

Spare me the details and tell me who won - how election polls accuracy and forecast affect their credibility

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Abstract

Election polling plays an increasingly important part of the media election coverage and has received wide public attention the past years. Failing to predict the outcome 2016 US Election and Brexit, polls have been subject to a substantial amount of public criticism and distrust. This paper investigates whether election polls' accuracy and their ability to forecast the winner affect, how credible people perceive these polls. We conducted a survey experiment (n=311), where subjects were randomly presented with a news bulletin describing how an average of the pre-election polls a) either predicted the right or wrong winner and b) whether the prediction were far from or close to the election result. The results show that being right matters more for the perceived credibility of election polls than being accurate. The study argues that the media should be considerate when reporting results from elections polls where the estimates are close to the threshold deciding the election's winner or loser. This becomes all the more important when the value of the winning threshold is within the margin of error of the poll estimate. Failure to predict the right winner can ultimately lead to a decrease in poll credibility, even if the forecast might be close to the final result in statistical terms.

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1. Introduction

Recent years election polls have become a bigger part during election campaigns, and they receive more attention in the media election coverage (Dahlgard, Hansen, Hansen, & Larsen, 2016; Hillygus, 2011; Traugott & Lavrakas, 2016). The recent years' increased use of election polls sparked a public and academic debate and critique of their ability to forecast an election result, and many people have been questioning election polls' credibility and usefulness (Cassino, 2016; Jennings & Wlezien, 2018; Zukin, 2015). This has been especially evident in the limelight of the 2016 United Kingdom European Union Membership Referendum (Brexit) (Barfar & Padmanabhan, 2015; Jennings & Wlezien, 2018), 2015 United Kingdom General Election (2015 UK Election) (Sturgis et al., 2016) and the 2016 United States Presidential Election¹ (2016 US Election) (Blumenthal et al., 2017), where the polls failed to predict the outcome of the elections².

The critic is somewhat paradoxical since the quality of election polls has increased in recent years, and they have on average become a better predictor of electoral outcomes (Blumenthal et al., 2017; Jennings & Wlezien, 2018; M. V. Larsen, 2016). In this regard the 2016 US and the 2015 UK Elections are interesting cases. The 2016 US Election polls were on average closer to election results than in the 2012 election – but the polls predicted the right winner in 2012, but not in 2016 (Blumenthal et al., 2017). A similar scenario emerged after the 2015 UK Election, where the election polls predicted the wrong winner and received a lot of public attention and criticism, although they were not much worse than polls at the most recent elections (Sturgis et al., 2016)

¹ During the presidential election FiveThirtyEight was one of the institutes that gave Trump the biggest chance of winning the day before the election, but still only with a 29 % chance of winning the Electoral College (Silver, 2016). After the 2016 US Election, medias such as New York Times ran stories with headlines such as “*How data failed the US in Calling an Election*” (Lohr & Singer, 2016).

² As a consequence of election polls' past failures the two largest broadcasting channels in Denmark (DR & TV2) decided to abandon election and exit polls in their election prior to the 2017 Danish Municipality and Regional Election (Hjort, 2015; Lauritzen, 2017).

People seem to base their criticism of election polls on single events rather than a general development. It is thus relevant to consider how people update their assessment of election polls credibility after an election based on a comparison of election result and the polls predictions. Hillygus (2011) raises the question of how we determine successful polls; Are polls deemed successful when they predict the right winner or make an accurate estimate which comes close to the election result? In this paper, we aim to shed light on this question by investigating *how the accuracy and the forecast of election polls affect how credible people perceive them?* For the remainder of this paper we use the notion of the polls “forecast” when we refer to their ability to predict the right or wrong winner. When we use the term “accuracy” we refer to the polls ability to make a prediction with a small or large margin to the election result.

Studies investigating the recent decline in poll’s credibility has predominantly focused on improving the quality of polls. This line of research has discussed how pollsters would benefit from making methodological advances by improving response rates and insuring more representative samples (Blumenthal et al., 2017; Cassino, 2016; Sturgis et al., 2016; Zukin, 2015) how to prevent social desirability bias in regard to intended turn-out and vote choice (Zukin, 2015), called for alternative forecasting methods (Barfar & Padmanabhan, 2015), how using aggregate measures of polls results may improve forecasting (Blumenthal, 2014; Fisher & Shorrocks, 2018) or the possibilities of probabilistic forecasting³ (Lohr & Singer, 2016; Westwood et al., 2018). Other studies have criticized the medias use of polls their election coverage for not paying sufficient attention to the statistical limitations (Bhatti & Pedersen, 2015; E. G. Larsen & Straubinger, 2012; Lohr & Singer, 2016), not clarifying whether polls measure a specific point in time (current voting intension) or try to predict future event (future election results) (Blumenthal, 2014), or only reporting polls that concurs with the media outlets political disposition (Searles, Ginn, & Nickens, 2016). This methodological aspect of improving polls are highly relevant and important – but this debate says nothing on predictions

³ This has been criticized for not reflecting the closeness of an election, making it difficult for people who do not have the necessary competencies understand probabilities to translate them into expected vote shares and demobilize the public (Lohr & Singer, 2016; Westwood, Messing, & Lelkes, 2018)

actually influence perceived credibility. Some studies of the perceived credibility of polls have focused on third person effects and shown that those who think polls will affect others and not themselves also express a distrust in election polls (Price & Stroud, 2005; Wei, Lo, & Lu, 2011). However, these studies do not tell us anything of how the quality of polls prediction – understood as their ability to forecast the winner and/or make accurate estimate of the election result – affect their credibility. Other research in opinion polls credibility has predominantly focused on how voters perceive polls that forecast an outcome which coincides or opposes their predisposition, and shown that polls contradicting prior opinions is perceived less credible (Chia & Chang, 2015; Kuru, Pasek, & Traugott, 2017; Tsfati, 2001). While this line of research was given valuable insight on how voters perceive the credibility of a single poll, it does not answer the question of how the quality or prediction of many aggregated polls affect their perceived credibility. We elaborate on this by investigating how voters perceive the credibility of elections polls in general instead of focusing on one specific poll. Our study furthermore broadens the scope by focusing on how voters' perception of polls' credibility is updated their ability to predict the right winner and/or get close to the election result disregarding any similarities between voter's opinions and the forecasted result. We apply a simpler approach by focusing our attention on how polls ability for forecast the right winner and produce an accurate estimate close to the election result disregarding the political outcome.

2. Theory

Research on how polls credibility is affected by voter's predispositions has its theoretical foundation in motivated reasoning, but tend to focus on the consequences of a single polls prediction concurring with the voter's political predisposition, which we abstain from in this paper (Chia & Chang, 2015; Kuru et al., 2017; Tsfati, 2001). This line of research however, does gives us insights on how voter update their perceptions of polls credibility when being presented with results from a concrete election polls We believe that people will update their trust in election polls based on an evaluation of how polls have fared in a recent election. This evaluation will then update their general perception of election polls. We base our understanding of how people update their belief in opinion polls' credibility on very general understanding of opinion formation and will not go into detail about whether this update of opinions is affectively charged (Lodge & Taber, 2013) or based

on cognitive endeavors (Petty & Cacioppo, 1986). The purpose of this study is not to arrive at a deeper theoretical understanding of how credibility of polls is constructed but mainly to explore how it is affected by polls ability to forecast the right winner and be accurate. We stick to the notion of general opinions being updated in the light of recent information – in this case how people perceived credibility in election polls is affected by their forecast and accuracy.

2.1 The forecast and accuracy as heuristics

In this section we elaborate on how the accuracy and forecast affect people trust in polls. As mentioned above we want to investigate how polls fared at an election affect the perceived credibility of election polls – both at the most recent election and polls in general. For the remainder of this paper we will refer to specific and general credibility when people evaluate the credibility of polls at respectively the most recent election and polls in general. From a statistician's point of view polls should be evaluated on their accuracy. Polls that has a small margin to the election result should be deemed more credible regardless of the prediction is above or below an arbitrary threshold that decides the winner of election. For example, if a party gets 51 % of the votes in an election where it takes 50 % of the votes to win, a poll predicting the eventual winner to get 49 % of the votes should be deemed equally credible as a poll predicting that the party gets 53 %, as both polls were +/- 2 %-point from the result. The only difference being that the latter's forecast was above the winning threshold and the former below. The same case could be made for two polls predicting respectively 39 % and 43 % for a party that gets 41 % of the votes at an election where it takes 51 % votes to win. In this case both predictions have the same margin to the election result, but none of them make a wrong forecast. Here, people would be more likely to base they assessment of the polls credibility solely on the accuracy rather than the forecast. But what is the winning threshold for the sake of the argument had been 40%, would the voters then give more weight to the polls accuracy or forecast?

