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High-Stakes Decision-Making Within Complex Social Environments: A Computational Model of Belief Systems in the Arab Spring

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Abstract

People experiencing similar conditions may make different decisions, and their belief systems provide insight about these differences. An example of high-stakes decision-making within a complex social context is the Arab Spring, in which large numbers of people decided to protest and even larger numbers decided to stay at home. This study uses qualitative analyses of interview narratives and social media addressing individual decisions to develop a computational model tracing the cognitive decision-making process. The model builds on work by Abelson and Carroll (1965), Schank and Abelson (1977), and Axelrod (1976) to systematically trace the inferences connecting beliefs to decisions. The findings show that protest decisions were often based on positive emotions such as pride, hope, courage, and solidarity, triggered by beliefs about successful protest and self-sacrifice. By contrast, decisions to stay at home were triggered by beliefs about safety, state approval, and living conditions. As one participant said, “When I heard about the revolution in Tunisia, my heart was filled with solidarity for the people.” In the words of a non-participant: “When people are killed, we must be careful. There are more important things than protest: safety and stability.” This study of individual explanations about events identifies the role of emotions in high-stakes decision-making within complex social environments.

Keywords: High-stakes decision-making; Emotion; Belief system; Political protest; Arab Spring; Reasoning; Complex social environment

1. Introduction

People faced with challenging social and political contexts often make different decisions about taking action. Belief systems provide a promising analytical tool to investigate these differences. Belief systems consist of beliefs addressing both “inner states as well as outer realities” perceived by individuals, such as risks, emotions, traits, events, or external structures (Jervis, 2006, p. 642; also see Mercer, 2010; Usó-Doménech & Nescolarde-Selva, 2016). They also include inferences that address connections where certain beliefs, called “antecedents,” trigger other beliefs, called “consequents” (belief \rightarrow belief), and, ultimately, decisions (belief \rightarrow belief \rightarrow ... \rightarrow decision) (Abelson & Carroll, 1965; Axelrod, 1976). Because beliefs relate to such a wide range of internal and external factors, this framework allows researchers to systematically trace how decisions are made. In particular, belief systems can shed light on how different people react differently to similar circumstances.

In the present study, belief systems are applied to the study of differences in people’s reports of their high-stakes decision-making during the Arab Spring. Much of the literature examines the Arab Spring by focusing on external factors, such as the politics and structures of authoritarian regimes (e.g., the use of repression, the military, the security apparatus), the organizational structures and methods used by the oppositional forces (e.g., prior protest tactics and organizational changes), or economic hardship (e.g., Achcar, 2013; Bellin, 2012; el-Ghobashy, 2011; Gunning & Baron, 2013; Malik & Awadallah, 2013; Nepstad, 2013). These analyses cannot explain why some individuals decided to participate in the uprisings whereas others decided to stay at home instead. Investigating belief systems based on which participants and non-participants made decisions for actions promises to add new insight.

2. High-stakes decisions within complex situations

In high-stakes decisions set within complex social situations, a large number of interconnected factors influence individuals, so that no obvious choice among options is evident to the decision-maker. In these situations, at least four different approaches have been used to investigate this type of complex, socially situated decision-making: (a) rational choice models, which calculate the costs and benefits of alternatives related to the actors’ preferences; (b) bounded rationality and cognitive shortcuts (heuristics), which identify key inferences underlying decisions; (c) the operational code, which identifies the philosophical and instrumental beliefs that guide decision-makers; and (d) cognitive mapping, which maps entire belief systems underlying decisions.

2.1. Rational choice

Rational choice models evaluate complex decision-making situations by comparing preferences for alternatives, based on their costs and benefits for the decision-maker.

Particular types of high-stakes decision-making in complex situations to which rational choice theories have been applied are social dilemmas, wars, economic crises, or political rebellion (Fearon, 1995; Lichbach, 1995; Ostrom, 1997; Williams, Collins, & Lichbach, 1997). Applications have made visible the particular costs and benefits that contribute to the difficulty of choice in complex decision-making situations. Olson (1965) and Samuelson (1954) have identified the public good problem, where each decision-maker would benefit from making a contribution in the long term, but prefers to free ride and rely on others to contribute because of the incurred short-term costs.

Lichbach has also applied these ideas to outline a “rebel’s dilemma,” which refers to rational political dissidents who refrain from participating in rebellion to overcome their political grievances unless the problem of free riding is overcome (1995). Fearon has identified an “inefficiency puzzle” in interstate wars, showing that negotiated settlements that are preferable to rational actors exist under broad conditions (1995). Axelrod has offered an explanation to the puzzle of cooperation among self-interested actors by showing that the long-term benefits of cooperation outweigh the short-term costs of defection (1981). These applications have outlined key considerations that enter high-stakes decisions within complex social environments. However, other fields of research have shown that focusing on the costs and benefits of alternatives fails to capture major aspects of high-stakes decision-making.

2.2. *Bounded rationality*

Research on bounded rationality has shown that reasoning in real-world situations often does not follow expectations from rational choice theories and that decisions are often based on cognitive shortcuts (heuristics) (Gigerenzer & Gaissmaier, 2011; Tversky & Kahneman, 1974). Simon first made a case for bounded rationality based on evidence from cognitive psychology that outlined the characteristics and limitations of decision-makers as opposed to economic accounts of objective rationality which evaluate behavior based on the situation alone (1985). In his view, decision-makers are fundamentally constrained by “the narrowness of the span of attention,” and cannot apply most of the information received from their environment to their deliberations (p. 302). Consequently, decisions are never based on evaluating all possible alternatives, as assumed by rational choice theories, but rather on selective and incomplete searches “through large realms of possibilities” (p. 295).

Applications of this approach to high-stakes decision-making in complex situations have investigated retirement savings, stock market investments, or medical treatments, and identified numerous cognitive shortcuts that are applied across these situations (Ariely, Loewenstein & Prelec, 2003; Benartzi & Thaler, 2007; Bornstein & Emler, 2001; Kahneman, 2003). Most notably, Kahneman and Tversky have shown that decision-making related to high risks relies on heuristics according to which people avoid losses rather than seek gains, as expected from rational choice arguments (1974). Related recent studies have shown that decision’s embracing risks are based on heuristics according to which

chances for success are overestimated while risks are ignored or underestimated (Weyland, 2012).

2.3. *Operational code analysis*

Operational code analysis was developed to study high-stakes foreign policy decisions. It explains decision-making based on the “philosophical” and “instrumental” beliefs that provide “a prism that influences the actor’s perceptions and diagnoses of the flow of political events” and that “influence the actor’s choice of strategy and tactics, his structuring and weighing of alternative courses of action” (George, 1969, p. 191). Applications of this approach have contributed extensive insight about policy decisions, addressing Soviet leadership and foreign policy making (Leites, 1951), U.S. management of conflicts in the period of strategic adjustment after the Cold War (Renshon, 2008; Schafer & Crichlow, 2000; Walker, 1977; Walker, Schafer, & Young, 1998), foreign policy decisions by Israeli prime ministers (Crichlow, 1998), or decisions about conflict behavior by democratic and presidential leaders more generally (Schafer & Walker, 2006; Walker et al., 1999).

Key beliefs that constitute the operational code underlying these decisions address the nature of politics, conflict, and political opponents; prospects for implementing one’s values, predictability of future events, and influence of political leaders on these events (philosophical beliefs); as well as beliefs about how to choose policy goals, how to implement these goals, the best way to deal with risk, the best time for an action, and the utility of various means (instrumental beliefs) (Walker et al., 1999, p. 176).

