Précis of "The Cognitive Underpinnings of Ideological Thinking"

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Overview: A Cognitive Lens on Ideologies

Since the birth of modern civilization, humans have been creating stories that capture their theories about how the world works and how they should act within this complex world. These narratives both describe and prescribe human action, and exist in a kaleidoscope of forms – from religious doctrines to political manifestos, and from racial supremacy to authoritarian nationalism. These accounts are broadly termed "ideologies", and envelope humans' personal and social lives to a considerable degree. At their best, ideologies offer adherents coherent explanations of the world and a sense of belonging to a social group of fellow adherents. At their worst, ideologies can indoctrinate and inspire discrimination, prejudice, and violence. In light of the atrocities committed in the name of ideological causes during the 20th and 21st centuries, many thinkers have pondered: Why are we – as societies and individuals – seduced by these explosive ideologies? As a response, philosophers and historians have developed rich accounts of the socio-economic factors shaping participation in collective ideologies. Nonetheless, there has been remarkably little rigorous scientific investigation into the *cognitive* origins of ideological thought and action.

The aim of this dissertation was to demonstrate that our ideologies may be tightly interconnected with our perceptual and cognitive architecture. It hypothesized that individual differences in ideological worldviews may reflect variations in the mechanisms of thought. Consequently, it sought to investigate two primary questions: Can individual differences in ideological worldviews be explained by variation in cognitive dispositions? And if so, which cognitive traits confer susceptibility (or resistance) to ideological thinking?

Historically, the psychological study of ideology has been marked by substantial balkanization. There is now a psychology of politics (Jost et al., 2003), of religion (Norenzayan, 2013), of prejudice (Brandt, 2017; Dovidio et al., 20l0; Duckitt & Sibley, 2009), of obedience (Reicher & Haslam, 2011), of collective action (van Zomeren, Postmes, & Spears, 2008), of moralization (Rhee, Schein, & Bastian, 2019; Rozin, 1999), of conspiracy theories (Douglas, Sutton, & Cichocka, 2017; van Prooijen & Van Vugt, 2018) – but there isn't an overarching psychology of ideology. The reasons for this fractionation are historical, methodological, and conceptual, and perhaps all can be traced to a theoretical interest in the *content* of ideological beliefs rather than the *structure* of ideological thinking. In other words, researchers have focused on asking why individuals believe specific ideological claims (such as about the presence of omniscient gods or socialist worldviews), rather than why ideological attitudes – regardless of their content – are so compelling to the human mind and pervasive across civilizations. An emphasis on the content of ideological beliefs justifies the existing academic landscape, in which each ideological domain merits its own discipline of study. In contrast, a theoretical and empirical focus on the systematic processes of ideological immersion invites a holistic, interdisciplinary outlook that addresses the cognitive commonalities across diverse ideologies.

The dissertation employed both theory-driven and data-driven approaches to map out the domain-general cognitive underpinnings of ideological thinking. A series of large online studies encompassing over 1,500 participants revealed that ideological rigidity may be rooted in cognitive rigidity. Specifically, the rigidity with which individuals process and evaluate neutral stimuli predicts the rigidity and extremity of their ideological beliefs. This relationship was corroborated using objective neuropsychological tasks of rigidity across multiple ideological domains (Chapters 2-5). In each ideological context, a different conceptual angle and analytic approach was adopted: the investigation of nationalism in the context of Brexit focused on voting behaviour and policy attitudes (Chapter 2; Zmigrod et al., 2018, *Proceedings of the National Academy of Sciences*), while the study of religion enabled a developmental perspective that considered the role of upbringing and active engagement in ideological rituals (Chapter 3; Zmigrod et al., 2018, *Psychological Research*). Furthermore, the analysis of political partisanship and extremism revealed the shared cognitive underpinnings of intense adherence to political parties on the left and right of the political spectrum (Chapter 4; Zmigrod et al., 2019, *Journal of Experimental Psychology: General*). Moreover, when an emphasis was made on extremist attitudes, such as endorsement of violence and self-sacrifice in favour of an ideological group, it was possible to appreciate the direct links between cognitive rigidity and susceptibility to radical ideological action (Zmigrod et al., 2019, *Frontiers in Psychology*). A focus on dogmatic thinking styles revealed the compensatory interaction between inflexibility and intelligence in shaping individuals' receptivity to evidence and alternative viewpoints (Chapter 5; *Personality and Individual Differences*). Consequently, cognitive rigidity plays a robust and complex role in ideological thinking across a range of ideological doctrines and attitudes (Zmigrod, 2020; *Current Opinion in Behavioral Science*).

