern (2004) have suggested a "structural model" for graded responsibility attributions when a causal candidate A belongs to a set of multiple factors, based on the minimal number of counterfactual changes that are required to make A pivotal for the occurrence of B. This model can be applied to causal responsibility for individuals in a team. For instance if an issue is decided by a narrow 6–5 majority vote, all six members of the majority are pivotal in making the outcome happen. They should accordingly each be perceived as fully responsible for the decision. In an 11–0 situation each voter is much less pivotal, as five other votes need to be changed before one's vote becomes pivotal, reducing each voter's responsibility correspondingly. Lagnado, Gerstenberg, and Zultan (2013) have shown that people are sensitive to pivotality when they judge the responsibility of members of a team both for a successful and for an unsuccessful outcome.

How people will judge the relative contributions of a winner or a loser in a match between two parties is not obvious. Will complete responsibility be divided between the two contestants in an additive fashion, as suggested by the finding from dyads studied by Teigen and Brun (2011), or according to Chockler and Halpern's (2004) structural model? In the latter case both parties may be considered as fully responsible, as each is making a pivotal contribution: The winner might have lost if he had played worse, and the loser might have won if he had played better. Other potential causal factors play a less pivotal role, for instance the advisory teams are several steps away from deciding the outcome (after all, they are dependent upon the players to implement their advice in the actual game, over which they have less control). The same applies to external factors like the location and chance factors, which can contribute to setting a more or less favorable stage for the game itself without actively producing the outcome. Moreover, it has been shown that human actions are considered better explanations of events in a causal chain than physical causes (McClure, Hilton, & Sutton, 2007), even when their contributions are of the same magnitude (namely, they increase the probability of the final outcome by the same amount).

him an even better chance (Ladbrokes 70 percent; Pinnacle Sports 75 percent).

1.3 Research questions

In the present study we want to examine the following questions:

1. Who is perceived as more causally responsible for the outcome of a match, the winner or the loser?
2. How are responsibility attributions affected by the magnitude of the outcome (large vs. small margins)?
3. How are responsibility attributions affected by outcome desirability and outcome salience?
4. Are responsibility attributions affected by the way the outcome is framed?
5. Are responsibilities perceived in the same way by lay people and experts?

1.4 Are winners more responsible than losers?

Counterfactual and structural models of causal responsibility do not distinguish between positive and negative outcomes. Although originally developed in a context of negative events, where the question is how much various agents are to be *blamed* for an unfortunate outcome (Chockler & Halpern, 2004), they are equally applicable to achievement situations where the question is how to apportion *credits* among the members of a successful team (Gerstenberg & Lagnado, 2010, 2012; Lagnado et al., 2013). Competitive situations like chess championships offer an opportunity to compare blame and credit attributions in the same setting. Even if winners and losers have to share outcome responsibility, as reflected in the counterfactual and structural analyses delineated above, they may not necessarily be judged to be equally responsible. Three mutually exclusive hypotheses are possible:

(1) For the sake of symmetry, the loser and the winner might be regarded as equally responsible, as one of them cannot emerge as a winner unless the other loses, and vice versa. In chess, both players have access to the same resources and play by the same rules, and to ensure fairness, alternate between playing the white and the black pieces. The symmetry argument may give each player 50% of the responsibility or the outcome.

(2) Questions of responsibility typically arise in situations where something has gone wrong, which in legal and philosophical settings raises issues of culpability and

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blameworthiness. Thus the concept of responsibility may be more strongly associated with failures than with successes, and hence lead to higher responsibility ratings for the loser.

(3) However, players and spectators of a game are more focused on success than failure. Also, when judging responsibility, people are sensitive to the actors' intentions. A person who causes an outcome unintentionally is usually regarded as less responsible than one who produces the same outcome on purpose (Bandura, 2001; Lagnado & Channon, 2008). In a competitive game, both actors are playing with an intention to win, but only the winner succeeds as intended. According to this line of argument, the player who succeeds is more responsible for the intended outcome.

Furthermore, it is known from attribution research that positive outcomes are more often attributed to dispositions, whereas negative outcomes tend to be attributed to adverse situational circumstances (Frieze & Weiner, 1971). This "positivity bias" has also been demonstrated for competitive athletic events (Lau & Russell, 1980), both in questionnaire studies answered by the athletes themselves (Martin & Carron, 2012), and in studies of sports fans (Madrigal & Dalakas, 2008), especially among supporters who are strongly identified with their teams (Wann & Dolan, 1994). However, in most of these studies attributions of wins vs. losses are confounded with "self-serving" attributions. We investigate in the present studies the responsibility of *both* players for winning and losing.

Moreover, most attribution studies have asked participants to evaluate the role of various causal factors for outcomes that have already occurred. In the present study in contrast, we ask about the roles of these factors in the case of hypothetical outcomes that either still *can* occur (Study 1) or *could* have occurred (Study 2). This allows participants to make direct comparisons between factors responsible, in their view, for potential wins and potential losses of the same event.

1.5 Large vs. small victories

For a single game of chess, three outcomes are possible: A win, a loss, and a draw. In a championship consisting of several games, the points from all rounds are added, allowing for graded outcomes. Matches between top chess players are often close, with many ties, leading to tournaments won or lost by narrow margins. It is not obvious that the champion can claim the same responsibility for a title earned with a narrow margin than for a massive victory. From a "causal power" perspective (White, 1989), a superior (wide margin) victory may suggest a higher causal responsibility on the part of the champion than a narrow (small margin) victory. But a wide margin victory also suggests inferior performance on the part of the losing player, who may accordingly carry more responsibility for playing so poorly or for committing grave mistakes.