2.4. *Cognitive mapping*

Cognitive mapping was developed by Axelrod in 1976 to help policy-makers improve their decisions, but it has been applied in numerous analyses to explore complex decision situations beyond the field of policy making. A cognitive map is a graphic representation of belief systems that captures the structure of the beliefs underlying decisions by making visible the beliefs and inferences antecedent to decisions. It combines graph theory (Cartwright, Harary, & Norman, 1965), causal inference (Simon, 1957), psychologic (Rosenberg & Abelson, 1958), evaluative assertion analysis (Osgood, Saporta, & Nunnally, 1956), and decision theory (Luce & Raiffa, 1957). Numerous applications have traced high-stakes decision-making in complex situations related to British intervention in Persia (Axelrod, 1976), wars between Israel and Arab countries (Bonham, Shapiro, & Trumble, 1979), rivalry between the Mongols and the Ming dynasty (Johnston, 1998), violent versus nonviolent resistance (Dornschneider, 2016), the housing market (Ferreira & Jalali, 2015), or environmental planning (Argent et al., 2016).

Cognitive maps are highly complex, and research has developed computational models that can systematically analyze the large number of beliefs and inferences contained by them (Bonham & Shapiro in Axelrod, 1976; Carvalho, 2010; Dornschneider & Henderson, 2016; Elsayah et al., 2015; Guiyun et al., 2006). Nevertheless, to date, there is no

standard method that systematically traces the key beliefs and inferences antecedent to decisions contained by cognitive maps.

The mentioned four approaches identify the processes by which beliefs play a role in high-stakes decisions within complex social environments. Rational choice analyses focus on the costs and benefits of alternatives available to the decision-maker; studies on bounded rationality explore cognitive shortcuts; operational code analyses focus on the philosophical and instrumental beliefs of decision-makers; while cognitive mapping visualizes the beliefs and inferences antecedent to decisions without specifying particular beliefs that matter most. Because they focus on different aspects of reasoning, these approaches do not provide insight into the subset of beliefs that activate a particular decision.

In the present study, my objective was to develop a computational model to trace the inferences connecting the subsets of beliefs to later decisions. The model is applied to a specific high-stakes decision in a complex environment. Based on empirical data from individual reports, the model identifies how people's beliefs and inferences lead to their decision about their own role in a complex social event.

3. Case study: Joining the Arab Spring

In December 2010, a street vendor in central Tunisia set himself on fire after the police confiscated his fruit cart. The event triggered protests against the authorities, which quickly spread across the countryside to the Tunisian capital, and further to other Arab countries. Over the following weeks, the protests developed into large-scale uprisings that involved millions of protestors throughout the Middle East, constituting the largest protests in people's memories. These uprisings became known as "the Arab Spring" and had unprecedented consequences throughout the region. During the following years, they led to the resignation of Presidents Ben 'Ali in Tunisia and Mubarak in Egypt, the death of Qaddafi in Libya, the departure of President Saleh from Yemen, and civil war in Syria. In spite of this impact, most Arab countries returned to autocratic rule in the following years.

Two countries experienced opposite outcomes of the Arab Spring: Egypt and Morocco. In Egypt, the main protests happened on January 25, 2011, and led to the resignation of President Mubarak a few weeks later. This was followed by the first free elections in Egyptian history, which brought the Muslim Brotherhood into power. A year later, the military took over and a new, autocratic president, al-Sisi, was inaugurated. In Morocco, the main protests happened on February 20, 2011, and led King Muhammad VI to introduce constitutional changes. These changes were confirmed by a referendum held in July, and the king remained in power.

3.1. A complex social setting with high-stakes decisions

The Arab Spring was an unprecedented historical event involving high-stakes decisions within a complex social setting. Throughout previous decades, millions of Arabs had

quietly endured severe economic hardship, inequality, and no political influence but had not engaged in mass uprisings. Arab autocrats deterred opposition through imprisonment, torture, or “disappearance” of political opponents (Bellin, 2004, p. 144; Bellin, 2012). When the Arab Spring erupted, some autocratic rulers employed armed actors who attacked civilians and posed “a genuine threat to the population” (Amnesty International, 2018, p. 39). There were also reports that “the security forces and army used torture as a weapon against protesters” (Amnesty International, 2018, p. 39). In spite of these high risks, unprecedented numbers of people decided to join in uprisings.

The literature has highlighted potential influences on the uprising, including economic grievances (Achcar, 2013; Joffé, 2011), class differences (Kandil, 2012), the new media (Lynch, 2011), pre-existing opposition networks (el-Ghobashy, 2011), coalitions between elites (Blaydes & Lo, 2012; Yom & Gause, 2012), social influence (Saideman, 2012), state repression (Davenport & Moore, 2012), emboldening emotions (Pearlman, 2013), and prior protest cycles (Gunning & Baron, 2013).

Many well-known analyses implicate beliefs as an important factor in people’s decisions to protest. Various researchers observe that new digital media enabled people to “believe that they can make a difference,” and that these beliefs motivated decisions to join the protests (McGarty et al., 2014, p. 726). In the words of Bellin (2012, p. 138): “Social media (Facebook, Twitter, YouTube, cell phones with video feed capacity) and satellite television (al-Jazeera, al-Arabiya) together enabled the mobilization of collective action in ways that had been heretofore impossible in repressive settings.” Howard et al. (2011) also consider social media as an enabling factor, and Lynch states (2011, p. 46): “A decade-long, media-fueled narrative of change is why Arabs immediately recognized each national protest as part of their own struggle.”

Others refer to beliefs about economic grievances to explain decisions to join the uprisings. According to Malik and Awadallah (2013, p. 296), “[t]he centrality of the economic question is evident. Arab revolutions were fueled by poverty, unemployment and lack of economic opportunity.” Joffé argues that the uprisings were preceded by a sharp increase in food and energy prices, aggravating people’s grievances and motivating decisions to join the protests (Joffé, 2011, p. 507): “The causes for the insurgency are similar—they lie in the global economic crisis...” This argument is also cited by Lotan and colleagues: “The demonstrations were an expression of citizens’ frustration over economic issues like food inflation and high unemployment” (2011, p. 1376).

In contrast, decisions to stay at home have been tied to beliefs surrounding the ruling elites of Arab monarchies, such as Saudi Arabia, Qatar, or the United Arab Emirates. According to Yom, “beliefs about their historical rarity and dynastic superiority” can explain why “most ruling kingships refrained from systematic violence,” and successfully “neutralized dissent through nonrepressive means” (2014, p. 43). Moreover, Menaldo argues (2012, p. 709): “Through the strategic use of constitutions, formal political institutions, Islamic principles, and informal norms, Middle East and North African monarchs have “invented” a political culture with a stable distributional arrangement and self-enforcing limits on executive authority.” These analyses imply that non-protestors accepted their rulers based on positive beliefs about them, including conformance to Islam,

historical rarity, distribution of wealth, or peaceful rather than violent response to protest. Nevertheless, there are also non-monarchical states without significant Arab Spring events, for example, Lebanon.

Others have suggested that decisions to stay at home were related to beliefs that protest included high risks. According to Stepan and Linz, participation in the uprisings required people “to reduce mutual fears” (2013, p.23), while Kamrava notes that “authoritarian states have historically maintained their power through a combination of promising to provide for national security, spreading fear and intimidation, and promising economic progress” (2012, p. 97), and Pearlman observes that over decades preceding the uprisings, “many citizens did not engage in public dissent for fear or danger...” (2013, p. 388).

Although these analyses shed light on important beliefs related to decisions about participation in the uprisings, they do not explicitly examine which beliefs entered these high-stakes decisions or the reasoning processes by which beliefs triggered decisions. Based on the literature, we do not know if people really made decisions based on beliefs about the superiority of their rulers, the risks associated with political resistance, beliefs about being able to make a difference, the early Tunisian success, or economic suffering. To systematically explore the beliefs that entered people’s decision, the following study develops a dataset of belief systems held by participants and non-participants during the uprisings, and a computational model to systematically trace the beliefs and inferences triggering decisions.

3.2. *Analyses of belief systems*

Developing a computational model is necessary because knowledge about the beliefs that trigger decisions is not available from the methods applied by existing studies, which investigate correlations between beliefs with similar contents, inferences between particular beliefs, or the structure of belief systems. The reason for the lack of methods is the large number of beliefs and inferences that are contained by belief systems. Given this complexity, it is not obvious how to trace the inferences connecting subsets of beliefs to decisions.

