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# The influence of political knowledge on opinion polarization in citizen deliberation

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## ABSTRACT

Empirical studies show that people with high political knowledge tend to polarize more than others. Polarization refers to a process where one becomes more extreme in the direction of her or his original views. While some evidence supports this view, there is also contrasting evidence, rendering ambiguous conclusions. Discussing in a deliberative setting might alleviate polarization among participants independent of whether they are knowledgeable. We examine the association between knowledge and opinion polarization in a deliberative mini-public setting, focusing on two reasons that may account for the diverging results. First, we distinguish between two types of knowledge: general political knowledge, which concerns knowledge on general political processes and structures, and issue knowledge, which concerns factual knowledge on the specific discussed topic. Second, we examine whether the deliberative context moderates the linkage between knowledge and polarization. We use evidence from two deliberative experiments to examine these linkages. The topic of the first is nuclear power and energy policies and the second concerns immigration. Our results show that general political knowledge and individual level polarization are associated. However, the specific nature of the association is context-dependent and differs between the two types of political knowledge.

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Deliberation; polarization; political knowledge; mini-publics; issue knowledge

## Introduction

There has recently been a large public concern, both in many European countries and in the US, about opinions becoming extreme and societies more polarized: ‘America is polarized. Our political parties are highly polarized and the American electorate is highly polarized’, writes Campbell (2016, 1). Societies have been claimed to be divided into camps or bubbles, and people talk to each other within these bubbles rather than across them. Sunstein (2002, 2007, 2009) argues that discussion in like-minded groups leads to opinion polarization, whereby opinions become more extreme, as well as to an amplification of cognitive errors. On the other hand, studies based on deliberative mini-publics have shown that the influence of like-mindedness on polarization can be alleviated when

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discussion takes place in a deliberative setting, where small group discussions are facilitated and primed by rules of discussion (Grönlund, Herne, and Setälä 2015).

The term opinion polarization can refer to several tendencies. In a polarized society, people are divided into opposite camps, whereas Sunstein talks mainly about group polarization, i.e. a shift where a certain group of people becomes more extreme. We address the phenomenon of opinion polarization at an *individual level* and define it as a development where an individual's opinions become more extreme in the direction of her original views. We ask which types of people are most likely to polarize, and under what conditions. We are interested in the connection between political knowledge and polarization, and furthermore, whether the connection is observed in a deliberative mini-public setting.

While there is some evidence suggesting that higher political knowledge is more likely to give rise to opinion polarization, the evidence is somewhat mixed (Taber and Lodge 2006; Taber, Cann, and Kucsova 2009; Meffert et al. 2006; Baekgaard et al. 2017). Our contribution lies in distinguishing between general political knowledge and issue knowledge, and asking whether they are differently connected to polarization. Further, we explore how differences in the deliberative settings influence the association between knowledge and polarization. Our research thereby combines two so far separate strands of literature, one on the connection between knowledge and polarization (Taber and Lodge 2006; Taber, Cann, and Kucsova 2009; Meffert et al. 2006; Baekgaard et al. 2017) and the other on the connection between deliberative democracy and polarization (Sunstein 2007; Grönlund, Herne, and Setälä 2015).

At the moment, we lack knowledge on the association of knowledge and polarization in a deliberative dialogue. Deliberative mini-publics are democratic innovations, where the rules of discussion prime participants to be open to others' arguments as well as to listen and respect views that are different from their own. The aim of this setting is to enhance reason giving, openness and reflection. These characteristics of the discussion are expected to alleviate biases in individual opinion formation by enlarging both the range of information and perspectives that are considered (Mercier and Landemore 2012). However, we do not know whether this is the case. The study of the consequences of deliberative mini-publics is important because they have been proposed as a remedy for several problematic tendencies in today's democracies (e.g. Gutmann and Thompson 2004; Smith 2009). Mini-publics can take several forms and they are used in increasing numbers in various countries to complement representative democracy (Elstub and Escobar, 2019; Grönlund, Bächtiger, and Setälä 2014). It is, therefore, important to study what kinds of outcomes deliberative mini-publics produce, do they have the suggested positive consequences, or will they perhaps bring about new problems? Moreover, we need to know, what are the specific models of mini-publics that would be most appropriate to strengthen democratic decision-making. We will contribute to these questions by studying how deliberation influences the connection between political knowledge and individual-level opinion polarization, and how the group-level disagreement and the decision-making method of the mini-public influence this connection. It is also noteworthy that our research has implications that go beyond mini-publics: if it turns out that deliberative mini-publics, which represent *ideal* forms of political discussion, are not able to alleviate polarization, it appears doubtful that less ideal forms of political discussion would alleviate polarization tendencies either.

We explore two potential reasons for the mixed evidence on the connection between knowledge and polarization earlier studies have revealed. First, we claim that it is helpful to distinguish between general political knowledge, which concerns knowledge about political processes and institutions, and issue knowledge, which concerns how much people know about the issue at hand. While both may clearly affect behaviour in deliberative discussions, they may have completely opposite effects when it comes to polarization of prior dispositions. Second, we believe that the setup of the deliberative discussions may moderate the link between either type of knowledge and polarization. In other words, the extent to which each type of knowledge affects polarization may depend on the deliberative setting.

Since there are no prior studies, to our knowledge that explicitly address similar issues, we here adapt an exploratory approach to examine how general political knowledge and issue knowledge affect polarization in different deliberative settings. However, we discuss the potential underlying mechanisms that connect each type of knowledge and polarization as well as the influence of different types of deliberative settings. Although we do not test the linkages experimentally, we rely on data from two deliberative experiments that concerned the use of nuclear power and immigration. Both experiments included different treatments that allow us to explore how different types of deliberation affect the associations between the two types of political knowledge and polarization. The results show that the two types do have entirely different links to polarization, but also that it is imperative to consider the type of deliberation to appreciate these differences.

## Political knowledge and opinion polarization

Political information is a key component in most individual-based theories of political behaviour. Possessing correct information about politics and political parties is a logical prerequisite of voting and other forms of political participation. Berelson, Lazarsfeld, and McPhee (1954, 308) conclude:

The democratic citizen is expected to be well-informed about political affairs. He is supposed to know what the issues are, what their history is, what the relevant facts are, what alternatives are proposed, what the party stands for, what the likely consequences are.

Even though most scholars find that, at least in the best of worlds, citizens need to possess politically relevant information in order to participate in democratic decision-making, empirical findings raise questions about the actual state of political knowledge among the citizenry (Campbell et al. 1960; Converse 1964; Butler and Stokes 1969; Converse and Pierce 1986; Delli Karpini and Keeter 1996; Grönlund and Milner 2006).

The terminology related to politically relevant information is somewhat diverse. First, there are the concepts of ‘political knowledge’ and ‘political information’. These are often, but not always, used synonymously. Lupia and McCubbins (1998, 24) point to the distinction between ‘information’ and ‘knowledge’ by stating that the former is merely data, whereas the latter is people’s ability to make accurate predictions. Second, we have the concept of ‘civic literacy’, which is closely related to political knowledge. Civic literacy consists of the ‘skills to act as competent citizens’ (Milner 2002, 3). Civic literacy resembles another notion, ‘political sophistication’, which has been defined as the quantity and organization of a person’s political cognitions (Luskin 1987). Moreover, there is

'citizen competence' (Kuklinski and Quirk 2001). 'Competence', as Sartori (1987, 117) has pointed out, can be conjoined with 'knowledge', but should be separated from 'information'.