Experts have been found to make better predictions of outcomes of soccer games than lay people (Pachur & Biele, 2007). However, after learning about the relative strengths of basketball teams lay people have been found to predict outcomes as accurately as experts (Heit, Price, & Bower, 1994). The relationship between the immediate causal impact of the players, who are actually performing the moves leading to victory or defeat, and background factors (supportive teams and external circumstances), may be judged differently by lay people and by experts, since the latter know more about each factor's role in the outcome of a game. They may also have different views on the role of chance. It is often assumed that chess is a pure game of skill that is immune to random factors like weather conditions and equipment failures. Yet players often face a choice between apparently equivalent moves, with unpredictable consequences for the development of a game. It may be more conceivable that random factors and external influences can tilt the outcome of an even match than of an uneven match between one clearly superior and one clearly inferior player. Such factors become less pivotal in the latter case, as several conditions have to be changed before they become critical (Chockler & Halpern, 2004; Lagnado et al., 2013). We would accordingly predict more responsibility attributed to extraneous factors for outcomes obtained with narrow than wide margins, and conversely that the actors themselves will be perceived as more responsible for large than for small wins and losses.

1.6 Desirability and salience

An agent's responsibility is closely related to the notion of causal power, which in turn is reflected in the agent's probability of attaining a desired result. For instance, Spellman's (1997) "crediting causality" model suggests that a factor's causal impact on a particular event can be conceived as an increase in probability for the event occasioned by the presence of this factor (compared to the probability of the event in the absence of this causal candidate).

Probability estimates are not immune to context effects. For instance it has been commonly assumed that the desirability of an effect will increase its probability, often labelled "wishful thinking" (Babad, 1997), the "preference-probability link" (Granberg & Brent, 1983), or simply "persistent optimism" (Massey, Simmons, & Armor, 2011). However, experimental evidence for a "pure" desirability bias has been elusive (Bar-Hillel & Budescu, 1995; Krizan & Windschitl, 2009). Perhaps desirability works mainly by making one outcome more salient or focal than another (Bar-Hillel, Budescu, &

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Amar, 2008). For Norwegians, Carlsen clearly was the focal player, and also the player they hoped would win. Wishful thinking might raise his judged probability for winning and hence make him appear more impactful and responsible for a victory than Anand. The same prediction could also be made based on salience. Carlsen's causal impact could loom larger than that of Anand simply because Carlsen occupies a more central place in our participants' mind. For losses, wishful thinking and salience would lead to divergent predictions. Wishful thinking should reduce Carlsen's probability of a loss and make him less responsible for losses than Anand, whereas focalism would make him more responsible than Anand both for wins and for losses.

1.7 Framing

Framing of outcomes has previously been shown to affect, among other things, risky choices (Tversky & Kahneman, 1981; Kühberger, 1998), preference for therapies (McNeil, Pauker, Sox, & Tversky, 1982), choice of consumer products (Levin & Gaeth, 1988; Sanford, Fay, Stewart, & Moxey, 2002), health messages (Rothman & Salovey, 1997), and negotiations (Moran & Ritov, 2011). The present study extends this research to responsibility attributions, by reframing Carlsen's victory as Anand's loss. Is Carlsen equally responsible for both these (equivalent) outcomes, or could it be that describing the outcomes as Anand's wins or losses would highlight this player's role as an agent, and perhaps make him appear more responsible? When the outcomes are framed as Anand's wins or losses, rather than Carlsen's, Anand would become more focal. A comparison of responsibility judgments under both frames would accordingly serve as a test of the salience hypothesis. This prediction will be explored in Study 2.

1.8 Studies

Two studies were conducted, each consisting of several different samples run at different points in time. Study 1 covered the time period just before and during the chess championship. Participants evaluated four hypothetical outcomes before actual results were known. Study 2 was conducted three weeks after the match ended and its results were known. Participants were asked to make the same judgments, imagining how they would have completed the questionnaire before the match had begun. Both studies included "lay" samples of participants with no specific background in chess and samples of participants with a strong interest in chess. All samples were Norwegian and clearly biased in favor of Carlsen.

2 Study 1

2.1 Method

2.1.1 Participants

This study consisted of five data sets with different samples of participants. The first sample was run a few days ahead of the first round, and the last just before the 9th round, only two days before the match was finished. Three samples (1, 3, and 4) made use of student participants from two Norwegian universities, and two "expert" samples (2 and 5) were recruited from a prominent chess club in Oslo and a Norwegian group of supporters that followed the championship in Chennai. Four groups received questionnaires in a paper-and-pencil format, whereas participants in Sample 2 were given an on-line questionnaire (Qualtrics) containing the same questions. For an overview of the participants in different samples, see Table 1.

2.1.2 Questionnaires

In the questionnaires, participants were first asked to state who they thought would be the winner, Carlsen or Anand, and to estimate Carlsen's probability of winning on an 11-point scale from 0 to 100%. The questionnaires then described four possible outcomes (each on a separate page): (1) Carlsen loses the match with a large margin; (2) Carlsen loses with a very small margin; (3) Carlsen wins with a large margin; (4) Carlsen wins with a very small margin.[2] Participants in all samples except the first one were asked to state the probabilities of each of these outcomes. This allowed us to check their understanding of probabilities as additive (the sums of probabilities of four exclusive outcomes of the same event should not exceed 100%).