Furthermore, a data-driven approach using Bayesian analyses and drift-diffusion modelling (DDM) was adopted to study the cognitive and personality signatures of a large array of ideological worldviews (Chapter 6; Zmigrod et al., conditionally accepted at *Nature Human Behaviour*). This revealed that psychological dispositions can predict ideological attitudes substantially better than traditional demographic variables, challenging the dominant perspective in the social sciences that socioeconomic indicators are the most powerful predictors of how citizens vote and what they believe. Moreover, using an unprecedented number of cognitive tasks and personality surveys, this work exposed the psychological dispositions that were most strongly linked to individuals' ideological orientations. This revealed cognitive correlates that were ideology-general and those that were ideology-specific. For example, conservatism and nationalism were related to greater caution in perceptual decision-making tasks and to reduced strategic information processing, while dogmatism was associated with slower evidence accumulation and impulsive tendencies. Religiosity was implicated in heightened agreeableness and risk perception. Ideological worldviews may thus be reflective of low-level perceptual and cognitive functions.

In its entirety, this dissertation suggests that there are both domain-general and domain-specific substrates of ideological thinking evident in disparate ideologies, and these commonalities and differences are fundamentally cognitive and perceptual in nature. The findings signify that individual differences in our cognitive dispositions may underpin the intensity of our ideological adherence, and so it is fruitful to use cognitive methodologies to understand the structure of ideological thought and action. Indeed, a rigorous biologically-grounded scientific study of the ideological mind may illuminate ancient paradoxes as well as pertinent societal questions facing modern democracies. The research is inherently interdisciplinary, pushing cognitive science into

the realms of political science, social and experimental psychology, history, and philosophy of mind, religion, and politics. While ideologies have had a long and illustrious past, this research hopes to show that it is possible to create a *cognitive* science of ideologies, and this may elucidate the radical extremisms of the future.

Bringing Together Cognition and Ideology

Dominant psychological theories about the emergence and maintenance of ideological worldviews have been explicitly *motivational* accounts (e.g. Jost et al., 2003; Hill & Williamson, 2005; Kruglanski et al., 2014). These have posited the intrapersonal and interpersonal motives for adhering to ideological groups, such as epistemic motives to attain coherence and certainty, existential motives to experience safety and meaning, and relational motives to feel socially connected with others. While these accounts have been theoretically fruitful, they have led to (1) a *neglect of cognitive theories* and approaches (Zmigrod, 2020) and (2) a corresponding *methodological reliance on self-report questionnaires rather than cognitive tasks* when operationalizing psychological processes in relation to ideology (Van Hiel et al., 2016).

However, a fundamental insight that has emerged amongst cognitive scientists over the past 50 years is that individuals vary in the way in which their brains process information from the environment. When presented with identical stimuli, individuals will process and physiologically react to these stimuli in different ways (Posner & Rothbart, 2018; Sallis, Smith, & Munafo, 2018; Trofimova, Robbins, Sulis, & Uher, 2018). Thus, there are *cognitive dispositions* – enduring biologically-based dispositional tendencies in processing, evaluating, and responding to stimuli – that guide individuals' behaviour and decision making. The robust cognitive scientific understanding that human behaviour is not solely determined by needs and motivations suggests that purely motivational accounts may be insufficient. The studies outlined in this dissertation therefore used validated tests from cognitive neuropsychology when assessing cognitive and perceptual traits.

Theory-Driven Research: The Role of Cognitive Rigidity in Ideological Thought

In the aftermath of World War II, social scientists began theorizing extensively about the psychological origins of ethnocentrism and xenophobia. To the tune of popular psychoanalytic thought, they asked: *What personality traits might make a person more prejudiced, dogmatic, and intolerant of others?* In response to this question, Else Frenkel-Brunswik noted that "one of the most pervasive formal aspects of the personality organization of the extremely prejudiced individual is his rigidity" (Adorno et al., 1950, p. 479). The idea that individuals who exhibit heightened ideological prejudice and dogmatism may be psychologically inflexible quickly became one of the most provocative and hotly debated hypotheses in political psychology. Frenkel-Brunswik proposed that "the rigidity of mental sets in the ethnically prejudiced also becomes evident in the handling of perceptual and other cognitive materials free of immediate social and emotional implications" (Adorno et al., 1950, p. 481). She thus proposed that the rigidity of the prejudiced, ethnocentric, or dogmatic

individual would be manifest in *non-political* contexts — for instance, in how they process perceptual objects, solve arithmetic problems, and evaluate the world and its citizens. An ideologically rigid mind may be inflexible in how it processes information from its perceptual, phenomenological environment and may be unsuccessful in reacting to change or ambiguity.