Most research has dealt with the complexity of belief systems by limiting the analysis. A large body of literature has examined correlations between beliefs with similar contents. This has provided extensive knowledge about subjects including ideology (Converse, 2006; Jost, 2006), right-wing authoritarianism (e.g., Crowson & DeBacker, 2008), prejudice and discrimination (e.g., Bilewicz et al., 2013), immigration (e.g., Bloom, Arikan & Courtemanche), or religious fundamentalism (e.g., Brandt & Tongeren, 2017). However, correlations focus on beliefs that occur together and overlook that connections between beliefs are often inferential, meaning that a certain belief can trigger another belief (e.g., Belief 1: “the state is violent” could trigger Belief 2: “protesting is dangerous,” so that B1 -> B2). Moreover, beliefs with similar contents constitute only a small subset of belief systems. Their analysis overlooks that belief systems are by their nature very complex and contain many beliefs with different contents that could trigger decisions.

Other studies examine inferences between particular beliefs. An example is Weyland’s study of the Arab Spring, which argues that the uprisings were the result of people

drawing “rash inferences” (2012, p. 917). Accordingly, they “overrated the significance of the Tunisian success, overestimated the similarities with the political situation in their own country, and jumped to the conclusion that they could successfully challenge their own autocrats” (2012, p. 917). However, focusing on this particular inference overlooks that protesting in the Middle East involves very high risks, and that decisions to mobilize for the Arab Spring could also have involved more complex deliberations in which people evaluated the risks of participating, or other factors that mattered to them.

Another field of research has examined the structure of beliefs, focusing on belief stability versus change. For example, Bonham, Shapiro, and Trumble investigate if U.S. policy officials adjusted their beliefs related to the October War, and conclude that “there was almost no restructuring of beliefs,” including beliefs that negotiations could eventually contain the Israeli–Palestinian conflict, beliefs that war made it more difficult to contain conflict in the region, or beliefs about Soviet influence (1979, p. 3; also see Crichlow, 1998; Pierce, 2011; Renshon, 2008). However, belief stability and change do not show how decisions are made, or, more specifically, how certain beliefs trigger other beliefs, which in turn trigger decisions (belief → belief → ... → decision). Therefore, related studies cannot provide insight about the beliefs that enter certain decisions, or the reasoning processes by which these beliefs trigger decisions.

4. Method

To identify belief systems, I analyzed the direct speech of individuals from Egypt and Morocco through ethnographic interviews and Facebook groups (in Arabic and French). I then applied qualitative methods developed by Strauss and Corbin (1990) to manually code the actors’ direct speech for (a) beliefs about external or internal factors, (b) direct and indirect inferences between beliefs, and (c) decisions (to protest or to stay at home). In this way, I constructed 121 belief systems. These consist of very large numbers of beliefs and inferences, and it is unclear which beliefs are connected to decisions, or how they trigger decisions. To understand these relationships, I developed a computational model to trace inferences connecting beliefs to decisions. Specifically, the model contributes information about indirect inferences connecting beliefs to decisions (belief → belief → ... → decision), subsets of beliefs that trigger decisions (as opposed to other subsets that fail to do so), beliefs that are shared by different actors versus beliefs that are unique to particular actors, and all of the beliefs contained in a large number of individuals’ belief systems.

5. Data construction

5.1. Sample

I conducted ethnographic interviews with protestors and non-protestors in Egypt and Morocco. Thirty-five interviewees lived in Cairo, 34 in Rabat, 12 in Marrakech, 6 in

Alexandria, 4 in Casablanca, and 2 in Salé, a commuter town opposite Rabat. There were 65 males and 28 females in the study, ranging in age from late teens (4) to their 20s (28), 30s and 40s (47), and 50s to 70s (14). Most of the sample (81%) were adults in their 20s to 40s. A few individuals gave detailed accounts of more than one event, and both were included as separate observations. In total, the interview analysis identified 68 non-protest and 34 protest decisions.

I held ethnographic interviews during 2014, when some Arab Spring protests were still ongoing in the region. In Morocco, I approached individuals in public places, such as streets, shops, libraries, and cafés. Various interviews developed from my daily interactions, such as buying groceries, searching for books in shops or libraries, or purchasing medication in a pharmacy. I also organized interviews with protestors by contacting members of *Mouvement du 20 Février*, the leading protest movement in Morocco. I moreover contacted opposition journalists, Muslim leaders, and politicians from the opposition by asking researchers I knew abroad. I interviewed women and men, old and young people, and people with different occupations, such as bankers, librarians, donkey riders, housewives, or unemployed people. The participants are described in Appendix 2. I avoided snowball sampling, where new interviewees are recruited from other interviewees' acquaintances. This creates the risk of being locked into specific interviewees' social circles.

In Egypt, approaching people in public places was not possible given the security situation in 2014. I relied on an extensive network of contacts I had established during 10 years of prior research, including academics, journalists, and friends. I also occasionally interviewed people I met while traveling, such as a cleaner, taxi drivers, or shopkeepers. The Egyptian sample consists of a similarly wide variety of individuals as in Morocco, as seen in Appendix 2.

5.2. Interview protocol

The interview schedule followed Spradley's guidelines for ethnographic interviews (Spradley, 1979). Ethnographic interviews are "a particular kind of *speech event*" which is based on "rapport" between the interviewer and interviewee (pp. 55, 58). They are characterized by three main features: (a) explicit purpose, according to which the interviewer explains where the conversation is intended to go; (b) ethnographic explanations, where the interviewee explains what she is asking or doing (e.g., "I would like to write some of this down"); (c) ethnographic questions, which enable the interviewer to collect information (Spradley, 1979).

When recruiting interviewees, I first introduced myself and asked if they would have the time to talk with me. When individuals agreed, their interviews were recorded. However, because of the sensitive nature of the research, I often took contemporaneous notes instead. At the beginning of the interview, I described the research project and asked if the interviewees had any questions. Then, I posed ethnographic questions or encouraged them to further elaborate on their thoughts.

Interviews typically began with descriptive questions about the interviewees' behavior—were they participating in protest or not? Occasionally, I knew about this behavior because interviewees had told me in a prior conversation, and I began interviews by asking “I remember you told me you are engaging in X?” After these introductory questions, I did not follow up with questions to encourage individuals to further elaborate on their behavior. I waited, nodded, or repeated what they said in the form of a question. The interviewees gave lengthy descriptions of their behavior, often addressing prior behavior such as their first experiences of protesting (protestors) or recalling earlier protests they had not joined (non-protestors). If prior behavior was not addressed during an interview, I posed related questions at the end of the interview. In later stages of the interviews, I also asked narrower questions that followed up on particular aspects, and I asked if interviewees wanted to add or emphasize any information.

Interviews in both countries discussed events in 2014 as well as prior behavior during the Arab Spring. Of 121 decisions identified from the interview analysis, only three referred to a change in their behavior (from protest to non-protest). Consistent with findings that beliefs are stable (Anderson, 1983), the reasoning processes identified from interviews were assumed to capture the key beliefs underlying decisions made in the Arab Spring. Although it cannot be excluded that interviewees provided post hoc rationalizations, all individuals referred to events, conditions, and behaviors that were happening at the time when they were making decisions and that were verifiable through the news.

5.3. Social media posts

I also analyzed Facebook posts in which individuals responded to the calls for the two main protests in Egypt and Morocco, which happened on January 25, 2011 (Egypt) and February 20, 2011 (Morocco). I accessed information by joining the Facebook groups that issued these calls: *Kulana Khalid Sa'id* in Egypt and *Mouvement du 20 Février* in Morocco. I searched past posting when the calls for the main protests were made. There were hundreds of individual posts from those who responded: emojis, songs or poems, or expressions of surprise or joy. Some commented on emotions or particular experiences without referring to their own decision about joining the protests. Others said that they would join the protests but did not provide information about reasons for joining. A few posts tried to discourage others from protesting. I selected only posts in which an individual described why they were planning to participate in the main protests in Egypt (January 25) or Morocco (February 20), a total of 19 posts. A problem related to data constructed from Facebook is that there is no evidence that individuals who said that they were going to protest actually did so. Contemporaneous social media accounts suggest that large numbers of people learned about the protests online and then decided to join them, suggesting that the posts were accurate.