Each of the four outcomes was followed by responsibility judgments performed on six rating scales from 0: "not at all responsible" to 10: "completely responsible", for a total of 24 ratings. The first four questions asked for responsibility ratings for the two players and for their respective teams. (Both players were allowed to bring a support team for assistance and consultations between the games. The role of these teams had been given some attention in the press prior to the match; they were included to ensure that all candidate causes were represented in the questionnaires). Suppose that Carlsen loses [wins] with a large [very small] margin. 1. "How much responsibility does Carlsen have for the loss [victory]?" 2. "How responsible is Carlsen's team?" 3. "How responsible is Anand?" 4. "How responsible is Anand's team?" The

[2]The phrase "a very small margin" (instead of just "a small margin") was chosen to make sure that the outcomes were perceived as non-overlapping.

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Table 1: Overview of participants in five data collections, Study 1.

Sample	Time	Participants	N	Men	Women	Mean age	Interest in chess[a]
1	Before match	Students	30	10	20	22	1.12 (0.87)
2	After 2 games	Chess players	25	24	1	48	Played for 37 years
3	After 4 games	Students	24	9	15	26	0.92 (0.92)
4	After 8 games	Students	40	15	25	25	1.12 (0.99)
5	After 8 games	Chess supporters	22	18	4	47	

[a] Interest in chess on 0-3 scales (Samples 1, 3, 4).

two last questions concerned the responsibility of extraneous factors: 5. Local conditions in India (there had been discussions of whether Anand would have a home advantage, and Carlsen a corresponding disadvantage). 6. The responsibility of chance. All participants received these questions for all four potential outcomes, thus all analyses are based on within-subjects comparisons.

2.2 Results

2.2.1 Sample 1: Students before the match

Prior to the chess championship 27 out of 30 participants believed that Carlsen would emerge as winner, with mean estimated probability for winning of 63.3% (similar to the bookies).

Mean responsibility estimates for Carlsen and Anand in the four conditions are displayed in the first row of Table 2. A 2 x 2 x 2 within-Ss ANOVA with *player* (Carlsen vs. Anand), *outcome* (loss vs. win), and *margin* (large vs. small) as the three factors shows that in general Carlsen was judged more responsible (M = 5.93) than Anand (M = 4.57), regardless of outcome; $F(29) = 21.24$, $p < .001$, η_p^2 = .42. A significant main effect of margin demonstrates that both Carlsen and Anand were seen as more responsible if they won/lost with large than with small margins, $F(29) = 20.13$, $p < .001$, η_p^2 = .41. An interaction effect of player and outcome, $F(29) = 15.71$, $p < .001$, $\eta_p^2 = .35$, shows that Carlsen is more responsible if he wins than if he loses, while Anand is more responsible for Carlsen's loss than for his victory. Results from separate 2 x 2 analyses for each of the two players are summarized in Table 2, showing that both players are significantly more responsible for winning than for losing, and more responsible for large margin outcomes than for small margin outcomes (no significant interactions).

Not surprisingly, the players were by far the most responsible contributors to the results of the match. A corresponding 2 x 2 x 2 analysis of the two teams yielded parallel results to the analysis for the focal players: Carlsen's team was given more responsibility than Anand's team, regardless of outcome (M = 3.77 vs. M = 2.53); the winner's team was given more responsibility than the loser's; and both teams were given more responsibility for large wins/losses than for close ones. Finally, the local conditions in India were given more responsibility if Carlsen lost (M = 3.10) than if he won (M = 2.24); $F(29) = 6.50$, $p = .016$, $\eta_p^2 = .183$, whereas chance factors were believed to be more responsible for outcomes with small margins (M = 4.79) than large ones (M = 3.67); $F(29) = 10.61$, p = .003, $\eta_p^2 = .268$.

2.2.2 Sample 2: Chess players after two games

These data were collected after the first two games had ended with a draw. Despite this inconclusive start of the tournament, 22 out of 25 chess players believed that Carlsen would eventually win the championship, with an estimated mean probability of 62.2%, close to the students' estimate in Sample 1. The probabilities for the four separate outcomes were clearly subadditive, adding up to a mean of 160.9%. Only 4 respondents gave estimates summing to 100%.

Responsibility judgments show again that the two players were regarded as the major contributors to the outcome of the match, with even higher scores than in Sample 1, as seen in Table 2. A 2 (outcome [loss, win]) x 2 (margin [large, small]) x 2 (player [Carlsen, Anand]) within-Ss ANOVA showed again a main effect of player, $F(1,22)$ = 11.96, $p = .002$, $\eta_p^2 = .35$, with Carlsen being in general more responsible than Anand. There is also an interaction effect between player and outcome, $F(1,22) = 6.17$, $p = .021$, $\eta_p^2 = .22$, indicating that although both players are more responsible when they win than when they lose, this effect is even stronger for Carlsen than for Anand. No significant effect of margin was observed.

Chess players felt that the local conditions in India were rather unimportant for the outcomes, and even less so if Carlsen won (M = 1.15) than if he lost (M = 2.20); $F(1,22) = 8.29$, $p = .009$, $\eta_p^2 = .22$. They also felt that chance played a very subordinate role, especially for large outcomes ($M_{\text{large outcomes}}$ = 1.46 vs. $M_{\text{small outcomes}}$ = 1.91;

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Table 2: Mean responsibility judgments (0-10) for the two players in the five samples of Study 1.