Since the 1950s when this hypothesis was first articulated, political psychologists have elaborated two main interpretations. The first, famously called the *rigidity-of-the-right* hypothesis, suggested that individuals on the political right are characterized by heightened rigidity (Jost et al., 1950, Jost, 2017). The second, labelled the *ideological extremity* hypothesis (or sometimes, the *rigidity-of-the-extreme*), posited that rigidity was in fact associated with ideological extremism on both the political right and the political left, such that individuals on the extreme left may also be characterized by psychological rigidity (Eysenck, 1954; Rokeach, 1948; Greenberg & Jonas, 2003). Theoretically and empirically, these two hypotheses have been pitted against each other throughout the history of political psychology. Nevertheless, they have been primarily studied with regards to motivational – rather than cognitive – perspectives on political ideology (and not other ideologies) and so heavily relied on self-report methodologies. In Chapters 2-5, the aim was to elucidate the nature of the rigidity hypotheses with regards to a range of ideological domains, using modern methodologies from cognitive science in response to contemporary ideological issues.

Chapter 2 – Rigidity of Thought and Inflexible Borders: A Cognitive Analysis of Nationalism

(Published in Zmigrod et al., 2018, *Proceedings of the National Academy of Sciences*)

Chapter 2 focused on the cognitive dispositions facilitating British nationalism in the context of the UK's 2016 EU Referendum. Brexit was a particularly potent manifestation of nationalistic identity and ideology, as voting patterns crossed conventional political party lines and family traditions, surprising pollsters and political analysts. Chapter 2 hypothesized that nationalistic thinking may be an instance of a general tendency to rigidly categorize information and to process information in an inflexible manner, such that cognitive inflexibility would be predictive of support for Brexit. Using voting behaviour and attitudes from the UK's 2016 EU Referendum, the study found that a flexible representation of national identity and culture was linked to cognitive flexibility in the ideologically-neutral Wisconsin Card Sorting Test (WCST) and the Remote Associates Test (RAT), and to self-reported flexibility under uncertainty. Structural equation modelling revealed that subjective and objective cognitive inflexibility predicted heightened authoritarianism, nationalism, conservatism, and system-justification, and these in turn were predictive of support for Brexit and opposition to immigration, the EU, and free movement of labour (Figure 1). This model accounted for 47.6% of the variance in support for Brexit. Path analysis models were also predictive of participants' sense of personal attachment to the UK, signifying that individual differences in cognitive flexibility may contribute towards ideological thinking styles that shape both nationalistic attitudes and personal sense of nationalistic identity.

The way the brain constructs internal boundaries between conceptual representations and adapts to changes in environmental contingencies has been shown here to be linked to their desire for external boundaries to be imposed on national entities and for greater homogeneity in their

cultural environment. This is particularly notable given the scarcity of empirical studies conducted on the topic of nationalism, and given that nationalism is often an ideological orientation that is evident across both the political left and the political right. The findings suggest that information processing styles in relation to perceptual and linguistic stimuli may be drawn upon in the evaluation of political information and in the formation of ideological identities. Thus, it is not only "psychological needs" that underlie individuals' adoption of nationalistic ideologies; "cold" non-emotional cognitive information processing styles also play a key role in ideological behaviour and identity.