Political sophistication and citizen competence relate directly to a cognitively oriented discussion on the interplay between political knowledge and civic education (Torney-Purta et al. 2001). This literature emphasizes classroom-based civic education and its importance to the acceptance of democratic principles and political participation (Galston 2001). Civic education of this kind is seen as an independent variable in relation to political knowledge, and this linkage is studied in psychological research. Although the term political sophistication is commonly used interchangeably with political knowledge – factual political knowledge being used as an indicator for political sophistication – the two are not synonymous (Luskin 1987). A high degree of political sophistication makes it more likely that a person will know and be able to recall certain political facts, but political sophistication is a broader concept that also covers cognitive abilities to process information and to make sense of political events. A person can possess factual political knowledge without being able to reflect on these issues and update opinions in light of new information.

Political knowledge covers several dimensions. We differentiate between *general political knowledge* and *issue-related knowledge* and examine how they affect polarization. General political knowledge concerns knowledge of the political system – 'the rules of the political game' of politics and everyday politics – the current political debate and agenda, and policies of politicians and parties. Issue knowledge, on the other hand, concerns knowledge of the topic at hand. While knowledgeable people may often score high on both, they are clearly distinct forms of knowledge that do not necessarily go together. People may, for example, be interested in political matters, and therefore achieve a high level of knowledge on general political matters, but not necessarily be interested in a specific political issue. Others, in turn, may have a lot of knowledge on a specific topic but be otherwise rather ignorant about politics. In this sense, general political knowledge functions aptly as an indicator for political sophistication, whereas issue knowledge is more connected to issue interest and how salient the issue is for the individual.

We believe that these different types of knowledge can have different implications for polarization, and that entirely different psychological mechanisms may be associated with polarization related to general political knowledge and polarization related to issue knowledge. Failing to distinguish between the two may, therefore, be part of the reason why previous studies have not found agreement on the link between knowledge and polarization.

Opinion polarization seems to be a part of a biased rather than a balanced information processing and reasoning process. There is plenty of evidence that people are not perfect Bayesian updaters in their information processing but rather use heuristics and shortcuts. Moreover, the theory of motivated reasoning states that our motivations influence the way we reason, and the theory describes two types of goals that are supposed to influence reasoning (Kunda 1987, 1990). An accuracy goal leads to a careful and balanced processing of information with the aim to reach a decision based on correct evidence. A directional goal, in turn, leads to an unbalanced information processing with the aim of reaching a specific goal, typically strengthening of existing attitudes, opinions or decisions already made. Directionally motivated people tend to reject or misinterpret information that conflicts with their attitudes, beliefs or preferences, and they use information selectively.

Typical processes of directional reasoning are the so-called confirmation and disconfirmation biases, that is, the tendency to seek confirmatory evidence to one's opinions and to avoid or ignore disconfirming evidence (Taber, Cann, and Kucsova 2009).

It is apparent that directionally motivated reasoning hinders opinion change. Opinions are less likely to change if new information is not processed in a balanced manner, and confirming information is given more emphasis than disconfirming information. Politically sophisticated people are per definition skilled in information processing and understanding of new information and arguments. For these reasons, they could be expected to be more likely to change their opinions in the face of new information. But knowledgeable people do not necessarily possess these traits. On the contrary, high levels of political knowledge can give basis for more rigid opinions because the knowledgeable are likely to be able to form counterarguments, are likely to be aware of a larger pool of arguments, and therefore also have opinions based on a larger pool of information in the first place. Moreover, high knowledge does not necessarily mean a more *balanced* information processing. On the contrary, there are certain cognitive characteristics that can make knowledgeable people more biased in their information processing: they are likely to be better in finding weaknesses in information that conflicts with their own views (Biek, Wood, and Chaiken 1996; Chaiken, Liberman, and Eagly 1989). Indeed, Biek, Wood, and Chaiken (1996) observed that knowledgeable people were more likely to process information in a biased manner but also that this tendency was dependent on having an intense affect related to the topic.

In addition to having rigid preferences, it is also possible that politically knowledgeable people are more vulnerable to opinion polarization than people on average (e.g. Strickland, Taber, and Lodge 2011). Why would that be the case? What would be the *mechanism* that explains the association between political knowledge and opinion polarization? It seems that the same processes that produce rigid opinions also relate to opinion polarization. Taber and Lodge (2006) argue that when people are exposed to new information about an issue, high and low political knowledge can give rise to different processes. Namely, those who have high levels of political knowledge can form counterarguments to disconfirming evidence and therefore neglect that evidence, whereas they do not try to find counterarguments for confirming evidence. The result is that they have more confirming evidence for their views, which in turn can polarize attitudes. Those with lower levels of political knowledge are not necessarily as good in forming counterarguments and thereby there is no biased accumulation of confirming evidence. In other words, politically knowledgeable people may be most vulnerable to confirmation and disconfirmation biases (Taber, Cann, and Kucsova 2009) which could account for their greater likelihood to polarize compared to less knowledgeable people. The reason for this association is the rather strong cognitive and informational requirements of the biases.

What does the existing empirical literature then show about the association between opinion stability, polarization and political knowledge? Previous studies give some support to the assumption that those who have high levels of political knowledge are less likely to change their opinions (for a summary of studies see Koch 1998). Koch (1998) studied citizens' opinions on health insurance in a series of American National Election Studies looking at the influence of the plans of the Clinton administration to change the insurance system. He observed a clear increase in the support for the public funding for health insurance. Moreover, he observed that the arguments of the political elite on

health insurance influenced most the preferences of those with either moderate or low levels of political knowledge. In other words, Koch's study suggests that highly knowledgeable citizens were least influenced by changes in the elite framing and priming of the health insurance issue. Cobb and Kuklinski (1997) compared the influence of easy or hard arguments on two policy issues, free trade agreement and health care, on subjects' opinions that were measured before and after exposure to a randomly selected argument type. They observed that political awareness, operationalized as the frequency of following politics, tended to hinder opinion change. Koch's as well as Cobb and Kuklinski's studies suggest that those who are politically knowledgeable tend to have more stable opinions. However, they do not yet demonstrate whether knowledgeable people have a tendency to polarize more than others.

In an experiment where student subjects' political attitudes on affirmative action and gun control were measured, Taber and Lodge (2006) observed more opinion polarization among politically knowledgeable subjects. They also found a connection between polarization and confirmation and disconfirmation biases. Meffert et al. (2006) used student subjects in a study looking at the influence of negative or positive campaign information, and the congruency of the type of information and candidate evaluation. In their study, those who had high political knowledge showed a stronger polarization effect than those low in political knowledge. In an interesting study, Baekgaard et al. (2017) observed that Danish politicians, who score high in political knowledge, tend to be as biased as ordinary citizens in their reasoning. Moreover, and contrary to the scholars' expectations, politicians became even more biased in their information processes when the amount of provided information was increased. However, it is also true that high political knowledge does not always boost polarization. Taber, Cann, and Kucsova (2009) found no association between political knowledge and polarization in a study with student subjects looking at attitude change after having been exposed to different types of arguments. It is notable though that they did observe an association between political knowledge and disconfirmation bias: those high in political knowledge spend more time and came up with more thoughts about arguments that were not in line with their own attitudes. Further, the argument strength-evaluations of people with high political knowledge were more biased against incongruent arguments compared to those with low political knowledge.