Sample	Carlsen loses		Carlsen wins		F(outcome)[a]	F(margin)[b]	p^a	p^b	η_p^{2a}	η_p^{2b}
	Large margin	Small margin	Large margin	Small margin						
Carlsen's responsibility										
1: Students	6.10	4.70	7.33	5.57	12.11	23.44	.002	.000	.29	.45
2: Chess players	7.70	7.22	8.48	8.48	7.52	1.45	.012	n.s.	.26	.06
3: Students	6.63	5.79	7.08	6.79	7.62	6.32	.011	.019	.25	.22
4: Students	6.15	5.71	6.72	6.77	10.31	0.92	.003	n.s.	.21	.02
5: Supporters	8.10	7.90	9.00	8.90	2.81	0.27	n.s.	n.s.	.12	.01
Anand's responsibility										
1: Students	5.23	4.67	4.40	3.97	6.70	3.13	.015	.087	.19	.00
2: Chess players	7.04	7.00	6.22	6.30	2.01	0.22	n.s.	n.s.	.08	.06
3: Students	6.50	6.12	5.37	5.39	11.83	0.37	.002	n.s.	.34	.02
4: Students	5.63	5.50	4.53	4.38	11.94	0.86	.001	n.s.	.23	.02
5: Supporters	6.91	6.91	6.38	6.38	1.04	0.00	n.s.	n.s.	.05	.00

[a] Main effects of outcome. [b] Main effects of margin.

$F(1,22) = 5.91$, $p = .035$, $\eta_p^2 = .19$). The low responsibility scores for these factors may be based on a conviction that all moves in a chess game are carefully thought through, with little room for extraneous and random influences.

2.2.3 Sample 3: Students after four games

Data from this sample were collected after the first four games ended in a draw, and the scores were now 2–2. Thus, the outcome of the championship was still open. Of 24 participants, 22 believed that Carlsen would become the champion, with a mean estimated probability of 58.3%. Despite the fact that probabilities had been discussed with this particular class of students, 18 of 24 participants gave estimates for the four outcomes adding up to more than 100%.

A 2 x 2 x 2 repeated measures ANOVA with player, outcome, and margin as the three factors demonstrated again a main effect of player, $F(1,23) = 8.75$, $p = .007$, $\eta_p^2 = .28$, with Carlsen being perceived as more responsible than Anand ($M = 6.57$ vs. $M = 5.82$). We observe again a significant interaction of player and outcome, $F(1,23) = 14.65$, $p < .001$, $\eta_p^2 = .39$, demonstrating that both players are perceived as more responsible if they win than if they lose. Carlsen is also more responsible for winning or losing with a large than with a narrow margin. A parallel pattern of effects emerged for the supporting teams. The scores for the contribution of local conditions and chance were also of the same magnitude and followed the same pattern as in Sample 1 (although not significant in this rather small sample).

2.2.4 Sample 4: Students after eight games

This study was conducted after eight games had been played, including two games won by Carlsen. The score was now 5 to Carlsen and 3 to Anand, which is an unusually large lead in a world championship. Carlsen now needed only 1.5 points to win the match. Expert calculations published at this point gave him a 95% chance of winning.

Thirty-nine out of 40 participants now believed that Carlsen would win, with a mean estimated probability of 73.2%. Probability estimates for the four outcome scenarios revealed that they now thought he was equally likely to win with a large or a small margin. All but three participants produced probabilities summing over 110%.[3]

A within-Ss ANOVA demonstrated again a highly significant main effect of player, with Carlsen ($M = 6.34$) more responsible than Anand ($M = 5.08$) regardless of outcome, $F(1,38) = 11.98$, $p = .001$, $\eta_p^2 = .24$. Both players were seen as more responsible when they win than when they lose. There were no significant effects of margin. The players' teams were also seen as more responsible for a win than for a loss, and local conditions and chance were

[3] This lenient criterion for additivity was chosen as individual estimates were given on a 0-100% scale in multiples of 10, which could have made exact 100% totals difficult to obtain.

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significantly more responsible if Carlsen lost than if he won.

2.2.5 Sample 5: Supporters

This was a heterogeneous "expert" sample, consisting of journalists, sponsors, chess experts and others, united in an ardent interest for the match and their support of Carlsen. Most of them answered the questionnaire just before the 9th game when the score was 5–3 in Carlsen's favor. (Unfortunately we failed to recruit a similar sample of Anand supporters, who at this point in the match declined to be questioned by Norwegians about responsibilities.) All of them believed that Carlsen would win, with a mean estimated probability of 85.9%. Probability estimates for the four outcome scenarios show that they thought he would most likely win with a large margin, and yet that he had at least a 50% chance of winning with a very small margin. Eighteen of 22 participants produced subadditive probabilities with sums exceeding 110%.

We found again that Carlsen ($M = 8.48$) was given more responsibility than Anand ($M = 6.64$), regardless of outcome; $F(1,38) = 11.36$, $p = .003$, $\eta_p^2 = .36$. There was no significant effects of outcomes or margins, but Carlsen's team was given more responsibility if he won ($M = 4.67$), than if he lost ($M = 3.16$); $F(20) = 12.86$, $p = .002$, $\eta_p^2 = .39$, whereas chance factors were more responsible if he lost ($M = 2.31$) than if he won ($M = 1.67$), $F(20) = 5.50$, $p = .029$, $\eta_p^2 = .22$.

2.3 Discussion

The five samples of Study 1 show a remarkably similar pattern of results, despite the diversity of participants and the fact that the samples were small and data were collected at very different stages of the match. In all samples Carlsen was seen to be more responsible than Anand, and both players were judged more responsible if they won than if they lost. The players were also somewhat more responsible for large wins and losses than for wins and losses obtained with a small margin, but this effect did not always reach significance. The responsibility of the teams were, as expected, much lower than the responsibility of the players, but generally followed a parallel pattern (Carlsen's team being more responsible than Anand's, and the winner's team more responsible than the loser's). Local conditions were typically judged more responsible if Carlsen lost than if he won, whereas chance factors were consistently judged more responsible for narrow than for clear outcomes, as expected. These effects are noteworthy by being obtained from ratings performed by the same individuals in a joint evaluation mode (Hsee, Loewenstein, Blount, & Bazerman, 1999), where respondents have access to all their own ratings, and could easily have made both players equally responsible, had they so wished.