5.4. Qualitative coding

Next, to identify beliefs, inferences, and decisions from the interview records and Facebook posts, I applied qualitative coding procedures developed by Strauss and Corbin (1990). To break down direct speech into beliefs, I applied open coding (p. 61) and grouped parts of sentences (words, subclauses, main clauses) or entire sentences according to similar and different factors addressed by their propositional contents. In this way, I identified 145 separable beliefs. I then used elements from axial coding (p. 96) to abstract these beliefs into 15 types, considering the factors addressed by the beliefs.

When assigning codes, I used the actors' own vocabulary to preserve meaning ("in vivo" codes, see Strauss & Corbin, p. 69). For example, a belief coded as "improved living conditions" was identified from quotes including "People in the villages have better salaries now," and "Life is much better now." It was assigned to the belief type "external conditions." Another belief coded as "state crimes" was identified from quotes addressing governmental corruption or censorship, such as "Mursi was corrupt and gave state secrets to Qatar." This belief was assigned to the belief type "state behavior." Appendix 1 lists further examples of quotes related to each belief and type identified in this analysis.

To identify inferences, I examined linguistic connectors, such as "therefore" or "if...then," as well as temporal and logical order. The following tables show two examples (Tables 1 and 2).

This sentence contains beliefs about two factors: (a) improved living conditions and (b) governmental effort. The sentence, moreover, contains a causal linguistic connector, which suggests that the belief about governmental effort (antecedent) triggers the belief that living conditions have improved (consequent).

These sentences also contain beliefs addressing two factors: (a) effort by the head of the state for the citizens and (b) satisfaction with life. The sentences directly followed each other, suggesting that the beliefs are connected. Both temporal order and logical reasoning suggest that the belief about satisfaction is a consequent of the belief about the ruler's efforts.

I identified decisions to protest from statements about joining the uprisings, such as "I am joining the people on Midan Tahrir," and decisions against protesting from statements, such as "I have never protested in my whole life." Sometimes individuals did not directly comment on protesting per se, and I referred to other statements that indicated support for a specific decision.

To examine the reliability of the coding method, a second researcher coded a random sample of the quotes using the same coding scheme. Out of approximately half of the

Table 1
Identification of inference based on causal connector

Consequent	Antecedent
People in the villages are living much better now <i>Belief that living conditions have improved</i>	because the government helped them <i>Belief about effort by the government</i>

Table 2

Identification of inference based on temporal order and logical reasoning

Antecedent	Consequent
He [the King] does many things. He helps the poor. He visits hospitals. He treats children kindly. <i>Belief about effort by the head of state</i>	I am happy with my life. <i>Belief about personal satisfaction</i>

beliefs, 73 of 86 (85%) were coded the same, suggesting a high rate of agreement in applying the codes. In total, the analysis constructed 121 belief systems, containing 53 protest decisions (30 in Egypt and 23 in Morocco) and 68 decisions against protest (32 in Egypt and 36 in Morocco).

6. Data analysis

To trace inferences that connect beliefs to decisions, the analysis develops a computational model that formalizes belief systems as Boolean circuits. An inference is a directed relationship between at least two beliefs where one belief—the antecedent—triggers another belief—the consequent (cf. Abelson & Carroll, 1965; Axelrod, 1976). For example, B1 “The government is attacking the citizens” could be an antecedent triggering consequent B2 “Citizens are dying” (B1 \rightarrow B2). A consequent of an inference can furthermore be an antecedent of another inference. For example, B2 “Citizens are dying” could be an antecedent of B3 “I feel frightened,” creating an inference chain where B1 triggers B2 and B2 triggers B3 (B1 \rightarrow B2 \rightarrow B3). In this structure, B1 is a pure antecedent, B2 an intermediate belief, and B3 a pure consequent. Inferences can also connect beliefs to a decision. For example, B3 “I feel frightened” could trigger a decision to refrain from protesting, creating an inference chain where B1 triggers B2, B2 triggers B3, and B3 triggers a decision (B1 \rightarrow B2 \rightarrow B3 \rightarrow Decision).

Inferences can have multiple antecedents, namely disjunctions and conjunctions (see Dujmović & Larsen, 2007). Disjunctions indicate that one or another belief can trigger a third belief. For example, B1 “I am in pain” or B2 “I am very happy” can trigger B3 “I am about to cry” (B1 \vee B2 \rightarrow B3). Conjunctions indicate that at least two beliefs together trigger another belief. By itself, B1 “The person is making a fist” could trigger B3 “The person is about to hit someone.” Together with B2 “The nurse is holding a syringe,” however, B1 can trigger B4 “The person is about to donate blood” (B1 \wedge B2 \rightarrow B3).

Formally, a Boolean circuit is an acyclical structure consisting of input terminals, gates, and output terminals (Livnat & Pippenger, 2006, p. 3200; also see Crama & Hammer, 2014). Each gate implements basic Boolean functions, whose inputs and outputs are “true” or “false,” depending on the input terminals and preceding gates. Input terminals receive their values from the environment. The values of the output terminals depend on the preceding gates, which in turn depend on the input terminals. Based on this, Boolean circuits are analogous to human reasoning and provide a convenient tool for the analysis of belief systems (Ibid.).

When formalizing belief systems as Boolean circuits, gates represent inferences. Input terminals represent pure antecedent beliefs, and output terminals represent decisions (pure consequents). The value assigned by the function of the output terminal shows if decisions can be reached: It is either “true” (decision reached) or “false” (decision not reached), depending on the preceding gates that indicate if certain beliefs are held (“true”) or not (“false”).

Boolean circuits contain two types of gates addressing inferences with multiple antecedents: AND-gates represent conjunctions, and OR-gates represent disjunctions. Any gate can represent inferences with single antecedents. Table 3 gives an overview.

Figure 1 shows an example of a simple monotone Boolean circuit which excludes negation (Grigor’ev, 1981, p. 1). There are three input terminals computing functions related to A, B, and C. If given as input, the value of their functions is “true.” Otherwise, it is “false.” There are two OR-gates related to D and E. D is “true” if A or B is “true.” Otherwise, it is “false.” E is “true” if “D” is true. There are two AND-gates related to F and G, including the output terminal G. Both AND-gates are “true” if all of their preceding gates are “true.” If only one or none of their preceding gates is “true,” they are “false.”

The circuit represents a simple, imaginary belief system that contains a decision about helping the refugees entering Europe. In the structure visualized by Fig. 1, we can systematically trace the inferences antecedent to the decision (G). We can identify which beliefs can trigger the decision, and how they trigger the decision. For example, given B (war in Afghanistan), the value of G is “false” (Fig. 1A). By contrast, given both B (war in Afghanistan) and C (EU borders open), the value of G is “true” (Fig. 1B). This means that the belief that there is war in Afghanistan alone cannot trigger a decision to help the refugees in Europe (1a), but that the decision becomes possible when adding the belief that the EU border is open (1b). We also see how the beliefs trigger the decision (1b): B (war in Afghanistan) triggers D (existence of refugees), D triggers E (feeling empathy), and D and C (EU borders open) trigger F (refugees enter Europe). F and E trigger the decision G.