The literature reviewed so far has not looked at the association between knowledge and opinion polarization in different types of deliberation. However, theoretically the deliberative setting should alleviate biased reasoning processes, and therefore differences in this regard may influence the connection between political knowledge and polarization. We are not aware of studies on the connection between political knowledge and opinion polarization in a deliberative discussion. In a related study, Zhang (2018) examines the influence of opinion diversity, political knowledge and attitude strength on individual-level opinion change in a deliberative event. She observes that opinion diversity fosters opinion change in a deliberative setting but that those who have high levels of political knowledge and strong opinions are not likely to change their opinions. The study of Himmelroos and Christensen (2018) shows that it is imperative to consider differences in deliberative settings to understand deliberative reasoning. These studies show that the deliberative setting is likely to affect the link between political knowledge and polarization.

There is a large amount of literature which demonstrates that participants' opinions tend to change in deliberative mini-publics, and also that participants' knowledge on



the discussed topic is increased (e.g. Gastil and Dillard 1999; Fishkin and Luskin 2005; Andersen and Hansen 2007; Setälä, Grönlund, and Herne 2010). Moreover, it also seems that these two changes are connected, in other words, those who gain knowledge also change their opinions (Fishkin and Luskin 2005). There is thereby evidence that learning in a deliberative mini-public is connected to opinion change. However, based on the same data we use, Grönlund, Herne, and Setälä (2015) show that learning in a mini-public is not connected to polarization. The difference between previous studies and ours is that they have first looked at opinion changes, group polarization, learning, and after that mapped how these are connected. We, in turn, study whether those *individuals who are politically sophisticated*, i.e. have high levels of general political knowledge and/or issue knowledge are most likely to *move into a more extreme position*. Grönlund, Herne, and Setälä's (2015) study is most closely connected to ours but it looks at the learning curve, whereas we follow previous social psychological literature which has demonstrated a connection between initial levels of knowledge and polarization. Further, we separate between two types of knowledge, issue knowledge and general political knowledge and consider how the relationships are affected by the treatments in the deliberative experiments since these treatments effectively influenced how deliberative the discussions were.

We consider it relevant to distinguish between general political knowledge and issue knowledge since the links to polarization are likely to differ. General knowledge as an indicator of political sophistication may be a constructive form of knowledge linked to deliberative ideals such as listening, contemplation and reasoning, which may impede polarization. Issue knowledge may instead be a sign of a high degree of involvement in the issue that makes it less likely that people will compromise and more likely to go to extremes, as indicated by previous studies (Meffert et al. 2006; Baekgaard et al. 2017). At the same time, considering the links to deliberative ideals, the implications of the two types of knowledge are likely to be very different in a deliberative setting, making it particularly important to distinguish between them here. The failure to recognize these differences may, therefore, help explain the conflicting results on the link between political knowledge and polarization.

## Research design

To explore the linkages between political knowledge and polarization, we rely on data from two separate experiments on citizen deliberation that were designed to examine the consequences of taking part in a controlled deliberative discussion. The topic of the first was nuclear power and energy policies, whereas the second concerned immigration. At both experiments, participants were recruited through a random sample of adult population in the southwestern region of Finland (Finland Proper). Each experiment also used pre and post deliberation surveys to measure attitudes concerning the topic of deliberation as well as certain 'side effects' of deliberation such as political and social trust, political efficacy, political knowledge, and readiness for political participation. Standard background variables were also measured, as well as experiences about the deliberative event.

The experiments were designed to test the influence of a certain manipulation in the conditions of deliberation. In both cases, experimental manipulations enable to study the ways in which deliberative mini-publics could be organized in practice, and how

these institutional design features influence the outcomes of deliberation. In the nuclear power experiment, the 135 participants were distributed into 12 smaller discussion groups and the *decision-making method* was varied so that six of the groups decided with a secret ballot, whereas the other half wrote a common statement on the discussed topic (Setälä, Grönlund, and Herne 2010). The common statement groups were informed that their aim was to formulate a statement, which all group members could accept. However, it was also emphasized that the groups should not aim at a consensus at whatever cost. The decision-making method is a crucial element of any decision-making body and it is relevant to study how it influences various outcomes of the body, in our case, in particular, individual-level effects. The main result of the experiment concerning opinion change was that while participants' opinions changed, the decision-making procedure did not influence these changes. However, participants' issue knowledge in the common statement treatment increased somewhat more than in the vote treatment. Furthermore, the common statement treatment increased external efficacy after deliberation, whereas the vote treatment did not (Grönlund, Setälä, and Herne 2010). The focus of the present article is the connection between individual-level knowledge and polarization, whereas earlier studies on the same experiment have demonstrated that opinions changed, and issue knowledge increased due to taking part in deliberation (Setälä, Grönlund, and Herne 2010).

In the immigration experiment, the 207 participants were distributed into 26 smaller discussion groups. The discussion groups' *composition* was manipulated so that some of the small groups were mixed in terms of the participants' opinions, whereas others were like-minded (Grönlund, Herne, and Setälä 2015). Ideal deliberation is commonly expected to take place among participants who have a diversity of opinions. However, it has also been suggested that deliberation among similar individuals can increase the efficacy of certain marginalized groups and be therefore an important part of a deliberative system (Karpowitz, Raphael, and Hammond 2009). The like-minded groups – enclaves – were formed according to a pre-test survey which measured the participants' opinions on immigration. Respondents with negative attitudes to immigration formed a *con* enclave, and respondents with a positive view on immigration a *pro* enclave. Within these enclaves, subjects were randomly assigned into two treatments and a control group. The manipulation of the group composition entailed the exclusion of a group of people with no clear opinions on immigration, i.e. those who were in the middle of the distribution. The main result concerning opinion change was that group-level polarization was hardly observed, and that participants' opinions became more tolerant towards immigration, even in the like-minded *con* groups (Grönlund, Herne, and Setälä 2015). The present study examines the connection between individual-level knowledge and polarization, whereas the earlier result on the same experiment studied polarization at the group and treatment levels.

In both nuclear power and immigration deliberations, trained moderators facilitated the small group discussions. The discussion rules were derived from the ideals of deliberative democracy, the facilitator read the rules aloud in the beginning of the discussion, and they were also handed out to the participants. The rules emphasized reasoned justifications, reflection, sincerity and respect, whereas the facilitation was supposed to enhance reciprocity, inclusion and equality of discussion. Facilitation and rules of discussion are supposed to help to reach the ideals of deliberation.<sup>1</sup>

**Table 1** presents the main characteristics of the experiments. Apart from the experimental treatments, all other features were held constant in the two experiments. There was only one additional difference between the experiments, namely that in the nuclear power experiment, an expert panel was heard before small group discussions took place. The panel consisted of four persons, two men and two women, two MPs, a lobbyist for nuclear power companies and a representative for an environmental NGO. The participants heard and questioned the expert panel in plenum after having read the information package but before going to their small groups for deliberation. In the experiment on immigration, the information package was presented in plenum, but there was no expert panel. Otherwise, the experiments followed comparable procedures with pre and post deliberation surveys, pre and post deliberation knowledge tests, small group discussions and a follow up survey. **Table 2** presents the phases of the experiments.<sup>2</sup>