Lay people and chess experts gave very similar ratings, except that experts seemed to attribute more responsibility to the players, and less responsibility to chance factors, than the students. This might be based on professional norms holding players solely responsible for their performances, not allowing them to "excuse themselves" for a loss by blaming situational factors or their own bad luck. Indeed from popular books with titles like "Chess: the art of logical thinking" (McDonald, 2004) one might think that a game of chess at a high level would not allow for chance factors to play a part. And yet, even top ranked players (including Magnus Carlsen himself) occasionally express concern for moments of indecisiveness, flagging attention, inexplicable "faulty" moves and so on, which may give the game an unpredictable turn and lead to unexpected victories or defeats.

It is worth observing that participants in all samples give both players responsibility ratings well above 5, the midpoint of the scale. Thus they do not simply distribute the responsibility among the two competitors in a complementary fashion. Earlier studies have shown that when people assign responsibility to two individuals doing a joint task, they tend to give proportional ratings that reflect their relative contributions, adding up to 100% responsibility for the dyad, but this distributional strategy is rarely used with groups of three or more actors (Teigen & Brun, 2011). The present results show that, when two actors are competing rather than collaborating, the distributional strategy is not applied. Both players are viewed as more than 50% responsible, even if there is only one single outcome of the match, which both players have to share. This finding is in agreement with the structural models suggested by Chockler and Halpern (2004) and by Lagnado et al., (2013), which imply that crediting one player for his success does not exempt the other player from being blamed, if they have both made critical contributions to the outcome. Moreover, giving the two players the primary responsibility does not prevent secondary responsibility to be apportioned to the two teams, to extraneous influences, and even to chance factors, which are less pivotal for the outcomes.

There is no normative model of responsibility that requires a fixed sum to be distributed among the causal candidates; for instance in criminal cases two perpetrators who commit a crime together may both be given full responsibility for the act. Probability judgments are, in contrast, restricted by additivity requirements, according to which the probabilities of a set of exclusive outcomes cannot exceed certainty, or a total of 100%. But lay people asked to assess the probabilities of a set of outcomes regularly violate this basic rule (Teigen, 1983), especially if the alternatives are not set up side by side and responses are

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Table 3: Overview of participants in two samples, Study 2.

Sample	Time	Participants	N	Men	Women	Mean age	Interest in chess[a]
6	3 weeks after match	Students	101	25	76	26	1.41 (1.15)
7	3 weeks after match	Chess players	76	71	5	46	Played for 29 years

[a] Interest in chess on a 0-4 scale (Sample 6).

submitted as ratings on a scale rather than requiring self-generated, written numbers (Riege, Sulutvedt, & Teigen, 2014; Riege & Teigen, 2013). The response format used in the present study, with outcomes on separate pages, accompanied by 11-point (0-100%) rating scales, did not facilitate additive probability estimates.

3 Study 2

Study 2 was conducted approximately three weeks after the end of the championship, with two samples, one of students and one of experienced chess players. Both data collections were performed with web questionnaires (Qualtrics).

The study had four major objectives:

1. To test the robustness of the findings of Study 1 with judgments from a larger pool of participants. Data in Study 1 were collected from small convenience samples (e.g., students attending a lecture), at arbitrary points in time during the championship.
2. To compare retrospective judgments of probability and responsibility with judgments performed before the outcome was known. It is well known from "hindsight" research that judgments of the probability of an outcome can be strongly affected by outcome knowledge (Fischhoff, 1975; Hawkins & Hastie, 1990; Roese & Vohs, 2012). Causal responsibility judgments are typically done looking back at an event whose outcome is known. We are not aware of studies that have compared judgments of responsibility of hypothetical versus actual outcomes.
3. To compare responsibility judgments of a lay sample (Sample 6) with an expert sample (Sample 7) tested at the same time and under similar conditions. The experts in Study 1 appeared to differ from the lay samples by holding the players even more responsible for the outcome. However the samples were not strictly comparable, as they were tested under different circumstances and at different points in time.
4. To investigate the influence of outcome frame on responsibility judgments. The result from all samples in Study 1 showed a "Magnus Carlsen effect", as this player was held more responsible than Vishy Anand, not only if he would win but also if he would lose the match. This could be due to a selective focus on Carlsen by the Norwegian participants, who generally rooted for his victory. The salience of Carlsen might have been further enhanced by the way the outcomes were formulated, which were in all cases described from Carlsen's perspective ("suppose that Carlsen loses [wins] with a large [very small] margin"). It is obvious that Anand wins when Carlsen loses and vice versa. However, research on framing has repeatedly shown that formally equivalent frames are not always perceived as identical. One explanation is that reframing increases the salience of the explicitly targeted event (Teigen, in press). We might accordingly expect Anand to be held more responsible for an outcome described as "Anand's win", than as "Carlsen's loss", even if these outcomes are equivalent. In the present study framing effects were examined by comparing judgments under two conditions, one framed as Carlsen's losses and wins (as in Study 1), and the other describing the same outcomes as Anand's wins and losses.

3.1 Method

3.1.1 Participants

This study consisted of two samples. Participants in Sample 6 were recruited by e-mail distributed to students at the Department of Psychology at the University of Oslo; participants could win a gift card of 500 NOK (€ 63). Sample 7 was recruited at 4 different chess clubs in Norway (Table 3), with no compensation for participation.