Tracing inferences contained by belief systems, this analysis does not aim to investigate the nature of inferences, which has been studied by a large body of research, which has shown that inferences rely on “principles of logic and other normative theories in our reasoning or decision making” (Evans & Over, 1996, p. 7), “personal” aspects that allow individuals to achieve their individual goals (Ibid.; Simon, 1985), “scraps of knowledge” rather than complete information (Oaksford & Chater, 2009, p. 69), “affective charge” that can be activated when people hear about political concepts they have evaluated before (Lodge & Taber, 2005, p. 455), or even erroneous beliefs (Kahneman, 2011; Tversky & Kahneman, 1971).

Table 3
Elements of belief systems and Boolean circuits

Belief System	Boolean Circuit
Decision (pure consequent beliefs)	Output terminal
And-inference	And-gate
Or-inference	Or-gate
Pure antecedent belief	Input terminal

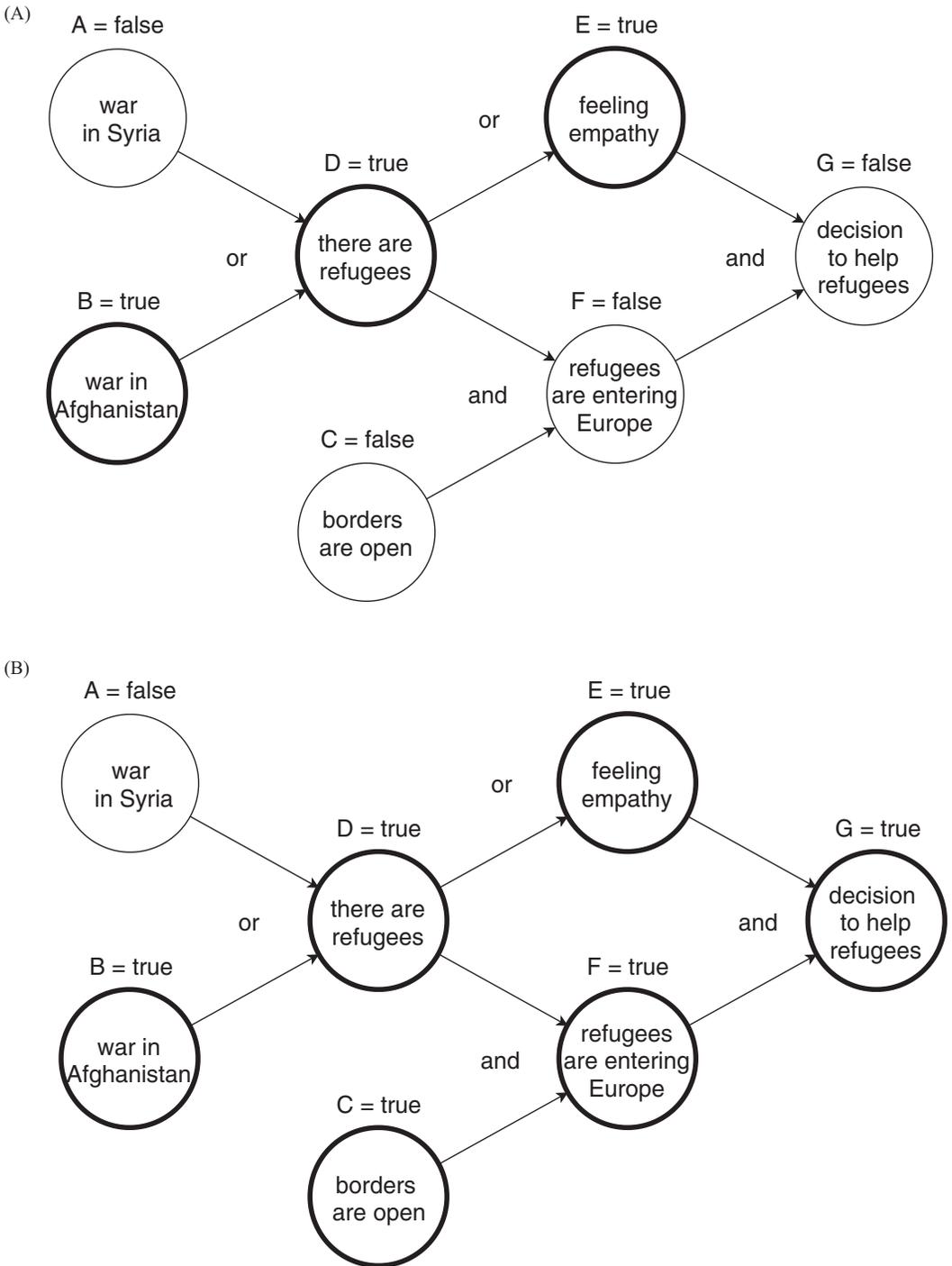


Fig. 1. Tracing inferences antecedent to decisions. (A) No decision can be made based on belief B. (B) A decision can be made based on beliefs B and C.

6.1. Computational model

To apply Boolean circuits, I wrote a simple computational model (in Python). The model represents a circuit as a two-dimensional list, and a group of Boolean circuits as a three-dimensional list. One-dimensional lists are used to represent the terminals and gates contained by a circuit.

Each one-dimensional list contains at least two strings that represent a belief and an identifier. Beliefs refer to the semantics, whereas identifiers refer to the structure of the circuit. Input terminals are indicated by “in,” AND-gates by “and,” and OR-gates by “or.” Inferences involving only one antecedent are represented as OR-gates (rather than AND-gates, see above). Output terminals are inferred, as visualized by Fig. 1, but may, for reasons of clarity, be listed as the last item of a two-dimensional list, as in the example below.

The structure of an inference is indicated by the order within a one-dimensional list: Consequents are located in position 0 (first items of lists), followed by the identifiers in position 1 (second items of lists), and the antecedents (remaining items). Input gates have no antecedents following the identifiers. This is an example:

```
[[ "dirE", "in", ["vioPG", "or", "dirE"], ["protectA", "or", "vioPG"], ["safety", "or",
"protectA"], ["improvLC", "or", "safety"], ["NP-E-2014", "or", "improvLC"]]]
```

This circuit represents a reasoning process of a person who decided against protesting (“NP”) in Egypt (“E”) in 2014. Specifically, the circuit represents the following inferences: A belief about a direct experience with the previous government (“dirE”) triggers another belief that the previous government was violent (“vioPG”). The belief that the previous government was violent triggers another belief that the army protects the people (“protectA”). The belief that the army protects the people triggers another belief that life in the country is safe (“safety”). The belief that life is safe triggers another belief that living conditions have improved (“improvLC”). The belief that living conditions have improved triggers a decision to refrain from protesting.

7. Results

To identify the beliefs and inferences that trigger a decision, the analysis proceeded in four steps, listed by Table 4. Step 1 identified each belief contained by the data. It showed that there are 145 beliefs about 15 types of external and internal factors. That means that the data contain 2^{145} belief combinations (trillions), each of which could be connected to a decision. Given this belief complexity, Step 1 also included an analysis that differentiated the beliefs related to decisions by protestors versus non-protestors, based on a function that identified the beliefs unique to each decision, and two proportion

z-tests that identified the beliefs that were related to significantly different proportions of decisions. Appendix 1 lists the results.

Step 1 did not provide information about the inferences that connect beliefs to decisions. Therefore, it remained unclear which beliefs can activate a decision. In response, Step 2 systematically traced the inferences that connect beliefs to decisions and identified subsets of beliefs that activate decisions. To identify the most meaningful beliefs, the analysis isolated the minimum subset of beliefs that activate the decisions in all 121 belief systems.

Step 2 applied functions that recursively process belief systems (see Appendix 3). In each recursive iteration, the function identified either a single random belief (for decisions to stay at home) or a set of five pure antecedent beliefs with the highest frequencies (for decisions to protest). It then traces whether, for all belief systems, the identified belief(s) trigger the decision. The final output consists of minimum subsets of beliefs that activate all decisions (presented in Appendix 4). This provides insight into decisions that is not available from looking at correlations between beliefs with similar content, belief stability, or particular inferences by making visible the beliefs that activate decisions.