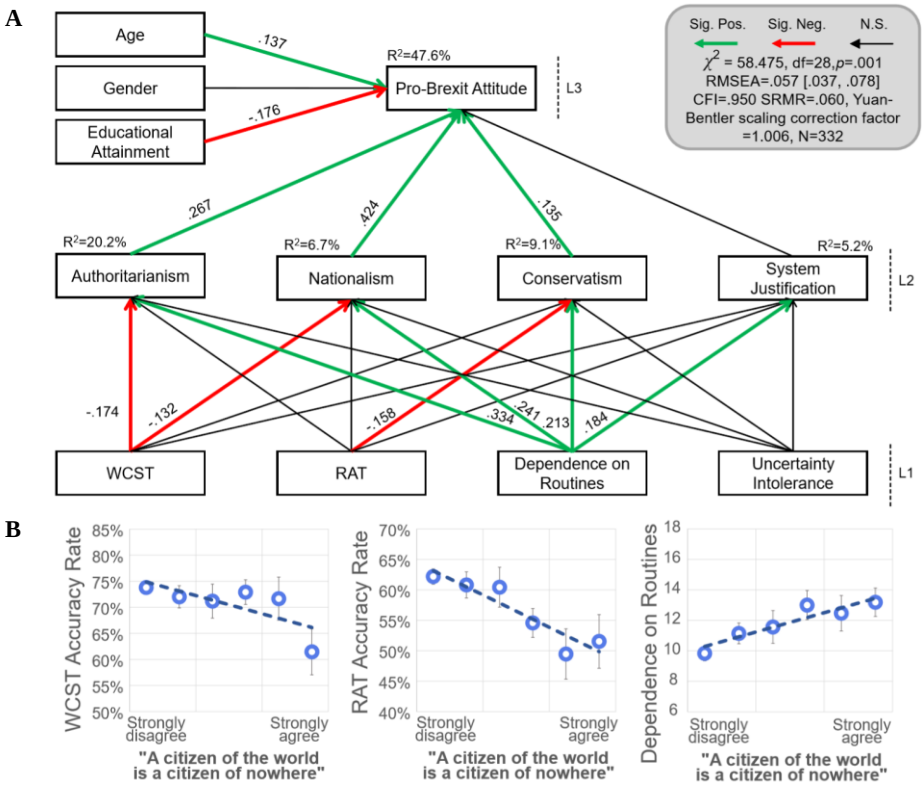

Figure 1. (A) Structural equation model predicting support for Brexit. Significance level was $p<.05$. Sig. Neg.=significant negative pathway, Sig. Pos.=significant positive pathway, N.S.=not significant, L1=Level 1 (Psychological Flexibility variables), L2=Level 2 (Ideological Orientation variables), L3=Attitude outcome variable, WCST=Wisconsin Card Sorting Test accuracy, RAT=Remote Associates Test accuracy. (B) Cognitive flexibility (WCST and RAT performance) and dependence on routines in relation to beliefs about citizenship. Error bars reflect 1± standard error, dashed lines reflect significant linear correlations.

Chapter 3 – Cognitive Flexibility and Religious Disbelief: The Roles of Ideological Rituals, Identity, and Upbringing

(Published in Zmigrod et al., 2018, *Psychological Research*)

Chapter 3 drew on interdisciplinary literatures from cognitive anthropology and the cognitive science of religion, which have emphasized *rituals* as forces that compel social cohesion and ideological belief (Whitehouse & Lanman, 2014). Notably, there has been a paucity of empirical work on the cognitive origins and consequences of engaging with ideological rituals. Given that engagement in repetitive and ritualistic behaviours is generally related to psychological rigidity, Chapter 3 hypothesized that participation in ideological rituals in the context of religion may be tied to cognitive rigidity. Specifically, two questions were examined: (1) To what extent is cognitive rigidity linked to religious adherence and practice of repetitive religious rituals? And (2) to what extent does early religious upbringing shape later cognitive rigidity? Overall, the results suggest that religious disbelief and reduced practice of religious rituals among religious individuals are related to heightened cognitive flexibility across three independent behavioural neuropsychological measures (Figure 2). When analysing participants' religious upbringing in relation to their current religious affiliation, it was manifest that current affiliation was more influential than religious upbringing in all the measured facets of cognitive flexibility. This raises valuable questions about causality: Does participation in ideological institutions shape cognitive flexibility? Or does cognitive inflexibility predispose individuals to engage with ideologies in a stronger and more passionate way? The paper begins to hint at dual processes: commitment to religious ideologies may shape and be shaped by cognitive inflexibility, highlighting that ideological affiliation, engagement, and upbringing may have different psychological antecedents and consequences.