## Research questions

On instead of hypotheses, we formulate research questions because the impact of deliberative discussion on decision biases is under-theorized and previous empirical research is scarce. Further, we do not have theories nor empirical results on the question of how variations in the design of deliberative forums would influence biases. However, we discuss some underlying mechanisms that could potentially account for the connections between the two types of knowledge and polarization, and how these connections are affected by the type of discussion as shaped by the experimental treatments in the two experiments. We ask, first, whether political knowledge has an impact on opinion polarization in a deliberative setting. Do participants who possess more political knowledge polarize more than those with less knowledge? In principle, we could expect that discussion in a deliberative setting should alleviate polarization. There are several reasons for this assumption. First, the rules of discussion prime participants to be open-minded, respective to others' points of view and ready to change their opinions if adequate arguments give a basis for a change. A moderator also takes care of a respectful and equal discussion in each small group, and participants are given a balanced information package on the issue at hand. These conditions of deliberative discussion should alleviate the influence of participants' initial levels of issue knowledge because all participants are provided with the same information on the issue, and they are also exposed to the same levels of new information

**Table 1.** The main characteristics of the experiments.

	Theme of discussion	
	Nuclear power and energy	Immigration
N	135	207
Mode of discussion	Face-to-face	Face-to-face
Year	2006	2012
Question	Should Finland build a 6th nuclear power plant?	Should Finland have more immigration?
Treatments	Secret ballot and common statement.	Like-minded and mixed groups
Features	Information package, expert panel, rules, moderators	Information package, rules, moderators
Main outcome	Treatment not important to opinion change but the common statement treatment had more positive side-effects	Like-minded anti-immigrant groups did not become more extreme

**Table 2.** The main phases of the experiments.

	Experiment, topic	
	#1, Nuclear power	#2, Immigration
Pre-test phase	Mail-in survey with opinions, political action, trust and an invitation to volunteer (T1) Invitation letter	Short mail-in survey to form enclaves (T1)  Mail-in survey with opinions, political action and a preliminary invitation to take part (T2) Enclave formation, invitation letter
Test phase	Knowledge quiz (T2) Reading information material on the nuclear power issue Hearing and questioning the expert panel (2 h) A short survey of 7 questions (T3) General instructions and deliberation in small groups (3 h) Decision-making in the small groups (1.5 h) Survey and knowledge quiz (T4)	Knowledge quiz (T3) Briefing on the immigration issue  General instructions for deliberation  Deliberation in small groups (4 h, incl. 45 min lunch break)  Survey and knowledge quiz (T4)
Post-test phase	Follow-up survey (T5)	Follow-up survey (T5)

from their fellow participants in the same small group. Further, conditions should be ideal for reasoned opinion change because of new information and new perspectives heard during the discussion which participants are primed to consider in their reflections on the issue.

The two experiments included treatments that vary the ‘deliberativeness’ of the small group discussions, and they, therefore, provide a possibility to examine whether the associations between knowledge and polarization differ depending on the specific context of deliberation. In the nuclear power experiment, decision-making with a common statement procedure can be considered to be closer to the ideals of deliberative democracy compared to a secret ballot. It is, therefore, possible that the common statement procedure, rather than the secret ballot, enhances the kind of thorough discussion and seeking for a common perspective that hinders polarization tendencies. Further, Setälä, Grönlund, and Herne (2010) observed slightly more increases in issue knowledge in the common statement groups which, in turn, might indicate that the common statement groups were more deliberative than the secret ballot groups. In the immigration experiment, the like-minded groups do not necessarily approximate the ideals of deliberative discussion because a lack of diversity of perspectives. It is, therefore, possible that the narrower range of opinions in like-minded groups lays ground for polarization. However, at the same time, it should be acknowledged that Grönlund, Herne, and Setälä (2015) did not see group level polarization in the like-minded groups. This might indicate that the other characteristics of the deliberative package, i.e. balanced information, facilitation and discussion norms, hindered polarization. It is also noteworthy that Grönlund, Herne, and Setälä (2015) did not observe a connection between increased issue knowledge and polarization. These considerations reveal that at this stage, our knowledge on the influence of the type of discussion is not deep enough to formulate exact hypotheses and therefore we rather explore the relationship between levels of knowledge and polarization.

Second, we ask whether the association between knowledge and opinion polarization depends on the type of political knowledge. Is it issue knowledge or general political knowledge that leads to polarization? We are not aware of previous literature looking at the difference between general political knowledge and issue knowledge in this respect, and we are not able to form specific hypotheses about the two types of

knowledge and polarization. However, we tentatively suggest that high issue knowledge, even though general political knowledge is low, is a sign of high involvement and directional motivational reasoning that might enhance polarization. Further, we acknowledge that high issue knowledge together with high general political knowledge might give basis for a confirmation bias, and thereby polarization because of firmly held political opinions based on a large and well-formed set of reasons.

With the two experiments and separation of two types of knowledge we are able to answer several questions. First, does the combination of high diversity of opinions and a common statement procedure weaken the association between knowledge and polarization, or does low diversity, in turn, boost the connection between knowledge and polarization? Further, do those who have a high level of issue knowledge and a low level of general political knowledge, i.e. those who are likely to have an intense attitude on a specific topic and to be directionally motivated reasoners, polarize more than others, or is it rather so that having high levels of both types of knowledge amplifies the effect of knowledge and is most likely to lead to polarization?

## **Operationalization of variables**

### ***The dependent variable: polarization***

To measure the extent of polarization, we created a variable inspired by previous work that relies on a binary measure to gauge polarization (McHoskey 1995; Wojcieszak 2011, 2012). We assigned a binary value for each opinion question: A value of '1' was given to every participant who after deliberation moved further in the same direction as his or her initial position. Value 1 was also assigned to those who were at the extremes both pre- and post-test or ended up at the extremes after initially not stating an opinion (don't know). All other respondents were given the value 0 unless they did not fill in an answer, in which case they were coded as missing. We then combined these binary values into an index measuring the extent of polarization in total. For the nuclear experiment, there were eight questions related to opinions on the use of nuclear power before and after deliberation, which means that the polarization index varies between 0 and 8. For the immigration experiment, there were 14 opinion questions, meaning that the index varies between 0 and 14. Most survey items were answered on a Likert scale (fully agree, partly agree, partly disagree, fully disagree). For these questions, a middle or neutral position was unavailable as an answer, but respondents could choose not to have an opinion. In the immigration experiment, three questions were on a 0–10 scale,<sup>3</sup> but all answers were recoded to vary between 0 and 1 to give them an equal weighting in the index.

This index is appropriate to use in the present circumstances since most opinion questions only include 4 answer categories and exclude a neutral category, which means that the extent of polarization on each question is likely to be limited. By creating an index rather than using a pure binary measure, we are still able to gauge the extent of polarization.

### ***Independent variables: general political knowledge and issue knowledge***

Both general political knowledge and issue knowledge are measured with indexes that indicate the number of correct answers to factual questions concerning political matters

(current events and basic democratic principles) or concerning either the use of nuclear power or immigration in Finland to capture the scope of knowledge adequately. This approach excludes knowledge aspects such as logical reasoning. Nevertheless, previous studies suggest that this approach is the best available for measuring the most important aspects of knowledge (Delli Carpini and Keeter 1993).