Voters seldom have the time and/or ability to process and judge all the information they receive during an election campaign. Most voter will therefor make use of heuristics, a cognitive short cut, when evaluating political information (Kahneman, 2003; Sniderman, Brody, & Tetlock, 1993). This also goes for election polls where we cannot expect people to evaluate and remember how many percentage points each

election poll was from the result – i.e. base their evaluation on the polls accuracy. This task will be further complicated by the fact that one must account for if the election results lies within the margin of error of the election polls. A task that takes some statistical training to conduct (Feric & Posavec, 2013; Lohr & Singer, 2016; Meffert & Gschwend, 2011; Westwood et al., 2018). On the other hand, we expect that people are more likely to remember if the opinion polls pointed in the direction of electoral outcome and base their judgement on this – i.e. the forecast. The forecast can thus be viewed as a heuristic when judging elections polls credibility because it is easier to base this assessment on the notion of them forecasting the right winner than how accurate they were in statistical term. This lead us to our first hypothesis:

H1a: A poll forecasting the right winner has a larger positive effect on the specific credibility than polls with high accuracy

This hypothesis investigates credibility in the specific poll, but says nothing about the general credibility. As mentioned above we believe that people general opinion is updated when evaluating new information on the same issue. In this case polls general credibility will be affected by the same factors as the specific credibility although effect is not assumed to have the same impact.

H1b: A poll forecasting the right winner has a larger positive effect on the general credibility than polls with high accuracy

As mentioned above we believe that the accuracy – i.e. the margin from a poll’s estimate to the actual election result - can affect the perceive credibility of election polls. Meffert and Gschwend (2011) show that people who are aware of polls prediction are better at forecasting the election result. The same notion is made by Westwood et al. (2018) who argue that it that it takes statistical training to understand polls. In line with these arguments we expect people ability to comprehend statistics will influence how they evaluate election polls credibility.

In psychological research it has been discussed whether numerate individuals process information differently. Numeracy can be “defined as the ability to understand probabilistic and mathematical concepts” (Peters, 2012). Numerate people are expected to be better equipped to using numerical information in their decision-making process, because they can decode the meaning behind numbers and understanding what they are an expression of and represent in societal terms (Peters, 2012), i.e. an understanding of the electoral consequences if a coalition of parties get respectively 49%, 51 or 57 % of the votes. Non-numerate people are on the other hand more prone to ignoring numerical information when assessing a societal issue and more affected by non-numerical information (Peters, 2012). We have included numeracy rather than knowledge and education in our analysis, because we often see variation in numeracy among people with the same level of political knowledge or one the same educational level (Peters, 2012). This will come in handy in our study since the experiment was conducted on a homogenous group enrolled on a higher education (See Methods section). Enos and Hersh (2017) & Lohr and Singer (2016) has shown that the perception of electoral closeness is influence by how statistically sophisticated people are. People often fail to estimate the closeness of an election when they are presented with probabilistic aggregators of an election result because they are not capable of understanding them. And so, arguably, numerate people will be less influenced by polls ability to forecast the right winner and more reliant on their accuracy in the perception of polls’ credibility, which lead us to our second set of hypotheses.

H2a: The effect of polls forecast versus their accuracy on specific credibility is weaker for numerate people

H2b: The effect of polls forecast versus their accuracy on general credibility is weaker for numerate people

To sum up, we expect people to update the perceived credibility of election polls by evaluating how they fared in predicting the result of the most recent election. People can either rely on the accuracy – how close polls

prediction came to the election result - or their forecast – if polls managed to predict the right winner. We hypothesize that the forecast has a larger effect on polls credibility than their accuracy. This effect is expected to be weaker for numerate people, who has the competences to judge polls based on their statistical merits. We expect to see this relationship for the credibility of polls at the most recent election and polls in general, although the effects are expected to be larger for the former.

3. Research Design

We conducted a 2x2 between subject design to investigate how polls accuracy and forecast affected opinion polls credibility. The subjects were randomly assigned to one of four groups varying on whether the election polls had a) predicted the right or wrong winners and b) had a forecast that was either close to or far from the election result. The experiment was conducted without a control group since we were interested in how the subjects would evaluate specific poll results. All the subjects hereby had to be presented with the results of some election polls in order to be able to compare their perceived credibility.

3.1 Sample

Our sample consist of 423 (55% females, age: min. = 20, max. = 50, M = 23, SD = 3.6) undergraduate journalism and political science students from respectively the University of Copenhagen and University of Southern Denmark⁴. The students had received a teaching in introductory statistics as part of their education, and were expected to have substantial knowledge of the possibilities and limitations of statistics to interpret election polls. A sample consisting of journalists and political scientists is relevant because most election and opinion polls in the media get produced and reported by people with this educational background. Journalism and political science students have a special responsibility in ensuring opinion polls are conducted and interpreted correct when being presented to the broader public and they are more experienced when it comes to reading polls. Our sample can thus be viewed as a conservative test because our subjects, in contrast to the broader public who do not possess the same level of statistical training, are expected to evaluate the credibility

⁴ Journalism University of Southern Denmark n=132, Political Science University of Southern Denmark n=46, Political Science University of Copenhagen n=245

of opinion polls based on their ability to make an accurate estimate rather than forecasting the right winner. Using a student sample does induce some limitations to the generalizability of the study, but the goal is here to estimate a local-average-treatment-effect (LATE), as the effect only will describe the effect for a given subpopulation and in a given setting (Druckman & Kam, 2011).

3.2 Case

The subjects were asked to evaluate the credibility of election polls publicized before the 2013 Regional Election for the Capital Region of Denmark. The Regional Elections in Denmark are often rated as a second order election and do not receive as much public attention as municipal or nation elections. Few respondents were thus expected to be able to recall each coalitions vote share, or how the opinion polls fared which made our treatment (see under Stimuli) appear more credible. The 2013 Regional Election was thus deemed as a suitable case for our study with higher experimental realism compared to more recent and/or higher salience elections.

3.3 Procedure

The experiment was conducted as part an online survey distributed between November 7th, 2017 and February 28th, 2018. The subjects received the survey on their student email address and answered the questions in a class room setting with an experimenter being present. The survey was send out to 575 students and 423 completed the survey resulting in a response rate of 74%.

The subject answered a series of background questions (gender, birth year & party choice). Afterwards they completed the Cognitive Reflection Test which was included in order to measure their numeracy (see Measures). The subjects were then presented with a short text describing the result of the 2013 Regional Election and the average prediction by the election polls prior to the election. As part of the experimental stimuli the subjects received different predictions (see Stimuli). Upon reading the text they answered questions on how credible the polls were at this specific election and in general. After these questions the experiment ended whereupon the subjects were debriefed and thanked for their participation.

3.4 Stimuli

The experiment was designed as 2 x 2 factorial design with variation on the election polls accuracy and forecast. We define the forecast as the election polls ability to predicting the right or wrong winner of the election. The accuracy is defined as the polls having a small margin (+ / - 2 percentage points) or large margin (+/- 5 percentage points) to the election results. This design enabled us to test how different combinations of election polls forecast and accuracy affected their credibility, and hereby being able to judge which factor had the highest impact. The default in each treatment group was that the red coalition won the election with 51 % of the votes. 51% was selected as a default in because it was close to the actual election result⁵ without the subjects detecting a manipulation and it ensued that a prediction with a small margin could either predict the right or wrong winner. The subjects were randomly assigned to one of the four groups in table 1⁶.