3.1.2 Questionnaires

The questionnaires asked respondents to go back in time and try to remember the thoughts they had about the championship prior to the match. Who did they think would win? They were also asked to assess their certainty of this outcome before the match (on a 0–10 rating scale), and at which point during the match they had become certain that Carlsen would be the winner. They were then presented with the same four outcomes as in Study 1 and asked to assess their prior probabilities, and to rate for each hypo-

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thetical outcome the responsibility of Carlsen, Carlsen's team, Anand, Anand's team, the local conditions in India, and chance. Half of the participants received the outcomes described with Carlsen in focus ("Suppose that Carlsen loses with a large [very small] margin"), as in Study 1. For the other half the same outcomes were described with Anand as the focal player ("Suppose that Anand wins with a large [very small] margin"). Otherwise, the questionnaires were identical. Thus, all factors except frame are within-subjects factors.

3.2 Results

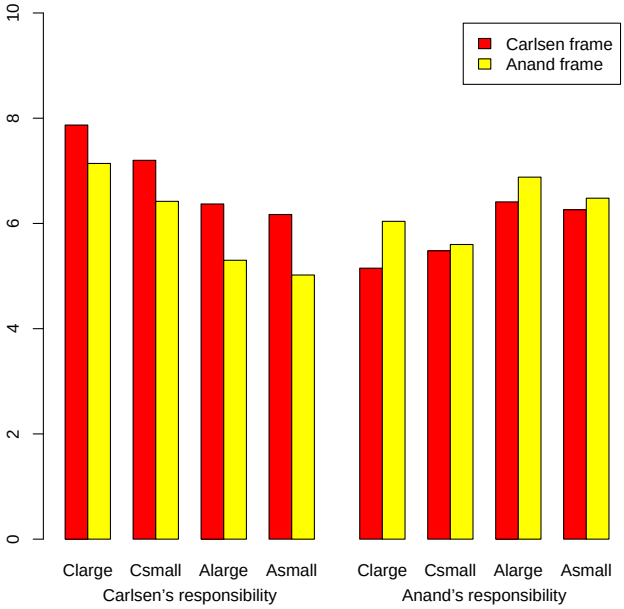
3.2.1 Sample 6: Students after the match

Altogether 85 participants out of 101 claimed that they had thought Carlsen would win even before the match, with mean certainty of 5.73 (corresponding to a probability of 57.3%). They had thought, however, that it was most likely he would win with a small margin. The probability estimates of the four individual outcomes were not very different from the prospective estimates from Study 1 that were collected during the match. Unfortunately, we failed to collect probability estimates for all four outcomes from Sample 1, which was run before the match started, so we cannot test for a hindsight bias. Yet, even though the present participants knew that Carlsen had won with a large margin, they did not claim to have known this "all along" (Fischhoff, 1975), but answered that they had believed a small victory and even a small loss to be more likely. Only three participants respected the 100% rule, against 93 whose probability estimates exceeded 110% in total for the four outcome scenarios (M_{sum} = 185.4%).

Mean ratings of responsibility for the two players are shown in Figure 1, by frame and outcome. The left panel of the figure shows that Carlsen's responsibility is consistently higher when he wins than when he loses, $F(1,94)$ = 58.12, $p < .001$, $\eta_p^2 = .38$, and more for outcomes with large than with small margins, $F(1,94) = 16.09$, $p < .001$, $\eta_p^2 = .15$, as in Study 1. However, there is also a significant effect of frame: Carlsen is consistently more responsible for outcomes described from his perspective than when the same outcomes are described as Anand's wins and losses, $F(1,94) = 6.18$, $p = .015$, $\eta_p^2 = .06$. Thus the "Magnus Carlsen effect" observed previously could be partly due to Carlsen's salience, as all outcomes in Study 1 were framed in terms of his losses and wins.

Anand's responsibility is also larger when he wins than when he loses, $F(1,94) = 31.78$, $p < .001$, $\eta_p^2 = .25$, and marginally larger for a large than for a small win/loss, $F(1,94) = 3.36$, $p = .07$, $\eta_p^2 = .06$. The right panel of Figure 1 shows that he becomes slightly, but not significantly, more responsible when the outcome is framed as his, rather than Carlsen's, wins and losses. Thus it appears

Figure 1: Mean ratings of Carlsen's and Anand's responsibility for four hypothetical outcomes, as a function of frame (Sample 6, students).
Clarge = Carlsen large win (Anand large loss);
Csmall = Carlsen small win (Anand small loss);
Alarge = Anand large win (Carlsen large loss);
Asmall = Anand small win (Carlsen small loss).



that the framing has neutralized, if not reversed, the Magnus Carlsen effect.

The responsibilities of the teams followed a similar pattern. In the Carlsen perspective condition, Carlsen's team is more responsible (M = 3.51) than Anand's team (M = 2.68), while in the Anand perspective condition the opposite pattern can be observed, making Anand's team (M = 3.56) more responsible than Carlsen's team (M = 3.27), $F(1,94) = 16.56$, $p < .001$, $\eta_p^2 = .15$. In both cases, more responsibility is given to the winner's team, with large margins producing more responsibility than small margins.

The local conditions in India were given more responsibility if Carlsen had lost (and Anand won), than if Carlsen won (M = 2.21 vs. M =1.37), $F(1,94) = 18.08$, $p < 001$, η_p^2 = .16. Such an outcome would also be more due to chance factors (M = 3.89 vs. 3.43), $F(1,94) = 16.40$, $p < 001$, η_p^2 = .15. Chance factors were, as in the previous samples, more responsible for wins and losses obtained with small margins (M = 4.10 vs. M = 3.22), $F(1,94) = 24.30$, $p <$ 001, $\eta_p^2 = .21$.