For each of these minimum subsets identified in Step 2, the chain of beliefs through which these trigger the decision varies between belief systems. Step 3 visualized these belief chains as graphs. I used the Python language software package NetworkX to create graphs. From these graphs, in Step 4, the analysis then identified direct antecedents of decisions and their direct antecedents.

7.1. Protest decisions

The graphs show that beliefs about positive emotions of pride and hope and emotion-related traits of solidarity and courage triggered a surprisingly large number of decisions to protest: 29 of 53 protest decisions were based on direct inferences from these beliefs (19 of 30 related to Egyptians and 10 of 23 to Moroccans; most decisions were triggered by beliefs about hope, followed by courage, solidarity, and pride). At first sight, this finding might not appear very meaningful because it refers to only 55% of protest decisions.

Table 4
Overview of the analysis

Step	Output	Output Description
1	Belief overview	Beliefs unique to decisions by protestors versus non-protestors Beliefs related to decisions by both protestors and non-protestors Beliefs related to significantly different proportions of decisions by protestor versus non-protestors
2	Beliefs that activate decisions	Minimum subsets of beliefs that activate decisions in all belief systems
3	Reasoning processes antecedent to decisions	Graphs visualizing connections between minimum sets and decisions
4	Key inferences to decisions	Direct antecedents of decisions Direct antecedents of direct antecedents of decisions

However, the protestors' belief systems contain 15 types of beliefs (see Appendix 1) and trillions of combinations of beliefs and inferences (direct and indirect). Given this complexity, the finding that 55% were motivated by direct inferences from beliefs related to positive emotions is very surprising: The probability of a single type of belief to directly motivate a decision is only 0.07 (1 of 15) and the probability that half of the protestors were directly motivated by a certain type of belief is extremely small (almost zero; $(53 \text{ choose } 29) * (1/15)^{29} * (14/15)^{24} = 1.1639006e-20$).

The remaining graphs show that protest decisions could also be triggered directly by negative beliefs about the government or by beliefs about interacting with protestors. Most of these beliefs were related to a significantly different proportion of protest decisions. Specifically, the beliefs address the following factors: governmental crimes, such as corruption or censorship (significant *z*-score), negative personality of the head of state (significant *z*-score), passing power to a family member (significant *z*-score), state violence (*no* significant *z*-score), and interacting with protestors (*no* significant *z*-score). However, these beliefs did not directly trigger as many protest decisions as the mentioned beliefs about positive emotions.

The graphs also show how beliefs related to positive emotions could themselves be triggered by other beliefs. Three of these were related to significantly different proportions of protest decisions and addressed factors including mass protests happening at home, a revolution happening in Tunisia, and fellow citizens sacrificing themselves. There were four additional beliefs which could trigger beliefs about positive emotions, which were not related to significantly different proportions of protest decisions. These beliefs addressed successful prior protests in one's home country, state violence against the people, families, and making an effort for oneself. Fig. 2A shows an overview. Beliefs related to significantly different proportions of decisions are marked by thick circles. Fig. 2B shows three excerpts from indirect inferences identified by the analysis, focusing on the beliefs that are related to a significantly different proportion of protest decisions (and excluding other beliefs that are not found to matter for reasons of clarity).

7.2. Decisions against protest

Most decisions to stay at home were not triggered by direct inferences from a particular belief type, such as beliefs about emotions (see Appendix 1 for an overview of all 15 types). However, an observable number of decisions was triggered by a belief about living in safety, which was unique to non-protestors (and related to a significantly different proportion of decisions against protest). This belief directly triggered seven decisions to stay at home. Furthermore, it triggered two other beliefs which themselves directly triggered 19 decisions against protest: beliefs about approving of the head of state (directly connected to 15 decisions), and beliefs about improved living conditions (directly connected to four decisions). This means that beliefs about safety triggered 26 of 68 decisions to stay at home. At first sight, this might not appear to be very meaningful because it refers to only 38% of the decision against protest. However, it is very surprising because the non-protestors' belief systems contain 94 beliefs (see Appendix 1). Based on

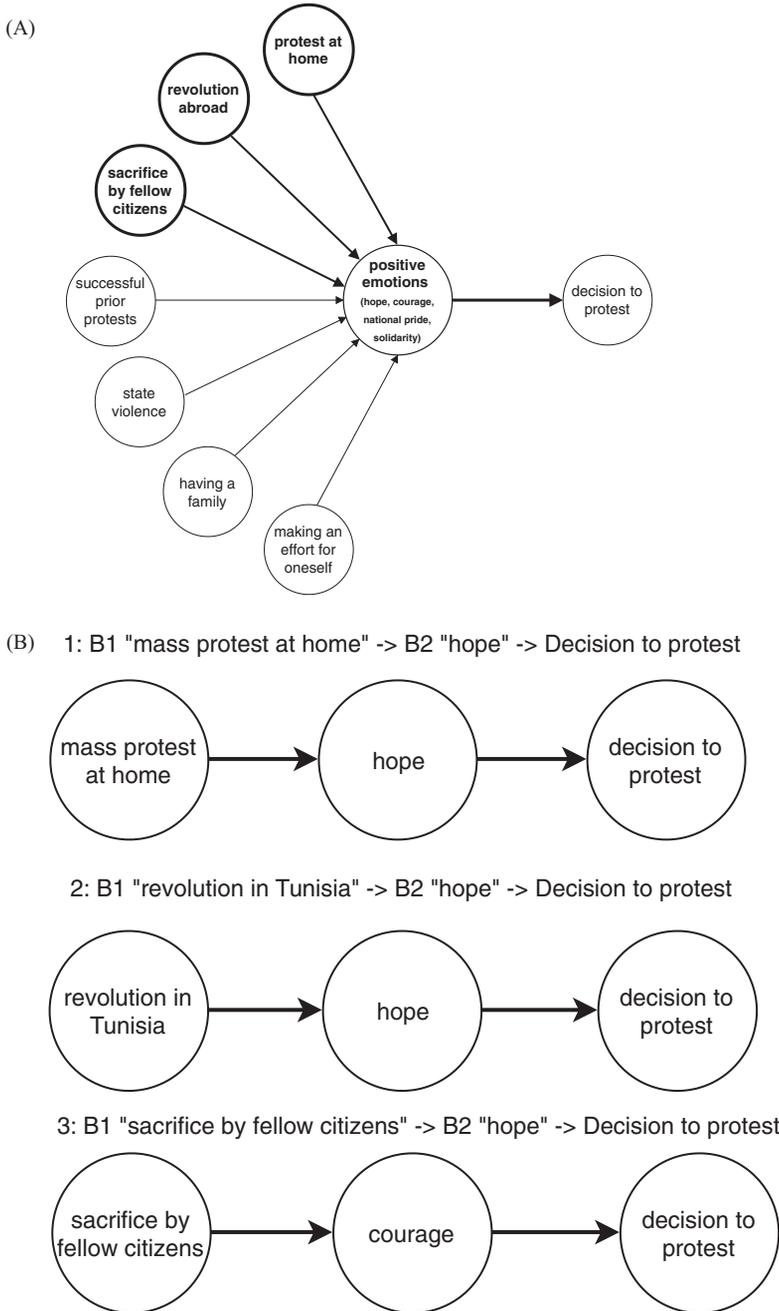


Fig. 2. Positive emotions and protest decisions. (A) Overview of direct antecedents of beliefs about positive emotions. (B) Examples of indirect inferences antecedent to protest decisions.