In the experiment on nuclear power, there were six questions on general political knowledge and nine on the use of nuclear power. Four answer alternatives were presented to the respondents for each question. Compared to open-ended questions, this approach may overestimate the extent of knowledge due to false positives, but according to previous research, the differences appear to be minor and the multiple-choice approach has been shown to capture adequately the extent of knowledge of the respondent (Delli Carpini and Keeter 1993). In the experiment on immigration, there were four general political knowledge questions and 11 on the issue of immigration. Four alternatives were again presented for most questions, but two issue questions asked respondents to provide their estimate without giving answer alternatives, thereby providing a sterner test of the respondents' factual knowledge (although a suitable margin of error were allowed for when determining the correctness of the answers). The indexes were subsequently recoded to vary between 0 and 1 with 1 indicating getting all questions correct.<sup>4</sup>

### **Treatment variables**

For the experiment on the use of nuclear power, a dummy variable indicates whether the respondents took part in a group where the decision was made through voting (vote treatment) or a common statement. For the experiment on immigration, a categorical variable indicates the group composition, i.e. whether the participants were in cross-cutting (mixed), pro-immigration or con-immigration deliberation groups.

### **Control variables**

The use of control variables in experimental research is debated since control is achieved through randomization (see Freedman 2008; Lin 2013; Kam and Trussler 2017). Nevertheless, since our research aims to go beyond the original scope of the experiments by examining the impact of observed variables rather than only treatments, we include some control variables to assure the robustness of the findings. These are age (in years divided by 100), gender (female/male), education (*What is the highest educational level that you have completed?* Answers include 8 categories where lowest: *Elementary school* and highest *postgraduate degree*) and political interest (*How interested are you in politics?* Answers on 4-point Likert scale: Not at all interested, Only a little interested, Somewhat interested and Very interested).<sup>5</sup>

Table 3 represents the summary statistics on the dependent, independent, treatment and control variables.<sup>6</sup>

## **Results**

To start the analysis, Figure 1 displays the mean polarization across treatments for the two experiments.

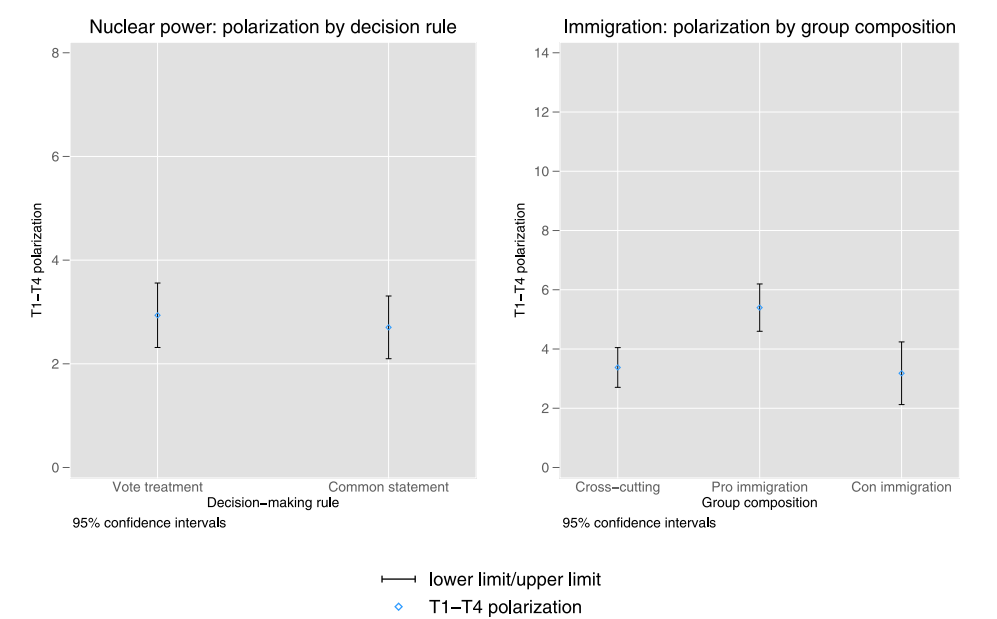
**Table 3.** Summary statistics on the dependent, independent, treatment and control variables.

Variable	Nuclear experiment				Immigration experiment			
	Obs	Mean	Std. Dev.	Range	Obs	Mean	Std. Dev.	Range
Polarization	127	2.82	2.44	0.00-8.00	183	4.15	3.30	0.00-14.00
General political knowledge	135	0.48	0.23	0.00-1.00	207	0.62	0.27	0.00-1.00
Issue knowledge	135	0.57	0.20	0.00-1.00	207	0.45	0.14	0.09-0.82
Age/100	135	0.48	0.17	0.18-0.84	207	0.53	0.17	0.19-0.82
Gender (ref. Female)	135	0.53	0.50	0.00-1.00	207	0.48	0.50	0.00-1.00
Education	128	0.49	0.28	0.00-1.00	205	0.54	0.27	0.00-1.00
Political interest	131	0.61	0.22	0.00-1.00	207	0.70	0.21	0.00-1.00
Decision rule treatment								
Vote treatment	67							
Common statement	68							
Group composition treatment								
Cross-cutting					88			
Pro					77			
Con					42			

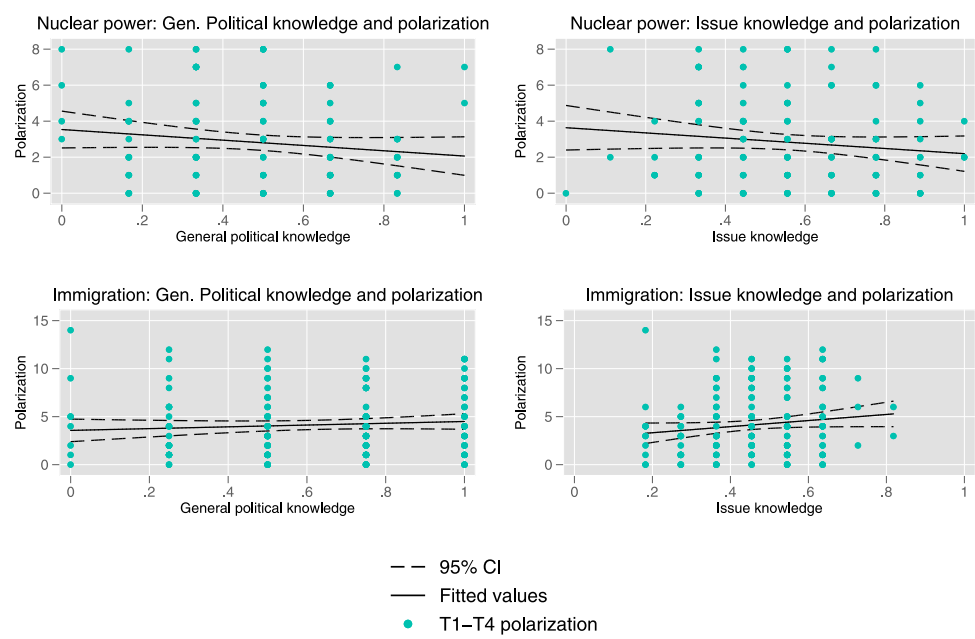
In the experiment on nuclear power, there is no difference in the level of polarization between the vote and the common statement treatments.<sup>7</sup> In the experiment on immigration, participants in the pro-immigration groups tended to polarize more – meaning they became even more liberal towards immigration as a result of being in like-minded groups.