Table 1 – Treatment conditions

		<u>Accuracy</u>	
		<i>Small margin (+/- 2 p.p.)</i>	<i>Large margin (+/- 5 p.p.)</i>
<u>Forecast</u>	<i>Correct prediction</i>	T1: Red coalition wins with 51 % in election, polls predicted 53 % N=103	T2: Red coalition wins with 51 % in election, polls predicted 56 % N=113
	<i>Wrong prediction</i>	T3: Red coalition wins with 51 % in election, polls predicted 49 % N=102	T4: Red coalition wins with 51 % in election, polls predicted 46 % N=105

⁵ The coalition led by the Social Democrats and consisting of mostly leftist parties won the election with 53% percent of the votes (KMD, 2018; SN.dk).

⁶ A randomization test was conducted to test whether there were any significant differences between the treatment groups on back ground characteristics and the independent variables. We found no significant differences between the various back ground variables and the four treatment groups (see Appendix - Randomization test)

3.5 Measures

As mention in the previous section, we wanted to investigate the specific and general credibility of election polls. We applied the following two questions to measure the subjects perceived credibility of election polls:

- How credible do you think that the polls during this specific election were? (1=Very credible-5= Not very credible)
- How credible do you think that polls in general are? (1=Very credible-5=Not very credible)

Specific credibility had a mean on 2.5 of a scale from 1 to 5 with a standard deviation on 1,1. General credibility had a mean om 2.5 and a standard deviation on 0,9.

We also included our own version of the Cognitive Reflection Test (Frederick, 2005) to measure the subject numeracy as we hypothesized that the effect of the treatment was contingent on the subjects' ability to understand and process statistics in thoroughly (Knobloch-Westerwick, Johnson, & Westerwick, 2014). This test is developed to measure "...the amount of conscious deliberation that people are willing in cognitive elaboration" (Knobloch-Westerwick et al., 2014) and can capture people's tendency to rely more on automated and fast system 1 (non-numeric) or slow and reflective 2 processing (numeric) (Thaler & Sunstein, 2008). Each question is designed to elicit an obvious but wrong answer, that people who are prone to spontaneous and intuitive thinking will provide. The right response will on the other hand require more elaborate and analytical thinking, which numerate people will be more disposed to give (Knobloch-Westerwick et al., 2014; Peters, 2012). Our numeracy measure was based on the following two questions:

- A ball and a bat cost 110 Dkr in total. The bat cost 100 Dkr more than the ball. How much does the ball cost?
- If it takes 5 washing machines 5 minutes to wash 5 towels, how long would it take 100 washing machines to wash 100 towels?

In the analysis, these two variables were transformed into a dichotomous variable; 0 = no correct answers (33%) and 1 = at least one correct answer to both questions (67%)⁷. We also included gender, age and party choice in the survey to make covariate-adjustment possible and make a randomization check. Party choice was included because research on election polls credibility has shown that people deem polls more credible if the forecast a result that concurs with peoples' predispositions as argued in the previous section. In the analysis, this variable is transformed into a dichotomous variable describing, 1 = vote for a red coalition, 0 = vote for a blue coalition⁸.

4. Results

In the following section we will present the analysis of election polls accuracy and forecast affect their credibility. The first section goes through the direct effect of how election polls ability to respectively predict the right winner or have a small margin to the election result affect the respondents trust in them. The second section show how this relationship is conditioned by the subject's numeracy.

4.1 Direct effect on specific credibility

Figure 1 show the average credibility of a specific election polls across the four treatment groups. The Y-axis indicate the perceived credibility on a 5-point likert scale going from 1=Very credible to 5= Not very credible (see section 3.5) Election polls that both predicted the right winner and was close the result are perceived as the most credible. This is followed by the polls which predicted the right winner but was far from the result. The third most credible polls were the one that predicted the wrong winner but was close to the election result. These three polls are all deemed somewhat credible with an average below the scales midpoint (3). The least

⁷ The correct answer to both questions is 5.

⁸ A red coalition consisted of The Social Democrats, Danish Social Liberal Party, The Socialist People's Party & Red-Green Alliance. A blue coalition consisted of the Conservative People's Party, The New Right, Liberal Alliance & Venstre. This division is based on the typical way Danish parties allies during an election. It should be noted that it is different from coalitions the parties formed during the 2013 regional election (Hovedstaden, 2013; SN.dk). During regional and municipal election campaigns parties often form coalitions that is different from the classic left-right party divide we see at the national level and untraditional alliances occur. These coalitions are not based on a binding agreement and are sometimes abandoned after the election during the constitution. The coalition forming process at second order elections is thus not very transparent and voters are not completely aware of which parties belong to which constitution. We chose to divide the parties in to a red and blue coalition based on the political allegiances at the national level, because it is closer to how the Danish voters think of coalitions in Danish party politics.

credible poll was the ones presented for treatment group 4, where the polls predicted the wrong winner and was far from the result. These descriptive statistics indicate that the polls forecast is more important their accuracy.

Figure 1 – Specific credibility of election polls

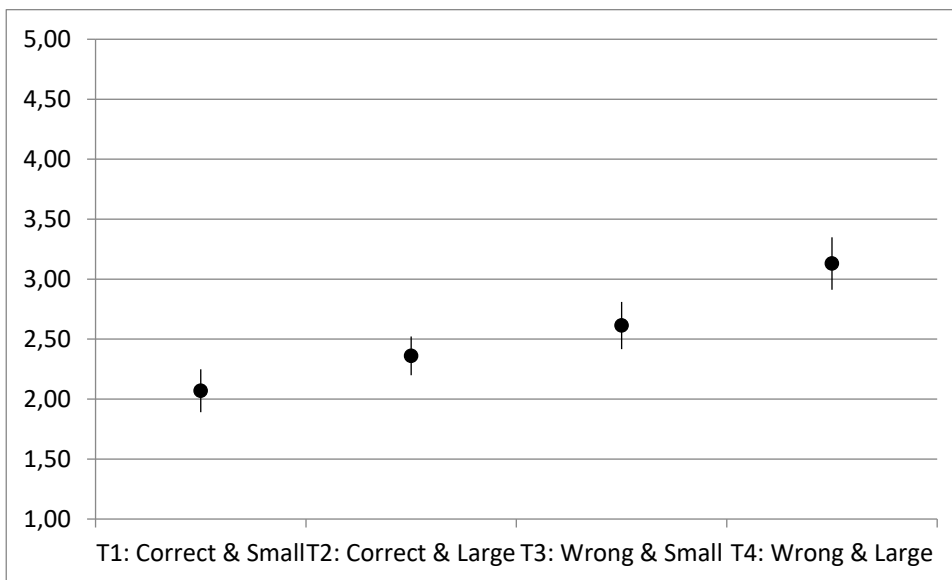
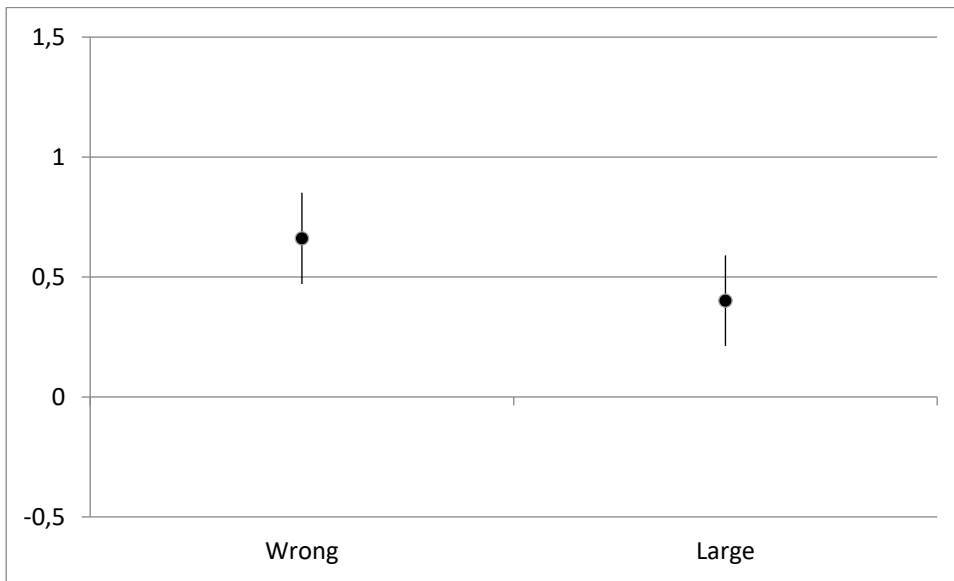


Figure 2 show the average marginal effect of how respectively predicting the wrong winner or having a large margin to the election result affects the election polls credibility. Predicting the wrong winner has the largest negative effect and decreases elections polls credibility with an average of 0.7 point on a scale from 1 to 5. Being inaccurate also decreases the trust on opinion polls but only with an average of 0.4 points. These results suggest that predicting the right winner is more important than getting close to the election result.