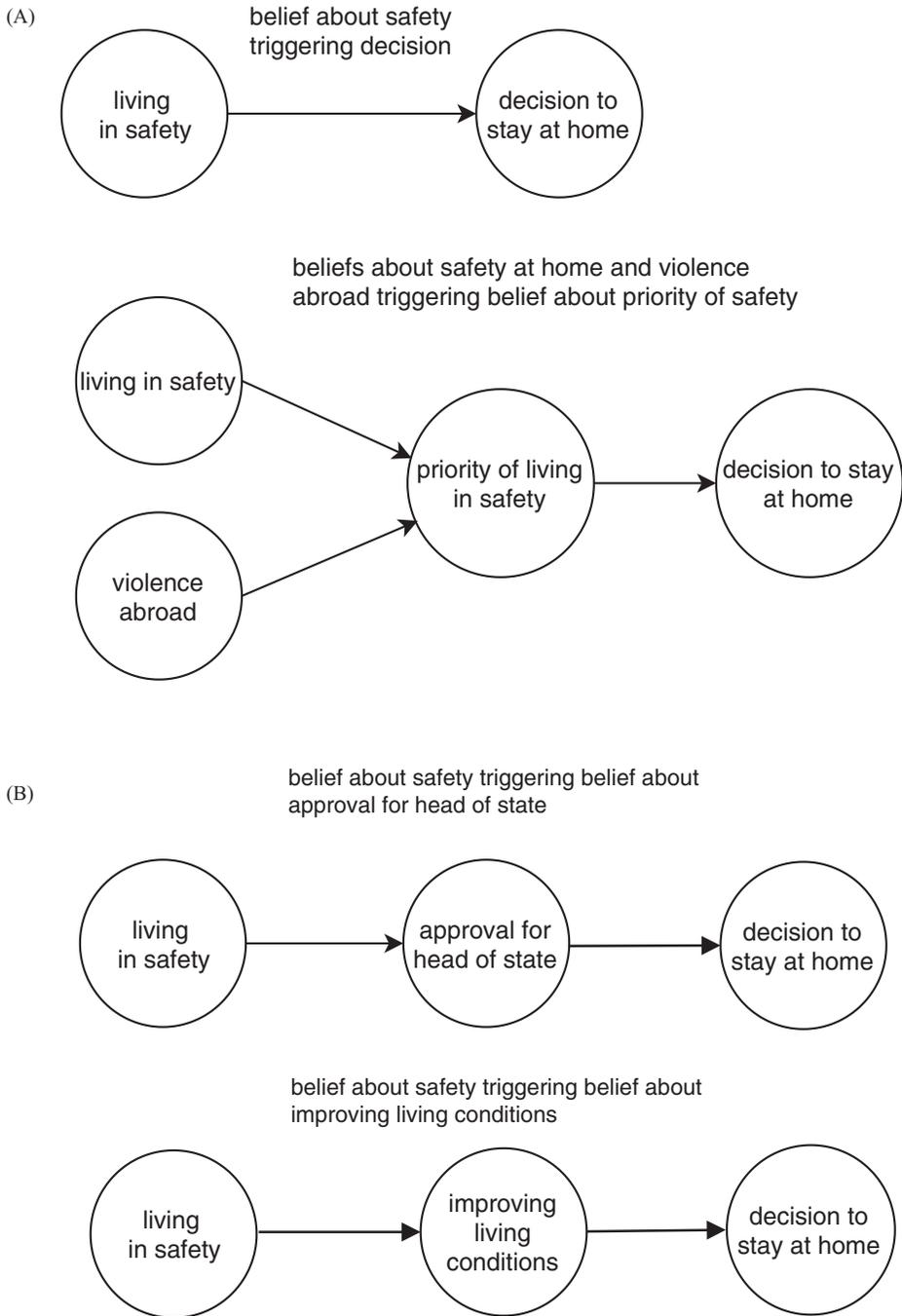


Fig. 3. Inferences antecedent to decisions to stay at home. (A) Direct inferences between beliefs about safety and decisions. (B) Indirect inferences between beliefs about safety and decisions.

this, the probability of a single belief to trigger a decision is .01 (1/94), and the probability that a particular belief can trigger more than one third of the decisions is almost zero $((68 \text{ choose } 26) * (1/94)^{26} * (93/94)^{42} = 1.3955662e-33)$.

The following figure visualizes inferences by which beliefs about safety triggered decisions to stay at home. Fig. 3A shows direct inferences between beliefs about safety and decision opposing protest. Fig. 3B shows indirect inferences between beliefs about safety, approval for the head of state, improving living conditions, and decisions to stay at home.

8. Discussion

These findings underline the importance of emotions in decision-making and add knowledge about their particular role, which remains contested (cf. Lerner et al., 2015; Schiebener & Brand, 2015). The finding that *positive* emotions and emotion-related traits contributed to *positive* decision-making (joining the protests) is consistent with valence-based approaches, while the finding that pride, hope, courage, and solidarity in particular contributed to protest decisions specifies how high-stakes decisions can be made beyond valence. The analysis also shows how these emotional factors can enter reasoning processes based on microlevel events (successful protest behavior and self-sacrifice of fellow citizens), which contributes to the literature on the influence of macrolevel phenomena like the weather or sports results on affect more generally (Edmans, Garcia, & Norli, 2007; Hirshleifer & Shumway, 2003; Kamstra, Kramer, & Levi., 2003; Schwarz & Clore, 1983).

8.1. *Emotions to motivate actions*

The finding that of 145 beliefs that address a great variety of factors, only four beliefs related to positive emotions were crucial to protest decisions underline the importance of the literature on emotions and decision-making (for overviews, see Lerner et al., 2015; Schiebener & Brand, 2015). The literature is divided on the particular role that is played by emotions in reasoning processes: Some studies highlight the effect of emotional valence, whereas others focus on integral emotions that arise from a particular decision and strongly influence decision-making, as opposed to incidental emotions that shape decisions without the subjects' awareness. Others examine emotional influence on the contents, depth, and goals of reasoning (Lerner et al., 2015).

The finding that *positive* emotions in particular played an important role in *positive* decision-making favoring participation is consistent with theories focusing on emotional valence (e.g., Finucane et al., 2000; Schwarz & Clore, 1983). It, moreover, contributes to the appraisal tendency framework (Lerner & Keltner, 2000, 2001; Lerner et al., 2015), developed in response to criticism that "two-dimensional models" cannot capture the particularities of specific emotions (Mellers et al. in Lerner, 2015, p. 804): The findings that pride, hope, courage, and solidarity motivated protest decisions specify how particular

positive emotions and emotion-related traits can contribute to decision-making beyond valence.

The reasoning by which these four factors are found to influence protest decisions is also consistent with the related literature: Pride, “a positive, self-conscious emotion,” has been found to have unique effects on task perseverance because it produced an appraisal tendency according to which the self is responsible for positive events (Williams & DeSteno, 2008, p. 1007). Hope, which is characterized by “positive feelings about the anticipated outcome,” has been found to support risk-taking behavior by “liberating people” and “motivating [them] to change their situation” (Halperin & Gross, 2011, p. 1230). Solidarity has been found to unite individuals who “like each other and feel psychologically close” to engage in mobilization (Diefendorff, Morehart, & Gabriel, 2010, p. 123; Summers-Effler, 2002). Courage refers to the strength to confront a fear-eliciting situation and has been found to motivate “difficult or dangerous” behavior (Norton & Weiss, 2009; Szagun & Schauble, 1997, p. 291).

The findings, moreover, add knowledge about how these four factors enter reasoning about particular decisions—specifically based on protest behavior and self-sacrifice by fellow citizens as well as success of this behavior in a related context (revolution abroad). This finding adds knowledge about the microlevel events that are connected to particular emotions, which contributes to the literature examining how macrolevel phenomena like the weather or sports results influence affect more generally (Edmans et al., 2007; Hirshleifer & Shumway, 2003; Kamstra et al., 2003; Schwarz & Clore, 1983). The finding that protest decisions are related to protest by others is consistent with the literature on diffusion (Saideman, 2012). My findings add microlevel knowledge by showing that protest can spread at the level of the individual via emotion-related factors.