Figure 2 provides a first dig at our main interest here by showing scatterplots together with fitted lines indicating the relationships in both experiments between polarization and general political knowledge and issue knowledge.

The plots show weak negative relationships between the degree of polarization and both types of knowledge in the nuclear power experiment. For both general political knowledge ( $B = -1.39, p = 0.084$ ) and issue knowledge ( $B = -1.39, p = 0.305$ ), those with



**Figure 1.** Polarization according to the treatments in the two experiments.



**Figure 2.** Polarization according to the level or general political knowledge and issue knowledge in the two experiments.

the highest extent of knowledge on average received a polarization score 1.39 lower than those with the lowest extent of knowledge. However, both effects are non-significant. The relationships are reversed in the immigration experiment, where there are weak, although again not statistically significant, positive associations for both general political knowledge ( $B = 0.93, p = 0.290$ ) and issue knowledge ( $B = 3.17, p = 0.071$ ). A similar pattern is shown in Table 4, where we report two regression models for each experiment: M1 only includes the two knowledge items, whereas M2 also includes treatment variables and control variables.

Both knowledge items again have negative, but non-significant effects in the nuclear power experiment. In the immigration experiment, we also find the expected positive, but non-significant effects in M1. The sign is reversed for general political knowledge after including control variables in M2, but it remains insignificant, so it is impossible to draw any firm conclusions.

These non-significant results suggest that neither knowledge type influence polarization. Nevertheless, as outlined above, it is likely that analyses that are more sophisticated are necessary to untangle the relationships since the treatments may moderate the links between the types of knowledge and polarization. To examine this, we in Table 5 show models that include interaction effects between the knowledge types and the treatments. We also examine whether there are interaction effects between the two types of knowledge.

Table 5 reveals that the two forms of knowledge do indeed affect polarization under certain circumstances. In the nuclear experiment, the interaction effects between the treatment and both types of knowledge are significant (General pol. knowledge  $B = 4.98, p = 0.003$ ; Issue knowledge  $B = -6.76, p = 0.005$ ).



**Table 4.** Direct effects of general political knowledge and issue knowledge in two experiments.

	Nuclear						Immigration					
	M1			M2			M1			M2		
	Coef.	SE	P	Coef.	SE	P	Coef.	SE	P	Coef.	SE	P
General political knowledge	−1.13	0.67	0.123	−0.44	0.87	0.625	0.53	(0.89)	0.546	−0.37	(0.87)	0.666
Issue knowledge	−0.99	1.52	0.530	0.44	1.85	0.818	2.62	(1.73)	0.130	0.65	(1.69)	0.699
Age				1.29	1.54	0.419				<b>−4.45</b>	<b>(1.30)</b>	<b>0.001</b>
Gender				−1.33	0.67	0.073				0.51	(0.46)	0.266
Education				0.24	0.92	0.799				0.01	(0.90)	0.992
Political interest				−1.77	1.04	0.117				<b>2.21</b>	<b>(1.08)</b>	<b>0.040</b>
Decision rule (ref. Vote treatment)				−0.17	0.56	0.773						
Group composition (Ref. cross-cutting)												
Pro										<b>1.74</b>	<b>(0.57)</b>	<b>0.002</b>
Con										−0.16	(0.71)	0.827
Constant	<b>3.93</b>	<b>0.86</b>	<b>0.001</b>	3.97	1.83	0.053	<b>2.58</b>	<b>(0.89)</b>	<b>0.004</b>	<b>3.87</b>	<b>(1.27)</b>	<b>0.002</b>
Random effects												
Constant 95% confidence interval											0.23–1.88	
Residual 95% confidence interval											2.55–3.19	
N		127			118							
Adjusted R <sup>2</sup>		0.01			0.07							
N: groups, individuals							26, 183			26, 181		
ICC							0.14			0.05		

Notes: Nuclear experiment: Coefficients are from linear regression models with clustered standard errors (SE) and *p*-values (*P*). Immigration experiment: Coefficients are from multilevel linear regression models, standard errors (SE) and *p*-values (*P*). Coefficients significant at a 0.05 threshold are **bolded**.

**Table 5.** The moderating effect of treatments on the links between political knowledge and polarization.

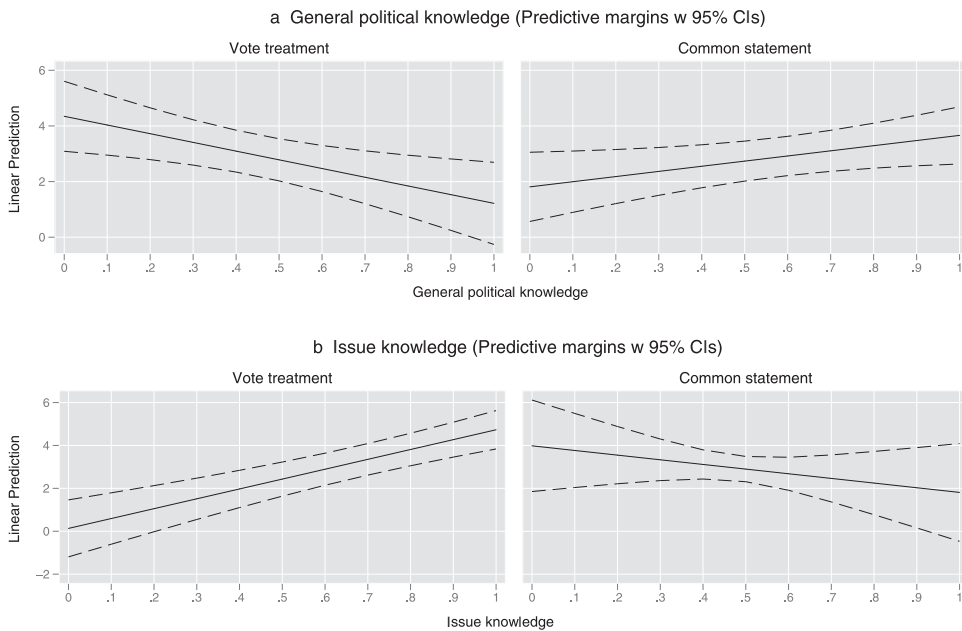
	Nuclear			Immigration		
	Coef.	SE	P	Coef.	SE	P
General political knowledge	<b>−6.21</b>	<b>2.58</b>	<b>0.035</b>	<b>−7.88</b>	<b>2.66</b>	<b>0.003</b>
Issue knowledge	1.99	2.43	0.430	−5.05	4.06	0.214
Age	1.46	1.34	0.300	<b>−3.68</b>	<b>1.28</b>	<b>0.004</b>
Gender	−1.37	0.69	0.072	0.49	0.44	0.274
Education	0.57	0.91	0.542	0.27	0.88	0.764
Political interest	−2.23	1.12	0.071	<b>2.33</b>	<b>1.06</b>	<b>0.028</b>
Decision-making rule (Ref. Vote treatment)	1.40	1.47	0.359			
Group composition (Ref Cross-cutting)						
Pro				1.70	1.91	0.374
Con				3.26	2.09	0.118
<i>Interaction effects</i>						
Pol. Knowledge # Issue knowledge	5.30	4.46	0.260	<b>14.37</b>	<b>5.67</b>	<b>0.011</b>
Decision-making rule# General pol. knowledge	<b>4.98</b>	<b>1.30</b>	<b>0.003</b>			
Decision-making rule# Issue knowledge	<b>−6.77</b>	<b>1.91</b>	<b>0.005</b>			
Group composition # General pol. knowledge (ref. cross-cutting)						
Pro # General political Knowledge				<b>3.88</b>	<b>1.80</b>	<b>0.031</b>
Con # General political knowledge				−1.95	2.23	0.382
Group composition # Issue knowledge (ref. cross-cutting)						
Pro # Issue knowledge				−5.18	3.68	0.160
Con # Issue knowledge				−5.14	4.40	0.242
Constant	<b>4.36</b>	<b>1.94</b>	<b>0.046</b>	<b>6.25</b>	<b>1.84</b>	<b>0.001</b>
Random effects <sup>a</sup>						
SD (Constant, issueknow. Politicalknow.)					0.029–3.14	
95% confidence interval						
SD Residual 95% confidence interval					2.48–3.10	
<i>n</i>		118				
Adjusted <i>R</i> <sup>2</sup>		0.13				
<i>N</i> (groups, individuals)					26, 181	
ICC					0.01	