3.2.2 Sample 7: Chess players after the match

Of 76 chess players, 73 claimed to have thought Carlsen would win even before the match started. Mean certainty rating was 7.0, corresponding to a 70% probability,

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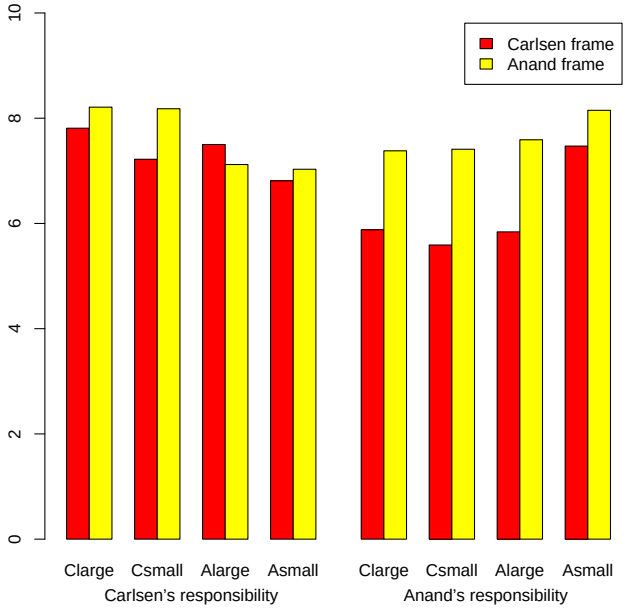
Figure 2: Mean ratings of Carlsen's and Anand's responsibility for four hypothetical outcomes, as a function of frame (Sample 7, chess players).
Clarge = Carlsen large win (Anand large loss);
Csmall = Carlsen small win (Anand small loss);
Alarge = Anand large win (Carlsen large loss);
Asmall = Anand small win (Carlsen small loss).



which is clearly higher than the students' ratings. Most of them said they had become completely certain after the sixth round (as had the students).[4] They also thought it was most likely he would win with a very small margin, but claimed they also would have given him a chance of around 50% of winning with a large margin, which is somewhat higher than the expert sample early in the match. But the latters' estimates had been elicited after two draws, which may have reduced Carlsen's perceived chances of a runaway victory. The chess players were not much better than the students in respecting the 100% limit of probabilities. The overall majority, 59 out of 67 participants, gave probability estimates exceeding 110% in total for the four outcome scenarios (M_{sum} = 166.7%).

Mean ratings of Carlsen's responsibility are presented in the left panel of Figure 2, which shows that Carlsen's responsibility is consistently higher when he wins than when he loses, $F(1,64) = 13.37$, $p = .001$, $\eta_p^2 = .17$, and higher for outcomes that are won/lost with large than with small margins, $F(1,64) = 16.09$, $p = .016$, $\eta_p^2 = .09$, consistent with the findings in the student sample. However, this time there was no significant effect of frame, as Carlsen appeared to be about equally responsible regardless of how the outcomes were framed.

In contrast, Anand's responsibility turned out to depend heavily on the way the outcomes were framed (Figure 2, right panel). When outcomes were framed in terms of Carlsen's failures and successes, Anand was given a mean responsibility of 5.94, but when the same outcomes were described from his perspective, his mean responsibility increased to 7.63; $F(1,64) = 8.70$, $p = .004$, $\eta_p^2 = .12$.

The teams' responsibilities were larger for wins than for losses: Carlsen's team was more responsible if Carlsen won (and Anand lost) than if Carlsen lost, and Anand's team was more responsible if Anand won (and Carlsen lost), than if Anand lost. As with the students, local conditions in India mattered more if Carlsen lost, and chance mattered more for outcomes with small margins, regardless of perspective. There was also in this sample a consistent trend to give higher responsibility ratings to extraneous influences in the Anand frame.

3.3 Discussion

Retrospective responsibility judgments for actual and hypothetical outcomes appear to be largely of the same magnitude and follow the same pattern as the prospective responsibility judgments reported in Study 1. Unfortunately we did not have answers from a sample of chess players prior to the match, making it difficult to assess the influence of outcome knowledge more precisely. We found, however, a substantial framing effect. The "Magnus Carlsen effect", that could be observed for outcomes described as Carlsen's wins and losses, disappeared when the same outcomes were described as the wins and losses of Anand. In the lay sample, Carlsen's responsibility changed with frame, and became considerably reduced in the Anand frame, whereas Anand's responsibility stayed the same under both frames, as is evident from a comparison of the left and the right panel of Figure 1. In the expert sample, framing affected primarily the responsibility of Anand (Figure 2). The expert sample also differed by giving consistently higher responsibility ratings to the players (overall means 7.49 and 7.64 for Carlsen and Anand, respectively), compared to the student sample (whose overall means were 6.44 and 6.04, respectively). On the other hand, chess players attributed less responsibility to chance than did the students ($M = 1.94$ vs. $M = 3.66$), as in Study 1. These differences suggest divergent notions about the nature of a chess match and its determinants. However, they could also reflect a more cautious response style on the part of the students, with regressive ratings closer to the midpoint of the scale (5). Similarly, as in Study 1, both novices and experts demonstrated substantial additivity neglect, summing up the probabilities for the four outcome alternatives to more than 100%.

[4] Carlsen himself claimed that he had become certain of winning after the third round (which ended with a draw), when he realized that he was a better player than Anand.

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4 General discussion

Data collected from seven lay and expert samples, at different points in time, paint a consistent picture of the factors that are perceived to be most responsible for the outcome of an important chess match. The main findings can be summarized as follows:

1. The winner is regarded as more responsible than the loser. Even if responsibility is in practice mostly discussed in a context of failures and mistakes, and is often equated with blameworthiness, the winner's achievements (along with his intentions of winning) seem to make him more of a contributor to the end result than his adversary who fails. In line with this, it is reasonable that people think that the victor in a highly skill-based sport wins because of extraordinary good play rather than of bad play by the opponent. This view was also shared by the expert chess players. Moreover, in line with the predictions of structural models (Chockler and Halpern, 2004; Lagnado et al., 2013) both the winner and the loser were perceived as having more than 50% responsibility. This pattern was displayed by all samples in both studies.