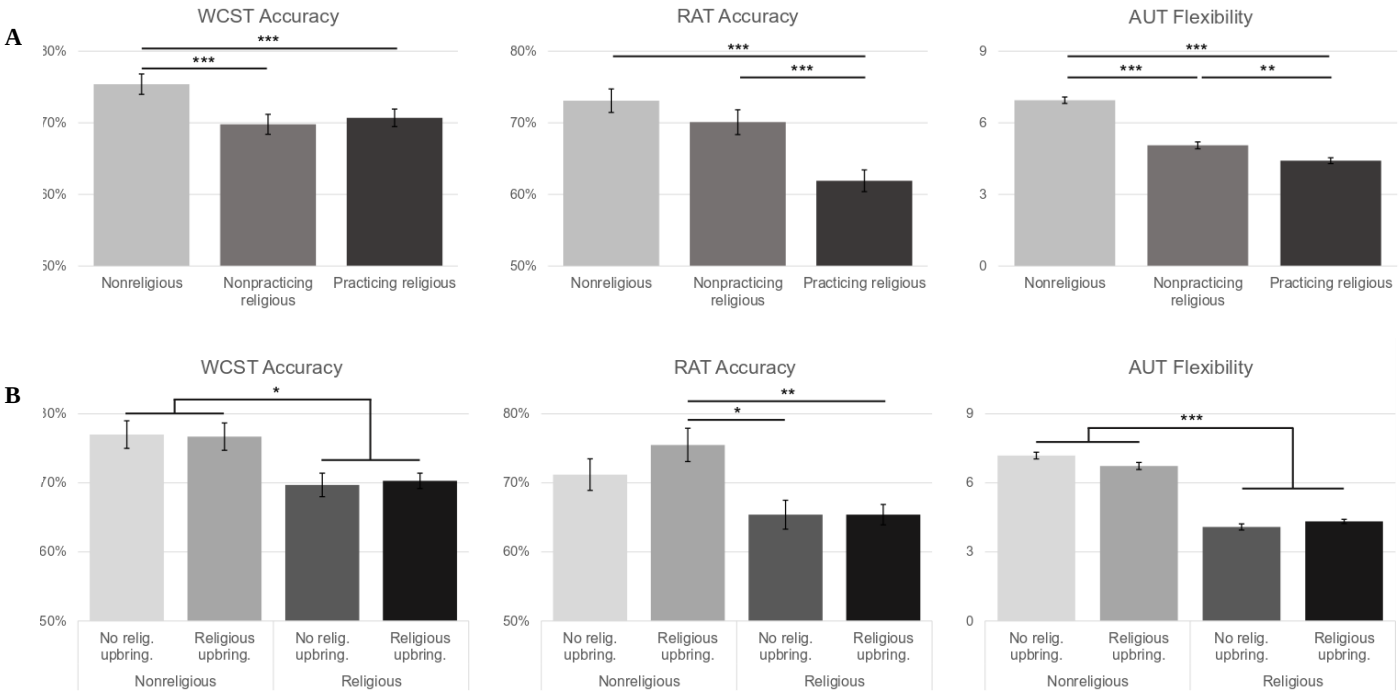

Figure 2. (A) Comparison of nonreligious participants, nonpracticing religious participants, and practicing religious participants who regularly attend religious services on the cognitive flexibility tasks. (B) Comparison of religious and nonreligious participants with and without a religious upbringing. Bonferroni-corrected, controlling for age, gender, and educational attainment. *p<.05, **p<.01, ***p<.001, error bars denote 1± standard error.

Chapter 4 – Ideological Symmetries: Testing the Ideological Extremity Hypothesis in American Political Partisanship

(Published in Zmigrod et al., 2019, *Journal of Experimental Psychology: General*)

The aim of Chapter 4 was to dissect the various components of ideological identity and participation in the context of US politics. As outlined above, contemporary political psychology has dealt with the rigidity hypotheses since the publication of *The Authoritarian Personality* (Adorno et al., 1950): the prominent *rigidity-of-the-right hypothesis* argues that mental rigidity is related to a conservative political orientation, while the *ideological extremity hypothesis* suggests that rigidity is associated with partisan extremity across the political spectrum. The rigidity-of-the-right hypothesis has been the main focus of empirical studies and meta-analyses conducted over the past 15 years, and so has received the most attention and supportive evidence (Jost et al., 2003; Jost, 2017; Van Hiel et al., 2010, 2016).

Challenging the established literature in political psychology, the study detailed in Chapter 4 revealed a clear inverted-U shaped relationship between partisan intensity and flexibility: participants on the extreme left and extreme right displayed reduced cognitive flexibility on three neuropsychological tests relative to moderates and those with only weak personal attachments to the political parties (Figure 3). This was evident across multiple statistical analyses, including quadratic regressions, Bayes factor analysis, and algorithmically-driven interrupted regressions. These findings signify that the rigidity with which individuals process and respond to non-political information may be related to the extremity of their partisan identities. The cognitively rigid mind may be more susceptible to the strictness, clarity, and categorical worldview which many doctrines espouse, while the cognitive flexible mind may be more likely to process socio-political arguments in a nuanced, non-categorical way that tolerates the ambiguities of social challenges.