Notes: Nuclear experiment: Coefficients are from linear regression models with clustered standard errors (SE) and *p*-values (*P*). Immigration experiment: Coefficients are from multilevel linear regression models, standard errors (SE) and *p*-values (*P*). Coefficients significant at a 0.05 threshold are **bolded**.

<sup>a</sup>We used the identity command to model the covariance structure of the random effects to get more complex models to converge. This assumes equal variances for random effects and that all covariances are zero. We used an unstructured approach that makes no such assumptions for the simpler models, and since the results for the fixed effects were similar we do not believe that this influences the substantial results.

Hence, the effects of each type of knowledge differ depending on the treatment. To clarify what the significant differences in slopes entail for how knowledge affects polarization, Figure 3 shows the predicted effects on polarization for both kinds of knowledge in the different treatments.

The relatively few respondents in the nuclear experiment entail wide confidence intervals. Nevertheless, the differences in slopes are pronounced, and indicate that both types of knowledge have contradictory effects depending on the treatment. For general political knowledge (Figure 3(a)), there is a negative coefficient in the vote treatment ( $B = -3.18$ ,  $p = 0.010$ ), which means that those with high general political knowledge on average receive a polarization score about 3.2 lower than those with the lowest extent of general political knowledge when making the decision by voting. In the common state-group groups, we instead find a positive coefficient ( $B = 1.90$ ,  $p = 0.042$ ), which means that those with higher levels of general political knowledge polarize by 1.9 points more than those with the lowest level of knowledge.



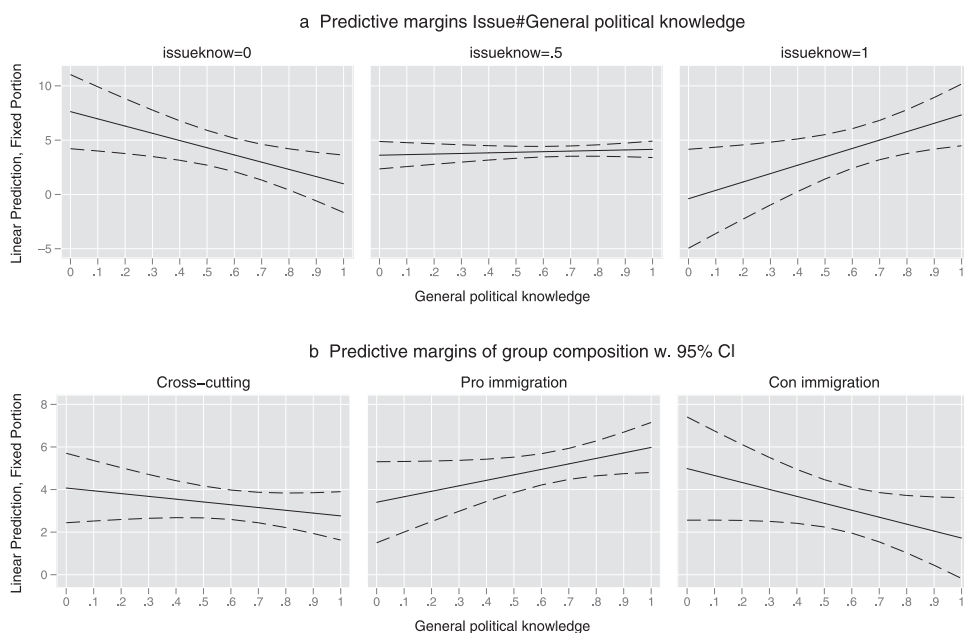
**Figure 3.** Nuclear experiment: effects of general political knowledge and issue knowledge on polarization by treatment.

For issue knowledge (Figure 3(b)), there is instead a positive coefficient ( $B = 4.58$ ,  $p = 0.000$ ) when deciding by voting, which means that those with the highest issue knowledge polarize about 4.6 points more than those with the lowest extent of issue knowledge under these circumstances. In the comment statement treatment, issue knowledge has a negative coefficient ( $B = -2.16$ ,  $p = 0.287$ ). Hence, while the effect is non-significant in this group, the tendency is for those with high issue knowledge to receive a lower polarization score compared to those with low issue knowledge in this situation.

This clearly shows that it is imperative to consider the treatment to understand how both types of knowledge affect polarization since the effects run in opposite directions, meaning they cancel each other out when only estimating direct effects, as in Table 4. Furthermore, it is important to distinguish between different types of knowledge, since high levels of general political knowledge polarize when making a common statement and depolarize when reaching a group decision through a vote. The opposite holds true for issue knowledge, where people with high issue knowledge are more likely to polarize when deciding through voting.

For the immigration experiment, there is a significant interaction effect between the two types of knowledge ( $B = 14.37$ ,  $p = 0.011$ ), which shows that their effects are interconnected in this case. The effect of general political knowledge also differs in the pro-immigration group compared to the cross-cutting group ( $B = 3.88$ ,  $p = 0.031$ ). Figure 4 shows the implications of these results.

Figure 4(a) shows that the interaction effect between the two types of knowledge entails that polarization occurs either when people have low levels of both kinds of knowledge or when they have high level of both kinds of knowledge. If either kind of knowledge



**Figure 4.** Immigration experiment: effects of general political knowledge and issue knowledge on polarization by treatment.

is at intermediate values, no polarization occurs. That both highly knowledgeable and those with little knowledge polarize, may indicate that polarization entails different cognitive mechanisms, despite the seemingly similar developments.

Figure 4(a) shows how general political knowledge affects polarization depending on group composition. In the Pro-immigration groups, the coefficient is positive ( $B = 3.04$ ,  $p = 0.028$ ), which means that those with higher levels of general political knowledge polarize by about 3 points more than those with the lowest level of political knowledge. In other words, participants with high knowledge became even more positive towards immigration. In the two other groups, the estimates have negative signs (albeit non-significant), which entails that here those with higher knowledge tend to polarize less.

It is here important to note that similar developments are not observable for issue knowledge, which again shows that it is important to distinguish between different types of knowledge.