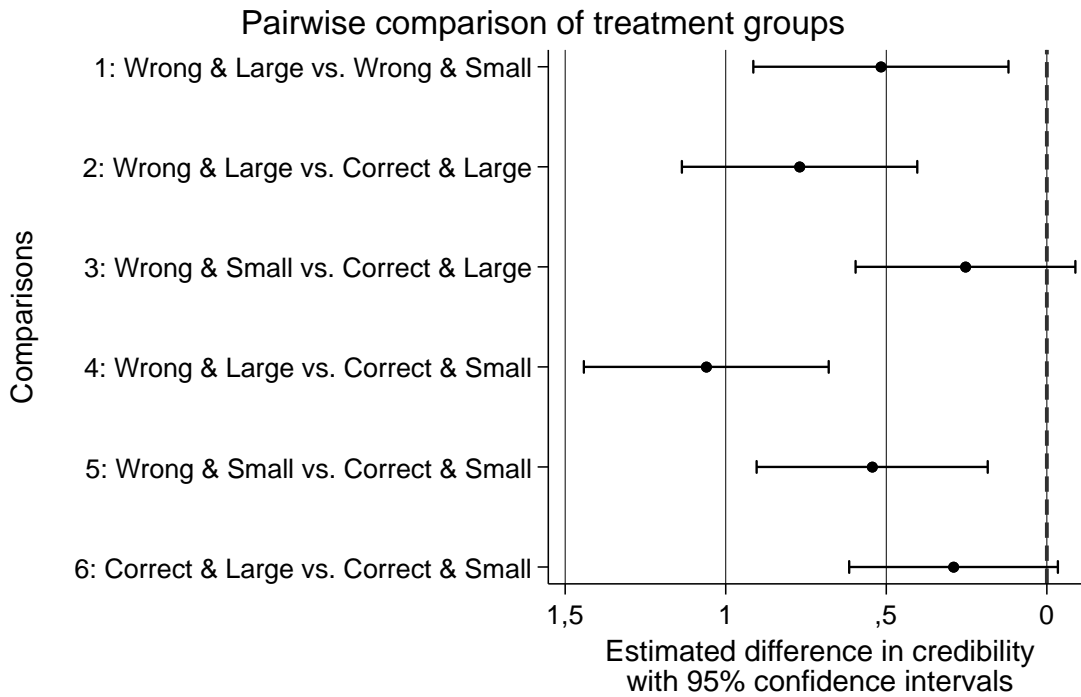
Figure 2 – Average marginal effect of forecast & accuracy on specific credibility



Note: Estimates are based on Model M1 in Table 2 in appendix A. Estimates are displayed with 95 % confidence intervals.

To further nuance the results, figure 3 compares the average credibility of election polls across the four treatment groups and show the differences between. Each comparison of the treatment groups is marked by a number on the Y-axis. Whenever the point estimate is to the left of the 0-line it signifies that the first mentioned group perceive election polls to be less credible that the second treatment group. The difference between two groups is statistically significant whenever the confidence interval does not cross the 0-line.

Figure 3 – Pairwise comparison of specific credibility between treatment groups



Note: Estimates are based on Model M1 in Table 2 in appendix A. Estimates are displayed with 95 % confidence intervals.

Figure 3 shows that there is no significant difference in the election polls credibility between the two groups that were presented with polls which had a right forecast in comparison 6. This suggest that is does not matter if polls are far from or close to the final election result if they predict the right winner. This supported by comparison 5 where the two groups that were both to close the result but where one got the winner right and the other got it wrong. The latter group find the election polls credibility significantly lower than the former, which is interesting since they were both equally close to the election result. The only difference between the two being one predicting a result above the 50 % threshold and the other below. In other words, these two presentations of election polls should have resulted in the polls being deemed equally credible, because they are equally close to the election result. This pattern repeats itself in comparison 2 when we look at the two groups that had a large margin to the election result. Comparison 3 where one poll predicted the wrong winner and came close to the result and the other poll that got the winner right but was far from the election result add

to this point. The former should be perceived as the most credible since it was closer to the actual result than the later, but the figure show the opposite. These results confirm out first hypothesis stating that a right forecast gives opinion polls more credibility than an accurate.

4.2 Direct effect on polls general credibility

Next, we turn to our investigations of how polls at the most recent election affect elections polls general credibility. Once again, we expect polls forecast to affect election polls more than their accuracy. First, we look at the average credibility of election polls in figure 4.

Figure 4 – General credibility of election polls

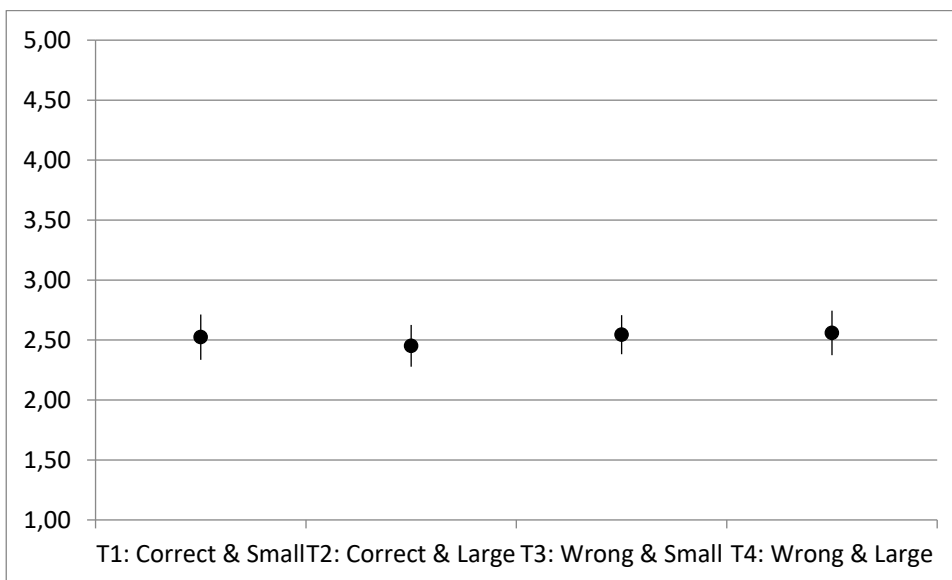
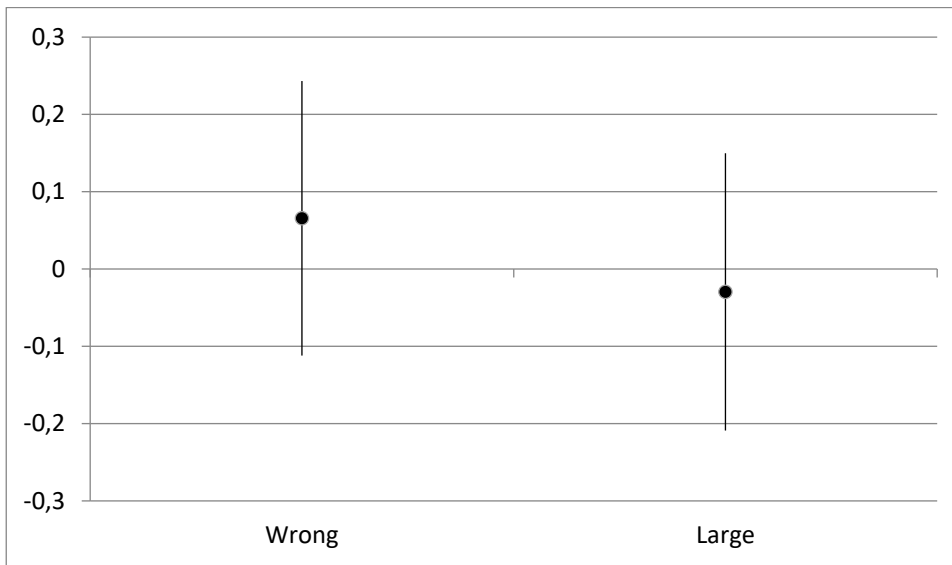


Figure 4 show that the average credibility is more or less the same across all four treatment groups. With an estimate of 2,5 on a 5 points scale, the subjects in all the treatment groups find election polls somewhat credible in general. These finding indicate that the quality of polls at the most recent election does not influence people's general opinion of election polls. Next, we turn to the effect of how the forecast and the accuracy of election polls affected their general credibility in figure 5.