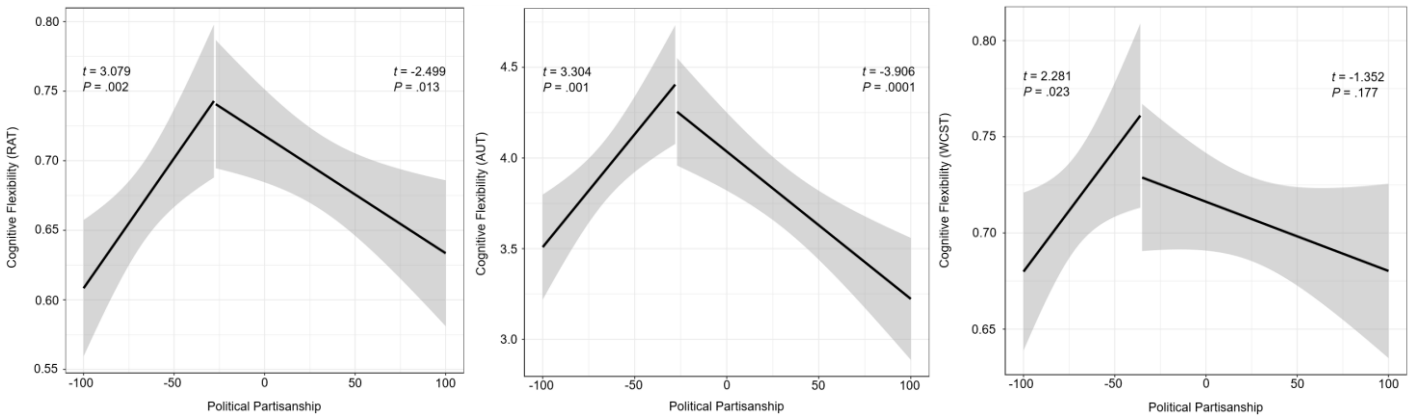

Figure 3. Interrupted regression results according to cognitive flexibility test. Political partisanship is operationalized such that partisan intensity is weighted by partisan direction (below 0 reflects left-leaning partisanship and above 0 reflects right-leaning partisanship). The shaded area reflects 95% confidence intervals.

Chapter 5 – Deconstructing Dogmatism: The Interaction of Cognitive Flexibility and Intelligence

(Published in Zmigrod et al., 2019, *Personality and Individual Differences*)

Instead of focusing on a coherent ideological identity or set of convictions, Chapter 5 examined the inverse of dogmatism, *intellectual humility* – the recognition of one's own potential fallibility when forming and revising attitudes. The results indicated that intellectual humility was positively associated with cognitive flexibility and with intelligence (measured with the Raven's Advanced Progressive Matrices). These relationships were pronounced for the facets of intellectual humility associated with respect for opposing opinions and openness to revising one's attitudes in light of new evidence. The data revealed an interaction: high cognitive flexibility is particularly valuable for intellectual humility in the context of low intelligence, and reciprocally, high intelligence is beneficial for intellectual humility in the context of low flexibility. Notably, there was evidence of a compensatory effect, as participants who scored highly on both flexibility and intelligence did not exhibit superior intellectual humility relative to individuals who scored highly on only one of these cognitive traits (Figure 4). These findings are suggestive of dual psychological pathways to intellectual humility; either cognitive flexibility or intelligence is sufficient for high intellectual humility, but neither is necessary. The interactionist perspective adopted in Chapter 5 highlights the importance of considering moderation effects when studying such complex phenomena and compilation of traits, and begins to hint at antidotes for dogmatic thought.