## Conclusions

We have studied the association between political knowledge and individual-level opinion polarization in two deliberative experiments. We differentiated between general political knowledge and issue knowledge, as well as looked at the potential impact of variations in decision-making mechanisms and group composition. While the exploratory approach means we are unable to draw definitive conclusions, we may nonetheless make several important observations when it comes to studying different types of knowledge and the link between political knowledge and polarization in a deliberative setting.

Our main observations can be summarized as follows: We cannot say that individual-level polarization vanishes in the deliberative setting, nor that the association between political knowledge and polarization disappears. Instead, our main message is that both the specific features of the deliberative setting as well as the type of knowledge, general political knowledge and issue knowledge, influence the ways in which knowledge and polarization are associated.

To be more specific, when the treatments are not considered, the associations between general political knowledge and polarization as well as issue knowledge and polarization are insignificant. Yet when we study interaction effects, we observe that knowledge is linked to polarization under specific circumstances. In the nuclear power deliberations, the vote and the common statement treatments produced opposite effects between knowledge and polarization, depending on whether we look at general political knowledge or issue knowledge as well as whether we look at vote or common statement treatments. In other words, *different people polarize under different degrees of deliberativeness*. On one hand, those with high levels of general political knowledge polarized more than those who had low levels of general political knowledge in the common statement procedure. In other words, even in those groups that should be closest to the ideals of deliberative democracy, i.e. groups with a diversity of opinions and a consensual procedure aiming at a common statement, participants with high levels of general political knowledge polarize. It, therefore, seems likely that also in everyday political discussion, knowledgeable people tend to polarize more than others. Moreover, our results imply that high levels of general political knowledge, independent of the level of issue knowledge, are not a guarantee against polarization.

On the other hand, those with a high level of issue knowledge polarized more than those with less issue knowledge, when the decision was made through a secret ballot. The secret ballot treatment was – at least by design – less deliberative, since the final say was reached through secret voting, rather than by a shared effort related to writing a common statement. In this case, high issue knowledge among participants led to more extreme views in the end of deliberation. This result indicates that we cannot claim that those who have high levels of issue knowledge tend to polarize more than others in general, but rather that they may have this tendency under certain circumstances.

In the immigration experiment, in turn, whether discussion took place in a mixed or a like-minded group also influenced polarization. We observed that those who polarized had either low levels of both general political knowledge and issue knowledge, or high levels of both. Those with high levels of general political knowledge polarized more than those with low levels in the like-minded pro-immigration groups. However, in the like-minded con-immigration groups and in mixed groups, those with high levels of general political knowledge polarized less. It seems that the diversity of opinions is not as such decisive for the association between knowledge and polarization but rather that diversity of opinions interacts with different types of political knowledge.

Polarization is often seen as a problem for democracies. We would, however, like to point out that it is not necessarily an unwanted progress from a normative perspective. If original preferences are already based on a large pool of political knowledge and consideration of different perspectives, and polarization is a sign of becoming more convinced about one's preferences this type of change would be desirable from a normative

perspective. However, if polarization is caused by a restricted information pool and biased heuristics, it is not a welcomed phenomenon from a normative point of view. It is particularly worth noting that in the immigration experiment, people with high levels of both kinds of knowledge were likely to polarize, and also that those with high levels of general political knowledge polarized more than those with low levels in the like-minded pro-immigration groups. Rather than interpreting these tendencies as a sign of highly knowledgeable people going to extremes (Sunstein 2007) it may show that people with high political sophistication and awareness of the issues during deliberation form more coherent preferences and therefore answer consistently on the attitudinal questions (Himmelroos and Christensen 2018). This shows that to understand the implications of polarization for democracy, it is not enough to establish that polarization occurs, it is also necessary to determine why it occurs. In particular, it is important to find out whether polarized preferences are based on a large pool of arguments and an unbiased pool of information, or rather on a limited perspective and a biased set of information.

To conclude, our results show that it is important to distinguish between different types of knowledge as well as the deliberativeness of discussions. Although we are unable to ascertain that either type of knowledge is more prone to polarization, there is clearly an intricate interplay between knowledge and discussion types that shapes the likelihood of polarization. The experiments we use here help to demonstrate that these differences exist, but since they were developed with different aims in mind, they are unable to help us disentangle these relationships. Future research should aim to discern the mechanisms that underpin polarization at the individual level by theoretically and empirically distinguishing between different kinds of knowledge and how they are related to reasoning and opinion formation. Furthermore, it is imperative to be aware that effects are likely to be situational and dependent on the specific features of the discussions.

Polarization can be a democratic dilemma, if the distinct filter bubbles or opinion enclaves drift far apart from each other, which seems to be the case especially in social media (Sunstein 2017). Democratic governance does not require total consensus, but it does require consensus among a *majority of people*. In practical terms, political parties need to form governments, whose policies are accepted by a majority of MPs in parliament. The further away from each other opinion enclaves drift, the harder it will be to find agreement on political issues. While our results here indicate that not even a deliberative controlled setting can totally alleviate polarization at the individual level, other analyses of deliberation in like-minded groups (Grönlund, Herne, and Setälä 2015; Strandberg, Himmelroos, and Grönlund 2019) show that deliberative rules and discussion moderation can alleviate opinion polarization at the aggregate level. This means that deliberative mini-publics as a democratic innovation have potential in facilitating consensus-seeking outcomes in today's polarized societies.

## Notes

1. We are unable to compare polarization in the deliberative setting to polarization in a control group. While we did have control groups in the experiments, political knowledge was not

measured in the control groups because they were contacted only with posted surveys that cannot be considered reliable measures of knowledge.

2. A more detailed description of the experimental procedures can be found in Setälä, Grönlund, and Herne (2010) and Grönlund, Herne, and Setälä (2015). The data are available from the Finnish Social Science Data Archive (Nuclear power: <http://urn.fi/urn:nbn:fi:fsd:T-FSD2355>; Immigration: <http://urn.fi/urn:nbn:fi:fsd:T-FSD2958>).
3. Respondents indicating an intermediate score of 5 on the 0–10 scale were coded as 0 or ‘not polarizing’ since they did not have a pre-existing opinion they could polarize towards.
4. We were unable to empirically verify the two dimensions with the use of factor analysis and item response theory, which is unsurprising considering the relatively few respondents. Nevertheless, the correlations between the general political knowledge and issue knowledge indexes are modest (Pearsons’ correlation coefficients: Nuclear experiment: 0.35; Immigration experiment: 0.29), indicating that the two forms of knowledge form distinct phenomena.
5. We limit the number of control variables to factors most likely to affect the level of political knowledge and issue knowledge. Other control variables including party identification and ideology were tested but did not alter the substantial effects.
6. We tested for the possibility of multicollinearity but found no need for concern (Highest VIF in nuclear experiment 1.52 for Issue knowledge, mean VIF = 1.28; highest VIF in immigration experiment 1.27 for Pro Immigration treatment, mean VIF = 1.1.7).
7. It may be feared that initial differences in nuclear opinions between the 12 groups in the nuclear experiment could affect the propensity for and direction of individual level polarization. However, a one-way ANOVA show no cause for concern in this regard ( $F(11, 77) = 0.48, p = .908$ ), meaning we are confident that initial differences in group composition do not affect the results.

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