Figure 5 – Average marginal effect of forecast & accuracy on general credibility



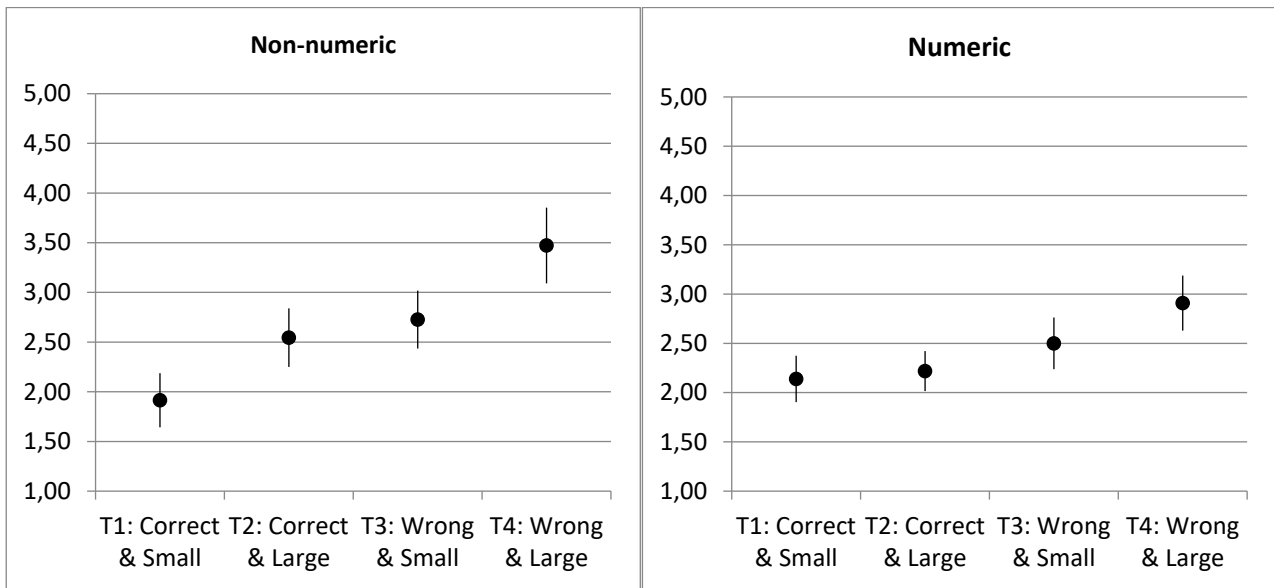
Note: Estimates are based on Model M3 in Table 2 in appendix A. Estimates are displayed with 95 % confidence intervals.

We can see from figure 5 neither the forecast nor the accuracy of election polls had any effect on how the subjects perceive election polls credibility in general. Both forecasting the wrong winner and having an estimate with a large margin to the election result were insignificant which is illustrated by the estimates confidence intervals overlapping the 0-line. Our subjects did not update their general trust in election polls on basis of how they fared at a recent election. We can thus reject hypothesis H1b.

4.3 Specific credibility and numeracy

In this section we investigate how the effects of election polls forecast and accuracy is moderated by people ability to understand statistics. Figure 6 show the average credibility in opinion polls across the treatment groups divided in to two groups of subjects who are respectively numeric and non-numeric.

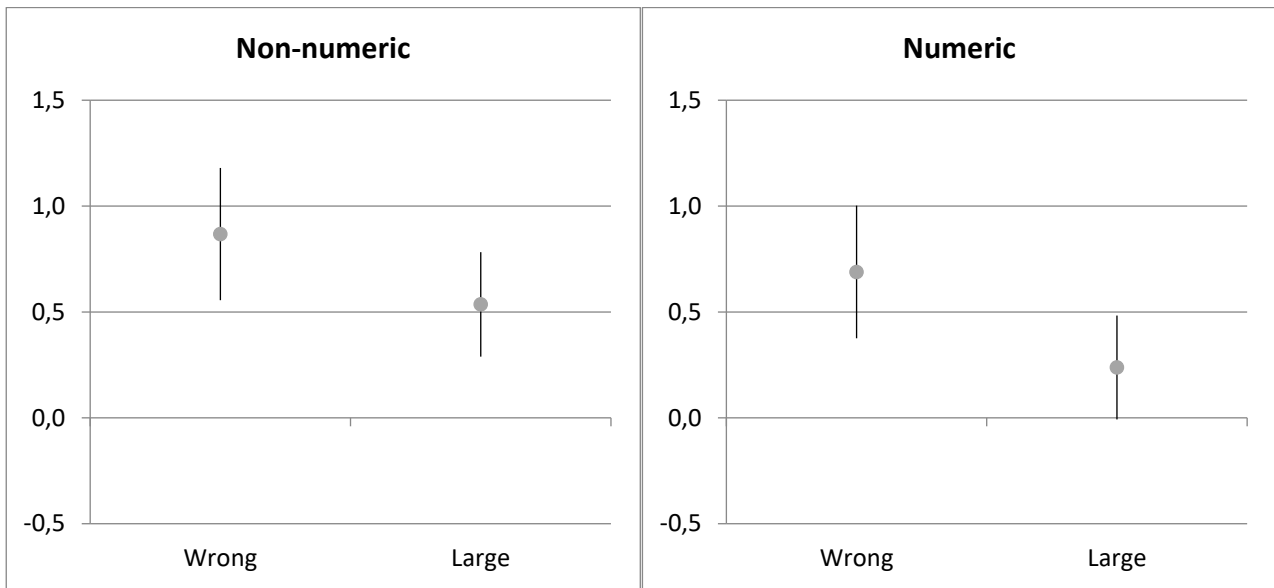
Figure 6 – Specific credibility of election polls by numeracy



Note: Estimates are based on Model M2 in Table 2 in appendix A. Estimates are displayed with 95 % confidence intervals.

Figure 6 show that the same pattern from figure 1 repeats itself for non-numeric subjects. The average credibility among numeric subjects are much close between the four treatment groups. All four averages are below 3 indicating that these subjects find election polls somewhat credible. These finding indicate that election polls accuracy and forecast affect their credibility far more for people who don't have the capacity to understand statistics which supports H2a. This is furthermore supported by figure 7 that show the average marginal effect of election polls forecast and accuracy for respectively numeric and non-numeric.

Figure 7 – Average marginal effect forecast & accuracy on specific credibility by numeracy

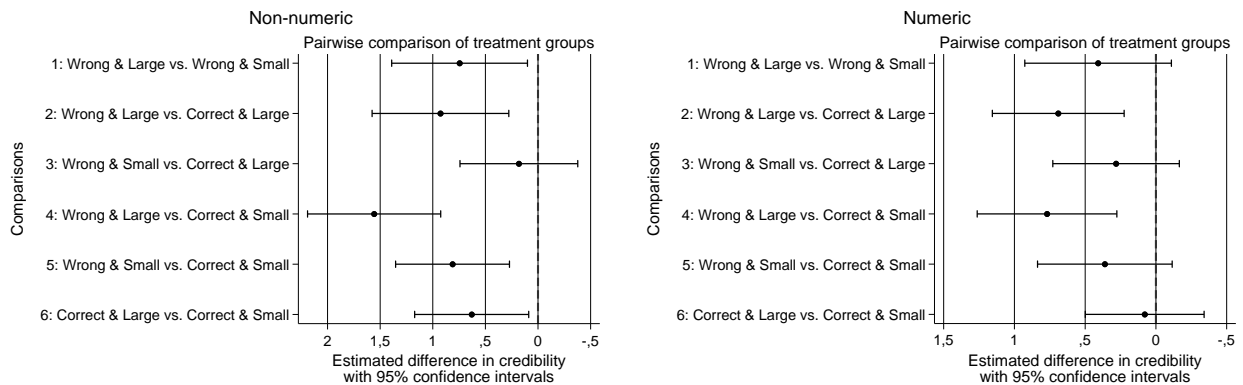


Note: Estimates are based on Model M2 in Table 2 in appendix A. Estimates are displayed with 95 % confidence intervals.