2. Players are regarded as more responsible for large wins and losses than for outcomes earned with a smaller margin. This effect was perhaps less consistent, but could have been predicted from a notion of causal power and the correspondence principle originally proposed by John Stuart Mill (1856; Nisbett & Ross, 1980; see also LeBoeuf & Norton, 2012), according to which "large" effects are assumed to be due to "large" causes. In the present case, participants might think that victory with a large margin implies more competence, and hence more causal responsibility on the side of the winner. The loser also becomes more responsible by revealing more incompetence and larger mistakes. Chance factors were in all samples viewed as more responsible for small wins and losses than for big ones.

3. The Magnus Carlsen effect. All samples in Study 1 made Carlsen more responsible than Anand, independent of outcome. This cannot simply be due to a desirability bias, as he was held more responsible than Anand for both wins and losses. Confirming previous research (Bar-Hillel et al., 2008; Krizan & Windschitl, 2009; Windschitl, 2003), salience (focalism) appears to be a better candidate for explaining the Carlsen effect. Carlsen was clearly the focal player for the Norwegian participants. Moreover, in Study 1 the outcomes were formulated as Carlsen's wins and losses. Study 2 showed that the Carlsen effect could be neutralized and even reversed by replacing them with equivalent formulations featuring Anand as the target player, making it less likely that the Carlsen effect was simply a product of Norwegian media coverage.

4. Framing. The latter finding revealed that responsibility judgments are also sensitive to how the outcomes are framed. Carlsen turned out to be more responsible for "Carlsen's loss" than for Anand's victory, according to Sample 6. Similarly, the chess experts in Sample 7 regarded Anand as more responsible for his losses than for Carlsen's corresponding victories.

Frames have a communicative aspect: by choosing one frame rather than another a speaker may "leak information" (Sher & McKenzie, 2008) about communicator preferences and states of the world. For instance "a half full glass" may have been empty to begin with, whereas a half empty glass might have been previously full (McKenzie & Nelson, 2003). Thus, when speaking of a particular outcome as Anand's victory (rather than Carlsen's loss), the speaker may already imply that Anand deserves more credit for the results. "Carlsen's loss" suggests, conversely, that Carlsen has mainly himself to blame for what happened.

5. Finally, participants in the expert sample attributed more responsibility than students to the players and less to chance factors. This difference was unexpected, given the fact that chess players should know more than students about variability in performance and situational factors impacting the performance of players during a sequence of games. It could, however, have been due to role norms dictating chess players to be made fully responsible for the outcomes and the subordinate role of chance in chess. Students might have been less certain about what are the decisive factors in chess and produced accordingly more regressive ratings. Interestingly, Carlsen himself (kindly answering our questionnaire after the match) assigned much higher responsibility to chance factors, perhaps due to modesty, but also by being aware of all the details and individual moves in each game, performed by himself and his opponent, that could have been different and might have produced a different outcome. Otherwise, the lay and expert samples were quite concordant in their patterns of responsibility judgments, despite their considerable differences in knowledge, background, gender, and age.

The findings summarized above are compatible with a view of causal responsibility and agency as coextensive concepts (Frith, 2013). Recent research on agency has been primarily concerned with the experience of personal agency by the actors themselves and the determinants of such feelings (Damen, Baaren, & Dijksterhuis, 2014; Wegner, 2003). In contrast, the present research is about how people perceive the agency and causal responsibility of other decision makers, regardless of their real or illusory conscious experiences. It is reasonable to assume that people are perceived as more agentic when they succeed, and reach their goals, than when they fail, which agrees with the finding that they are rated more responsible in former case than in the latter. This effect can also be predicted from the assumption that actions make peo-

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ple seem more responsible than inactions (Zeelenberg, van der Pligt, & de Vries, 2000). Chess players often claim that winners succeed by taking and maintaining the initiative, highlighting the winner's (as opposed to the loser's) active role during a game.

Moreover, large effects should be associated with more agency (they require more agentic power) than less conspicuous outcomes. Finally, a salient favorite actor should be imbued with more agency and hence be perceived as more responsible than an actor who is not in focus. Likewise, an actor placed as the grammatical subject of a statement ("Carlsen loses the match against Anand") is clearly presented as more agentic than the same actor featuring as the object in a verb phrase ("Anand wins the match against Carlsen"). We have previously found that decision makers who take risky decisions, or act against others' advice, will be given more responsibility for the outcomes of their decisions (Nordbye & Teigen, 2014). They were also expected to be more personally involved, and presumably more agentic. The present study may not just be informative about responsibilities in the realm of chess, but also add to our knowledge of what makes actors appear agentic and how responsibilities are shared between mutually dependent opponents. The effects of verbal frame have implications for outcome communication; for instance, it may be helpful for managers and politicians to realize that it is better to declare that "they won" than "we lost"—at least when it comes to reducing the perceived responsibility for a defeat.

The generality of the present research is limited by the fact that we studied a single championship with participants who favored only one of the competing parties. There is an obvious need to conduct complementary studies where participants from both sides can be compared. Moreover we do not know to what extent responsibility judgments obtained from a chess event are applicable to other, less intellectual, sport domains, like football and basketball, where motivational and situational factors are often viewed as more important. Yet the robustness of the present results, obtained from several lay and expert samples at different points in time during a real sports event, illustrates how responsibilities can be distributed between competing players.

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