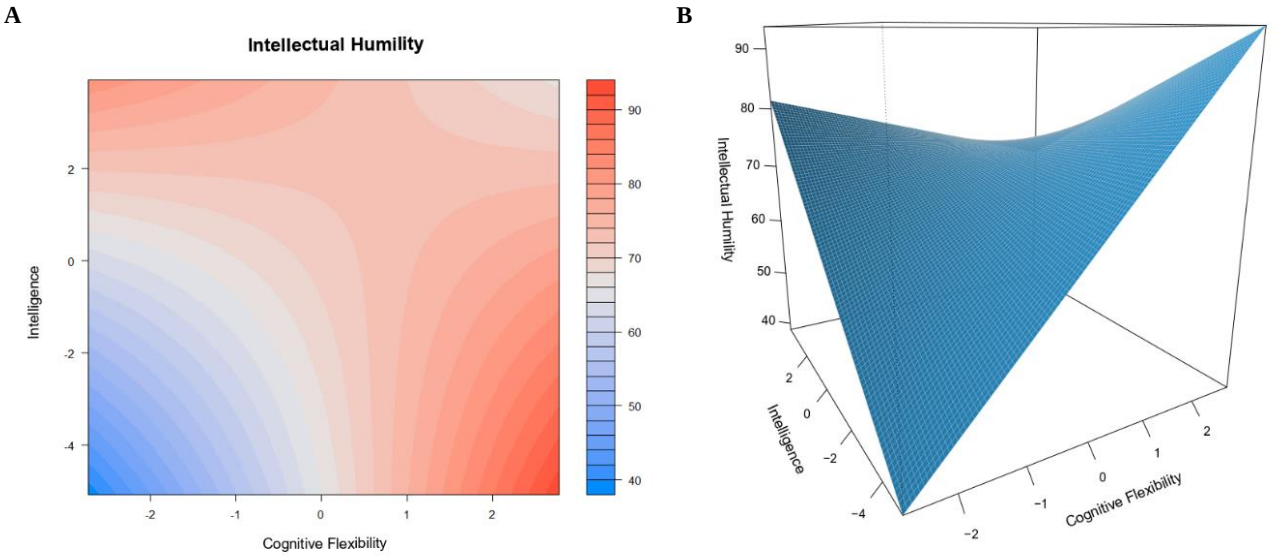

Figure 4. Representation of the regression surface predicting intellectual humility as a function of cognitive flexibility and intelligence, while controlling for age, gender, and educational attainment. (A) Filled contour plot. Colour gradient reflects comprehensive intellectual humility score. (B) Perspective plot.

Data-Driven Approaches: Moving Beyond Disciplinary Dogmas

Empirical research on the psychology of ideology has traditionally been highly theory-driven. This has increased the scope and applicability of political psychology and facilitated the falsifiability of scientific claims by encouraging the development of hypotheses and conceptual frameworks. Nonetheless, a growing concern has emerged amongst researchers that psychologists of politics, nationalism, and religion generate hypotheses and develop study designs that confirm their prior beliefs about the origins of social discord (Duarte et al., 2015; Malka et al., 2017; Tetlock, 1994; Washburn & Skitka, 2018). This is exacerbated by the fact that due to limited resources and siloed research disciplines, studies in social psychology frequently focus on one ideological domain (e.g. political conservatism) or one psychological domain (e.g. analytical thinking). While an in-depth focus on a specific domain is essential for theoretical development, the selection of hypotheses and methodologies can at times suffer from problems of bias and a lack of conceptual integration across different ideological and psychological domains. It is therefore essential to complement theory-driven research with data-driven approaches, which can help to overcome these methodological challenges, as well as offer a holistic view of these complex relationships by "letting the data speak". Perhaps most importantly, data-driven research can help validate or challenge theory-driven findings and consequently offer directions for future research.

Chapter 6: A Data-Driven Analysis of the Cognitive and Perceptual Attributes of Ideological Attitudes

(Zmigrod et al., conditionally accepted at *Nature Human Behaviour*)

Chapter 6 built on the convergent finding from Chapters 2-5 that it is fruitful and productive to embrace an individual differences perspective to study the cognitive underpinnings of various ideological orientations. However, it departed from the theory-driven approach of Chapters 2-5 and instead relied on a unique dataset to apply a data-driven approach to these questions (Figure 5). Using an unprecedented number of cognitive tasks (N=37) and personality surveys (N=22), and data-driven derivation of mental structure, the study conducted the first rigorous, systematic quantification of the relative contributions of demographics, personality, and cognition to individuals' ideological inclinations. Data collection of the psychological variables took place in 2016, and was guided by a general interest in self-regulation and goal-directed behaviour (outlined in Eisenberg et al., 2018, 2019; Enkavi et al., 2019), while the collection of ideological attitudes data was undertaken 2 years later in 2018. This temporal and conceptual separation meant that there was little scope for researcher theoretical bias about the psychological antecedents of ideological worldviews. The findings illustrate that psychological variables consistently outperform demographic variables in accounting for political conservatism, religiosity, and dogmatism. A combination of novel data-analytic strategies including in-sample linear regression, out-of-sample cross-validation, and Bayesian Model Averaging, revealed that including psychological traits increased explanatory power by 4- to 15-fold.