The findings complement other studies on the role of emotions in protest behavior, which has highlighted negative emotions of anger and frustration, triggered by inequality, injustice, and relative deprivation. According to the social identity model of collective action (SIMCA), anger related to group-based deprivation plays a crucial role in mobilization against the political system (van Zomeren, Postmes, & Spears, 2008, p. 506). In line with Gurr (1970) and Davies (1962), others have argued that negative emotions of frustration related to perceived deprivation are key to explain mass mobilization (Lotan et al., 2011). The findings of this study add new knowledge by showing that when mobilization is observable, beliefs that others are joining and sacrificing themselves, and that their efforts are successful can motivate protest decisions via positive emotions and emotion-related traits. Moreover, the finding that emotions of hope triggered decisions in favor of protest is consistent with the emphasis SIMCA puts on efficacy, referring to a belief that participating in collective actions makes it more likely to achieve certain goals. The finding that emotions of solidarity supported decisions to engage in protest is furthermore in line with the role of group identification, highlighted by SIMCA.

The findings of this study also speak to SIMCA by specifying governmental crimes, such as corruption or censorship, as a potential source of anger or frustration: The analysis shows that the belief about governmental crimes (“crimeState”) is the most frequently coded belief of protestors and the belief that most significantly distinguished protestors

from non-protestors. This finding is consistent with a recent review of the literature on global protest which discusses anger with corruption as a common short-term driver of protest, and as an explanation for the Egyptian Arab Spring (Carothers & Youngs, 2015, p. 7). By contrast, the findings show that beliefs about poor living conditions, considered another potential source of frustration or anger by the literature, are significantly more characteristic of non-protestors. This is consistent with observations that recent mass protests in autocracies directed at governmental change (such as the 2014 Hong Kong protests or the 2011 Syrian and Libyan uprisings) were primarily the result of political factors. By contrast, protests that were triggered by socioeconomic issues happened in democracies and were directed at policy rather than governmental change (such as protests responding to rising housing and living costs in Israel, austerity measures in the UK, or tax increases in Greece) (Carothers & Youngs, 2015, pp.7–8).

Related research has also commented on differentiated emotions in collective action against the government, connecting positive emotions of pride about political leaders or traditions to system-supporting behavior or attitudes, and negative emotions of anger, distress, and resentment about the economic order to system-rejecting behavior or attitudes (cf. Osborne et al., 2019, p. 245). The findings of this study instead show that positive emotions of pride about the people who are opposing leaders and existing political traditions can be related to system-rejecting rather than system-supporting decisions. This sheds light on various roles the emotion of pride can play in decision-making.

8.2. *Motivators to avoid protests*

The finding that decisions to refrain from joining the uprisings were based on beliefs about safety is consistent with the literature on integral emotions and decision-making. As Lerner et al. noted: “a person who feels anxious about the potential outcome of a risky choice may choose a safer option rather than a potentially lucrative option” (p. 804). This finding is, furthermore, consistent with the literature suggesting that non-participation is related to fear. Fear is an emotion experienced in defense against threats (Olatunji, Berg, & Zhao, 2017) and can be related to defensive actions (Fanselow, 2018). In the case of the Arab Spring, serious threats were posed by governmental violence against the protestors, suggesting that non-participants decided against protest based on threats to their safety (Pearlman, 2013; Weyland, 2012).

The interview analysis showed that when talking about safety, non-participants did not directly address governmental violence against protestors. Instead, they said that they believed living conditions more generally to be “safe” in comparison to other countries that experienced large-scale violence or historical experiences of large-scale violence at home. This information provides new and rarely available insight that shows how non-participants reason about threats without directly addressing the main source of danger.

Moreover, the findings show that beliefs about safety combined with state approval motivated decisions to stay at home. Rather than fearing the government, this finding suggests that non-participants also approved of their rulers. This finding is consistent with theories on system justification, according to which people strive to hold positive views

about the existing social, political, and economic structures, and are reluctant to challenge the status quo even when it does not benefit, or harm them (Jost et al., 2004). The finding that decisions against protesting were based on beliefs that living conditions were improving, moreover, contributes insight that shows how people justify an oppressive political system. Nevertheless, research has shown that system justification “is observed most readily at an implicit, nonconscious level of awareness” (Jost et al., 2004, p. 881) and cannot be captured by the data constructed for in this analysis.

8.3. *Limitations*

This study developed a computational model to analyze belief systems by tracing inferences antecedent to decisions. Alternative computational models may be possible to test whether the proposed process leads to the best fit. For example, recent models that analyze structural features could be applied to identify the beliefs that are central as opposed to peripheral in the belief systems examined by this study (Boutyline & Vaisey, 2017). Beyond computational models on individual belief systems, other recent models analyze the convergence of individuals’ beliefs to a shared belief system based on logical constraints and social influence (Friedkin et al., 2016). These models could be used to examine the convergence of beliefs among protestors or non-protestors in a given social network under logical constraints, referring to the key beliefs identified by this study. To further investigate these social dynamics, the findings of this study could also be applied to construct agent-based models (Edmonds, 1999; Elsayah et al., 2015). These models could be used to examine the broader patterns of protest and non-protest that emerge from the decisions of the individuals examined by this analysis as well as incorporate interdependencies between individual decisions to protest or not.

This study has examined the Arab Spring as a complex social situation where beliefs inspired actions. There are numerous other complex social situations in which beliefs have been found to inspire actions, such as warfare (Bonham, Shapiro, & Trumble, 1979; Kull, Ramsay, & Lewis, 2003), terrorism (Crenshaw, 2000; Dornschnieder, 2016), opposition to immigrants (Bloom, Arian, & Courtemanche, 2015), environmental protection (Argent et al., 2016), or cooperative behavior (Axelrod, 1981). These situations often exhibit features of a “wicked” problem, for which no (optimal) solution exists (Head, 2008; Rittel & Webber, 1973, p.155). In this study, the complexity of wicked problems was captured by the beliefs of the decision-makers, which address numerous types of external and internal factors that are interconnected to decisions through complex chains of inferences. Apart from their complexity, these beliefs also exhibit other features of wicked problems, such as conflict between the decision-maker’s short-term interests (to stay unharmed) and long-term benefits (living in a free society), or diverse and incomplete knowledge (little or no information about the Arab Spring was disseminated by the state media, whereas social media gave varied and partial accounts). This study dealt with these problems by tracing how individuals decided to protest, given the information that was available to them, and the particular interests they considered in their deliberations.

Most of the data examined by this study were constructed from ethnographic interviews. Following the recruitment process described above, certain groups are not represented by this study: Individuals who live in rural areas, individuals who do not access public spaces, and individuals who rejected interview requests. Since the main locations of protest during the Arab Spring were big cities, the data examined by this study can be assumed to capture the major beliefs inspiring participation although individuals from rural settings are excluded. The Arab Spring was, moreover, a public event that happened in public spaces. Individuals who did not visit to these places could be very old, ill, or very rich and are unlikely to have played a major role in the uprisings. Individuals who rejected interviews typically said that they had no time. Nevertheless, the list of interviewees does not exclude particular groups that have very busy lives. Many interviewees had full-time jobs and families and commented on a lack of time in the interview. Moreover, interviewees came from different societal groups, including men and women, teenagers and retired people, and middle-aged people with various occupations.

9. Conclusion

The findings of this study provide in-depth insight into high-stakes decision-making within complex social environments by focusing on the Arab Spring as a particular case. Applying the analytical framework of belief systems, the study provides an example of what can be gained from systematically tracing inferences connecting beliefs to decisions, and the level of detail that remains overlooked by more macrolevel-oriented approaches. Identifying and analyzing more than 100 beliefs about different types of factors, the study shows that positive emotions and emotion-related traits based on successful protest behavior and self-sacrifice by others played a crucial role in decision-making underlying the Arab Spring. This provides new evidence about the important role of emotions, while specifying how particular emotions and emotion-related traits contribute to a particular high-stakes decision. Future research would be needed to replicate these findings in other contexts.

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Supporting Information

Additional Supporting Information may be found online in the supporting information tab for this article:

Appendix 1. Beliefs identified by the analysis.

Appendix 2. The sample.

Appendix 3. Function identifying minimum sets.

Appendix 4. Minimum Sets.