The figure shows that both a wrong forecast and large margin have a negative effect on election polls credibility for non-numeric people. A wrong forecast also has a negative effect, albeit weaker, for numeric people which show that they still use the forecast as a heuristic when evaluating election polls credibly. Figure 7 also show that a large margin does not have an effect on people with high numeracy. This is interesting since one would expect this group to rely more on election polls accuracy since they are able to understand and judge on how close polls get to the election result in statistical terms.

Figure 8 compare the average credibility across the different treatment groups for subject with respectively high and low numeracy.

Figure 8 – Pairwise comparison of specific credibility polls between treatment groups by numeracy



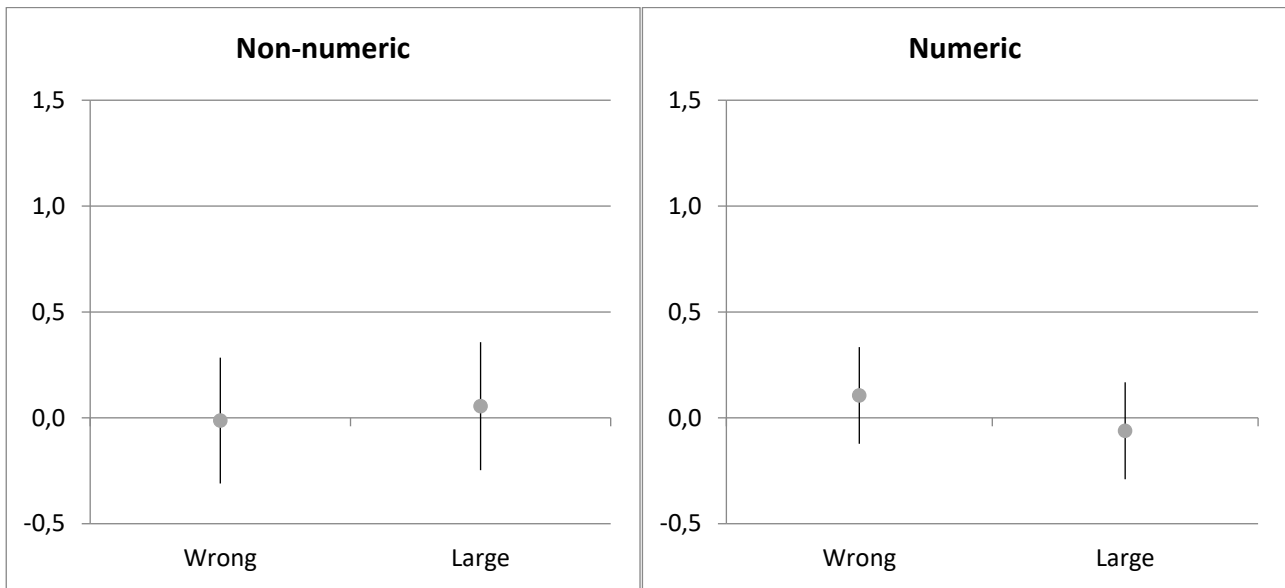
Note: Estimates are based on Model M2 in Table 2 in appendix A. Estimates are displayed with 95 % confidence intervals.

The pattern from figure 3 repeats itself in figure 8 for non-numeric people with the only difference being a significant difference between the treatment groups that were shown a correct forecast in comparison 1. The picture is different for numeric people, where the treatment groups that received polls that had a wrong forecast and a large margin are significantly different from both groups with a correct forecast, shown by respectively comparison 2 & 4. We do not see any significant differences in comparison 1 & 6 where we look at the groups that had the same forecast regardless of the forecast being correct or wrong. This illustrates the point of election polls accuracy being less important for people who understand statistics. These findings support hypothesis H2a stating that the effect of a right forecast versus an accurate is weaker for subjects that are numerate. This being said, numerate people are by no means immune to the effects of elections polls forecast.

4.5 General credibility and numeracy

Figure 9 depict the effect on general credibility of predicting the wrong winner and having a large margin to the election result for non-numerate and numerate subjects.

Figure.9 – Average marginal effect of forecast & accuracy on general credibility by numeracy



Note: Estimates are based on Model M4 in Table 2 in appendix A. Estimates are displayed with 95 % confidence intervals.

The figure shows no significant effects of the polls forecast or accuracy for non-numerate nor numerate subject. The general credibility of election polls is not affected regardless of one's ability to understand and comprehend statistics and we can reject hypothesis H2b.

To sum up, election polls' credibility is affected by their ability to predict the right winner and getting close to the election result. The former has a larger effect than the later which show that election polls that has a right forecast are deemed more credible that polls that has a small margin to the election result. The general credibility of election polls was not affect by how polls fared at the most recent election.

5. Discussion

In this paper we have investigated how election polls ability to forecast the right winner and bring an accurate estimate of the election result affect their credibility. We hypothesized that people were more likely to rely on the elections polls forecast when assessing their credibility compared to the polls ability to make a prediction that came close to the election result. We further hypothesized that this

relationship was stronger among people who are not able to understand and comprehend statistical concepts.

We investigated how the forecast and accuracy of election polls affected their credibility by conducting a 2x2 between subject experiment. Subject were asked to evaluate opinion polls credibility after being presented with information of how the polls fared at an election. The polls had either predicted the right or wrong winner and been close to (+/- 2 percentage points) or far from (+/- 5 percentage points) the election result. Our results showed that people are more affected by election polls forecast than their accuracy. We found that polls which predict the right winner are more credible than the ones who are close to the election result. Even if two polls are equally close to the election result and thus equally valid the ones that predict the right winner are deemed more credible. This relationship is especially evident among people who are not capable of understanding statistics. The result show that people do not update their general opinion of election polls based on how they fared at a recent election. This might be because their general opinion is made up by many assessments and evaluations of election polls and it takes more than one election to make a significant change (Tsfati, 2001). It might also be because we referred to a low salience election in the experiment was a low salience election which the subjects could not recall. Had we used data from a more recent and high salience election such as the 2016 US Election, the Brexit referendum or a Danish National Election, results might have been different since people have stronger opinions about polls in these elections. The recollection of previous election polls could have magnified the reduction of their credibility (Tsfati, 2001). Especially the 2016 US Election and Brexit have, as argued in the introduction, led to criticism of election polls both in general (Hillygus, 2011; Sturgis et al., 2016). Second order election have arguably a smaller and more local effect than a first order election which have a larger impact on politics. Future studies should investigate how polls credibility is affected after a first order election as a failure to predict the winner in this type of election might have a

stronger and more lasting impact on the evaluation of election polls. Even if we did not find any significant changes in the general credibility, we still believe that polls ability forecast a wrong and/or inaccurate result may have a permanent effect. Following the logic of on-line processing people's election of election polls is affected by the feeling of being let down by a polls wrong forecast even if they do not remember the factual detail (Lodge & Taber, 2013). This feeling might not leave an instant mark on the perceive credibility but will still update the general feeling toward opinion polls and hereby have an indirect albeit smaller effect on future assessments. In other word we might not have detected an effect on polls in general, but that does not mean that it can leave a subconscious emotional mark in people's memory and have a negative effect in the long run.

These findings have serious implications for the medias use of polls in the election coverage. Journalists and pollsters alike have special responsibility to cover polls correct because people who have difficulties understanding statistics need a good and correct explanation of polls implications for them to guide their behavior (Lohr & Singer, 2016; Meffert & Gschwend, 2011; Westwood et al., 2018). This is especially important in elections where the error margin is high, such as election, with a close race between the main contestants, when the predicted vote shares are high or the election has two main parties/candidates (Jennings & Wlezien, 2018). Research has shown that voter often use polls as a heuristic to guide their electoral behavior when they do not have the time or resources to invest in politics (Gasperoni & Mantovani, 2015; Meffert & Gschwend, 2011). Voters will thus use polls to get a sense of how the rest of the populations stand and either follow their lead. Either to ensure that they are on the winning team (the bandwagon effect) or simple by thinking that so many people cannot be wrong, so they better follow the herd (Dahlgaard et al., 2016; Moy & Rinke, 2012). Polls can also mobilize voters if they predict a close race between two contestants and giving the impression of an election where one's vote can tip the scale, or through the underdogs effect, where voters cast their vote on a party they sympathize with to ensure they get enough votes

to pass the electoral threshold (Dahlgaard et al., 2016; Enos & Hersh, 2017; Moy & Rinke, 2012). No matter how polls are used as a heuristic they need to give an accurate estimate of the population's opinion and to be reported in a precise manner. Or else polls will lead to a biased assessment of how the population stands on an issue and guide people's behavior on a false premise (Enos & Hersh, 2017; Strömbäck, 2012b). This is especially important for non-numeric voters who we have shown are more likely to use polls' forecast as a heuristic.

While we cannot expect all citizens to have a sophisticated understanding of the statistical limitations of election polls, the same does not go for journalists and pollsters. Reporting real world events in an objective and truthful manner is a special virtue of this profession (Strömbäck, 2012a). The population often gets their news of opinion polls from the media, which highlights the importance of journalists and pollsters reporting polls with emphasis on the limitations, so it will not lead to biased use of polls among the electorate (Enos & Hersh, 2017; Loukissas & Pollock, 2017; Strömbäck, 2012b). Furthermore, our study has shown that people do not judge the credibility of polls based on their statistical merits, rather simply on their ability to predict the right winner. This has implications for journalistic practices because if election polls are not in an appropriate manner, they will lose their credibility and the media will lose a valuable tool to create drama and excitement in their news reporting (Strömbäck, 2012a).

Our study is not without its limitations. The treatments were designed with only one political coalition as the winner of the election. This was done to keep the treatment in line with real past events but also to ensure that the treatment groups were sufficiently large to detect any effect. Previous studies have shown that personal affection toward the predicted winning or losing party in an election poll affects the perceived credibility (Chia & Chang, 2015; Kuru et al., 2017; Tsifti, 2001). Our subjects might have been influenced by party sympathy when evaluating how the polls fared in our experiment. 80 % of our subjects said that they would vote for a party in the red coalition which

could lead to greater trust in the polls that forecasted the right winner and vice versa. To test this, we include party choice and coalition as a control variable – both as and interaction with treatment groups and as independent variable – to see if it had any significant changes to the result. We did not however find any effect of party choice in our subsequent analysis (see Appendix – Result and robustness check). We still recommend future studies to investigate election polls credibility when parties from both sides of the political spectrum have won a recent election.

Another limitation is that we looked at how polls fared when they predicted vote shares for a coalition of parties. The results might have been different if the treatment was focused around vote shares for individual parties or candidates. We also only investigated effect of election polls that were close a 50 % threshold where the margins of error is larger and forecast are associated with more uncertainty (Jennings & Wlezien, 2018; M. V. Larsen, 2016). Future studies should take these matters into account by changing the predicted and final vote shares of different parties and candidates. We do however believe that the fact that our experiment had estimates around 50% solidify our point about journalists and pollsters having a special responsibility when covering polls in horse race elections.

Finally, we need to address the external validity and generalization of our experiment. The subjects received the treatment as part of a survey distributed in a class room setting, which does not resemble how people would normally receive news containing opinion polls (Druckman & Kam, 2011). One could increase the mundane realism by conducting a similar field experiment right after an election and present the stimulus material as a real news story. While this approach could strengthen the external validity, it would be on the expense of the internal validity since the subjects are expected to be influenced by real world election polls (Gerber & Green, 2012). Our study enables us to isolate the causal effect of opinion polls forecast and accuracy albeit the limitation mentioned above. Using a student sample does indeed limit the generalization of our study. We do not consider

this as a major limitation since we are not interested in investigating how the credible the population find election polls, but rather the effect size of election polls forecast and accuracy (Druckman & Kam, 2011). As argued in the method section we believe that our study constitutes a rather conservative test of how polls forecast and accuracy affect their credibility. The study's participants have had substantial training in statistics enabling them to conduct, interpret and be aware of the limitation of election polls. The participants were thus expected to be less influenced by the forecast than our study showed. We anticipate that any effects found in this study are larger and more evident in a larger and more representative sample, where the subjects cannot be expected to have the same statistical training as in our sample. We still recommend that future studies should be based on a more representative sample and that measures are taken to ensure that the stimulus material is more realistic. Despite these limitations our study has given us valuable causal insight to how election polls ability to forecast the right winner and produce an accurate result affect how people perceive polls credibility.

6. Conclusion

In this study, we have showed that election polls ability to forecast the right winner is more important than their ability to make an accurate estimate close to the final election result even if it from a statistician's point of view should be the other way around. These findings were most evident among people who do not have the ability to understand and comprehend statistics. We could however only detect effects on the credibility of polls at a recent election and not on polls in general. Our results call for more caution when assessing how election polls have fared at an election. Election polls are always associated with some uncertainty, which should be considered by voters, pollsters and reporters alike when judging their credibility. This is especially important in close elections where the margin of error is typically larger and small changes in the electorates attitudes can flip the election result around. Our study calls for pollsters and journalists to be explicitly aware of the

limitations of election polls in their election coverage. People in this profession have a special responsibility when it comes to presenting results from election polls within its limitations since people who do not possess the same statistical training are more affected by polls' inability to predict the right winner of an election. If polls are perceived as being untrustworthy, journalists and pollsters lose a cheap and useful tool in their election coverage, and even worse people whose political behavior is easily affected by opinion polls, will act on a wrongful assumption of how the rest of the electorate stands. Election polls can be a useful and accurate tool whether it comes to adding excitement and drama to the election coverage, using them as heuristics to guide vote choice or mobilize the electorate, we just need to be more aware of their limitations.

7. Bibliography

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Appendix A – Results and Robustness

Table 2 – Results main study

	M1 Credibility - Specific	M2 Credibility - Specific	M3 Credibility - General	M4 Credibility - General
Wrong	0,544*** (0,136)	0,812*** (0,204)	0,0204 (0,127)	-0,0639 (0,197)
Large	0,291* (0,123)	0,630** (0,204)	-0,0723 (0,131)	0,000906 (0,221)
Wrong*Large	0,226 (0,194)	0,115 (0,318)	0,0873 (0,181)	0,106 (0,304)
Polsci University of Copenhagen	0 (.)	0 (.)	0 (.)	0 (.)
Journalism University of Southern Denmark	0,444*** (0,107)	0,426*** (0,112)	0,656*** (0,103)	0,718*** (0,105)
Polsci University of Southern Denmark	0,155 (0,139)	0,102 (0,146)	0,243 (0,155)	0,174 (0,161)
Numerate		0,246 (0,182)		-0,313 (0,194)
Wrong* Numerate		-0,451 (0,271)		0,0927 (0,258)
Large* Numerate		-0,551* (0,259)		-0,132 (0,275)
Wrong*Large * Numerate		0,214 (0,404)		0,0394 (0,382)
Constant	1,913*** (0,0979)	1,761*** (0,140)	2,291*** (0,0989)	2,505*** (0,151)
<i>N</i>	417	394	417	394
<i>R</i> ²	0,166	0,192	0,095	0,143

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3 – Results robustness check

	M5 Credibility - Specific	M6 Credibility - Specific	M7 Credibility - Specific	M8 Credibility - Specific	M9 Credibility - Specific	M10 Credibility - Specific
Wrong	0,718*** (0,207)	0,637*** (0,101)	0,553*** (0,139)	0,294 (0,278)	0,906*** (0,221)	0,861*** (0,224)
Red Coalition	0,244 (0,146)	0,348* (0,160)	0,210 (0,118)	0,222 (0,207)	0,118 (0,124)	0,224 (0,123)
Wrong Red Coalition	-0,0909 (0,239)			0,308 (0,321)		
Large	0,415*** (0,101)	0,636** (0,201)	0,329** (0,126)	0,283 (0,252)	0,694** (0,214)	0,566* (0,219)
Polsci University of Copenhagen	0 (.)	0 (.)	0 (.)	0 (.)		0 (.)
Journalism University of Southern Denmark	0,426*** (0,115)	0,437*** (0,114)	0,433*** (0,114)	0,455*** (0,117)		0,379** (0,121)
Polsci University of Southern Denmark	0,160 (0,144)	0,151 (0,144)	0,156 (0,143)	0,140 (0,142)		0,140 (0,155)
Large Red Coalition		-0,275 (0,233)		0,0544 (0,291)		
Wrong*Large			0,187 (0,204)	0,703 (0,394)	-0,0442 (0,337)	0,121 (0,353)
Wrong*Large*R ed Coalition				-0,656 (0,458)		
Numerate					0,262 (0,198)	0,147 (0,197)
Wrong*Numerat e					-0,569* (0,289)	-0,496 (0,288)
Large*Numerate					-0,552* (0,273)	-0,367 (0,278)
Wrong*Large*N umerate					0,355 (0,430)	0,152 (0,437)
Female						-0,278* (0,108)
Age						-0,00491 (0,0165)

Constant	1,650*** (0,144)	1,567*** (0,156)	1,720*** (0,136)	1,706*** (0,182)	1,752*** (0,178)	1,883*** (0,420)
<i>N</i>	376	376	376	376	353	348
<i>R</i> ²	0,160	0,163	0,162	0,168	0,152	0,204

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix B – Randomization test

		R1	R2	R3	R4	R5	R6	R7
T1: Correct & Small	Female	0,104 (0,285)						
	Age		-0,00351 (0,0463)					
	Social Democrats			0 (.)				
	Danish Social Liberal Party			-0,876 (0,564)				
	Conservative People's Party			-0,606 (0,961)				
	The Socialist People's Party			-0,519 (0,657)				
	Liberal Alliance			-0,424 (0,790)				
	Danish People's Party			-0,606 (1409,8)				
	Venstre			-0,0954 (0,724)				
	Red-Green Alliance			-0,452 (0,642)				
	The Alternative			-0,424 (0,664)				
	Cristian Democrats			-16,69 (3110,4)				
	No party			-0,606 (1,502)				
	Abstain from voting			-0,606 (4184,9)				
	Do not know			-1,992* (0,939)				
	The New Right			13,22 (1007,3)				
	Red Coalition						-0,275 (0,377)	

	Cognitive reflexion test - 0 correct (ref. category)					0 (.)		
	Cognitive reflexion test - 1 correct					0,259 (0,342)		
	Cognitive reflexion test - 2 correct					0,0559 (0,355)		
	Numerate						0,165 (0,294)	
	Polsci University of Copenhagen							0 (.)
	Journalism University of Southern Denmark							-0,129 (0,312)
	Polsci University of Southern Denmark							0,486 (0,484)
	Constant	-0,0674 (0,212)	0,0699 (1,062)	0,606 (0,508)	0,288 (0,342)	-0,130 (0,228)	-0,130 (0,228)	-4,41e-14 (0,181)
T2: Correct & Large	Female	0,160 (0,280)						
	Age		0,0387 (0,0403)					
	Social Democrats			0 (.)				
	Danish Social Liberal Party			-1,019 (0,544)				
	Conservative People's Party			-1,947 (1,254)				

The Socialist People's Party	-1,166 (0,674)		
Liberal Alliance	-0,511 (0,762)		
Danish People's Party	12,96 (996,9)		
Venstre	-0,560 (0,728)		
Red-Green Alliance	-0,499 (0,617)		
The Alternative	-0,665 (0,649)		
Cristian Democrats	-16,83 (2953,7)		
No party	-0,154 (1,318)		
Abstain from voting	-0,744 (4080,8)		
Do not know	-0,730 (0,689)		
The New Right	12,98 (1007,3)		
Red Coalition		-0,107 (0,384)	
Cognitive reflexion test - 0 correct (ref. category)			0 (.)
Cognitive reflexion test - 1 correct			0,564 (0,328)
Cognitive reflexion test - 2 correct			-0,0941 (0,361)
Numerate			0,294

							(0,289)	
	Polsci University of Copenhagen							0 (.)
	Journalism University of Southern Denmark							0,141 (0,299)
	Polsci University of Southern Denmark							0,560 (0,479)
	Constant	-0,0220 (0,210)	-0,821 (0,933)	0,847 (0,488)	0,182 (0,350)	-0,103 (0,227)	-0,103 (0,227)	2,68e-13 (0,181)
T4: Wrong & Large	Female	-0,101 (0,283)						
	Age		0,0334 (0,0412)					
	Social Democrats			0 (.)				
	Danish Social Liberal Party			-1,153* (0,564)				
	Conservative People's Party			0,153 (0,852)				
	The Socialist People's Party			-1,705* (0,769)				
	Liberal Alliance			-0,693 (0,806)				
	Danish People's Party			13,12 (996,9)				
	Venstre			-0,000108 (0,707)				
	Red-Green Alliance			-0,693 (0,645)				
	The Alternative			-0,357 (0,649)				
	Cristian			-16,75				

Democrats								(3065,2)
No party								-0,000119 (1,323)
Abstain from voting								15,29 (2959,2)
Do not know								-0,470 (0,689)
The New Right								-0,664 (1414,2)
0.redblock								0 (.)
Red Coalition								-0,665 (0,367)
Cognitive reflexion test - 0 correct (ref. category)								0 (.)
Cognitive reflexion test - 1 correct								0,346 (0,343)
Cognitive reflexion test - 2 correct								0,222 (0,352)
Numerate								0,287 (0,295)
Polsci University of Copenhagen								0 (.)
Journalism University of Southern Denmark								-0,0470 (0,307)
Polsci University of Southern Denmark								0,302 (0,498)
Constant	0,0632 (0,205)	-0,756 (0,954)	0,693 (0,500)	0,511 (0,327)	-0,187 (0,232)	-0,187 (0,232)		0,0163 (0,180)

<i>N</i>	407	411	418	382	396	396	423
pseudo <i>R</i> ²	0,001	0,002	0,034	0,004	0,005	0,001	0,002

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The coefficients for each treatment groups are compared with T3: Wrong & Small individually

Appendix C – Background variables and measures

	%	N
Treatment Groups		
T1: Correct & Small	24	102
T2: Correct & Large	24	103
T3: Wrong & Small	27	113
T4: Wrong & Large	25	105
<i>Total</i>	<i>100</i>	<i>423</i>
Sample		
Polsci University of Copenhagen	58	245
Journalism University of Southern Denmark	31	132
Polsci University of Southern Denmark	11	46
<i>Total</i>	<i>100</i>	<i>423</i>
Gender		
Male	45	183
Female	55	224
<i>Total</i>	<i>100</i>	<i>407</i>
Party		
Social Democrats	10	43
Danish Social Liberal Party	29	123
Conservative People's Party	3	14
The Socialist People's Party	8	35
Liberal Alliance	6	23

Danish People's Party	0	2
Venstre	9	36
Red-Green Alliance	13	55
The Alternative	11	48
Cristian Demokrats	0	1
The New Right	0	2
No party	1	6
Abstain from voting	0	1
Do not know	7	29
<i>Total</i>	<i>100</i>	<i>418</i>
Coalition		
Blue	20	78
Red	80	304
<i>Total</i>	<i>100</i>	<i>382</i>
Cognitive reflexion test		
0 correst answeres	37	148
1 correct answeres	36	142
2 correct answeres	27	106
<i>Total</i>	<i>100</i>	<i>396</i>
Numeracy		
Low	37	148
High	63	248
<i>Total</i>	<i>100</i>	<i>396</i>

	Very credible	Somewh at credible	Neither credible or not credible	Not credible	Not Very credible	Total	n
How credible do you think that the polls during this specific election were?	13	46	20	16	5	100	417
How credible do you think that polls in general are?	9	52	22	13	4	100	417

	Mean	Std. Dev.	Min	Max	n
Age	23	3,6	20	50	411
Credibility specific (1=Very credible; 5=Not very noncredible)	2,5	1,1	1	5	417
Credibility general (1=Very credible; 5=Not verycredible)	2,5	1,0	1	5	417