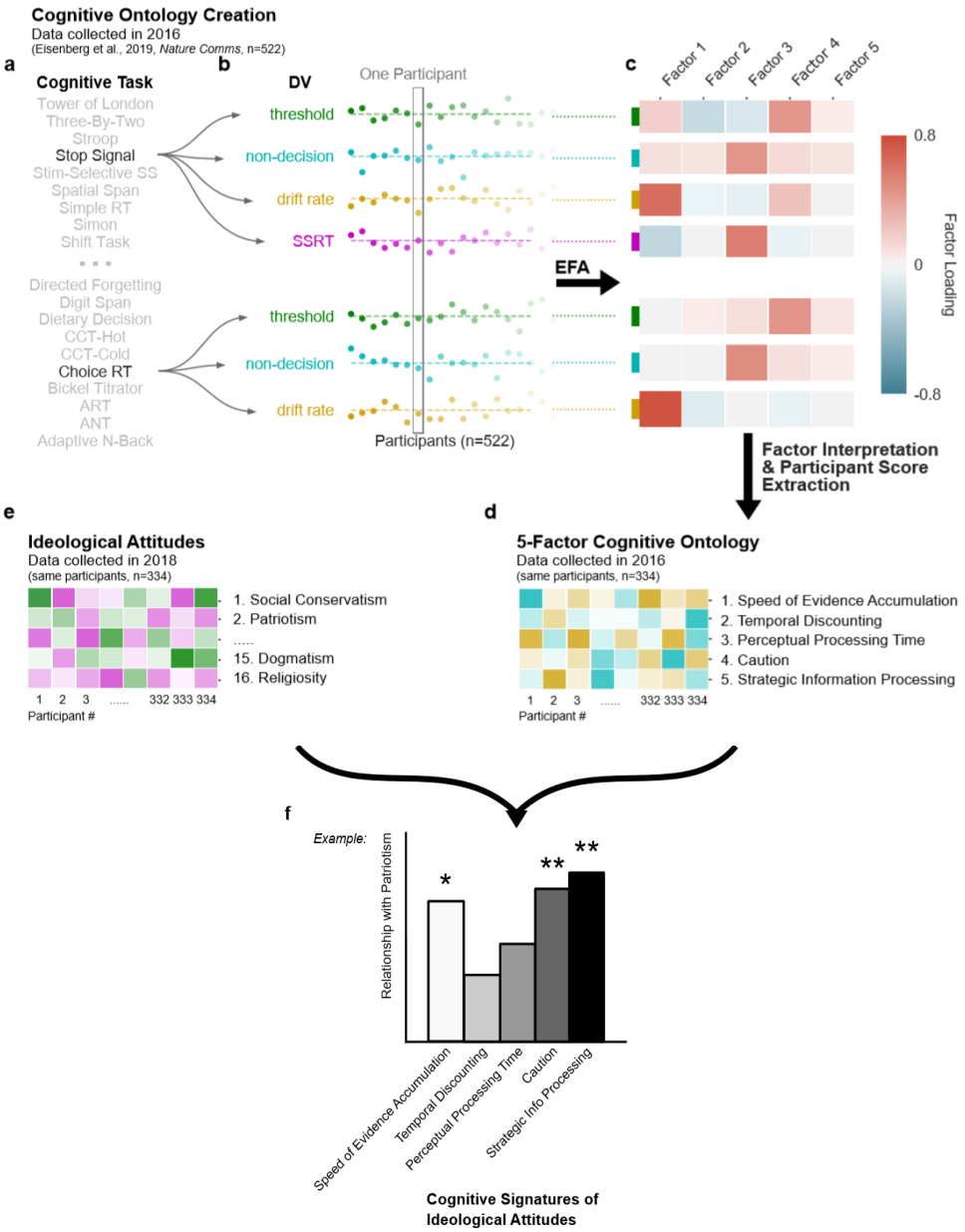

Figure 5. Summary of task analytic pipeline.

The findings demonstrated large effect sizes and strong evidence for predictive models of ideological orientations that incorporate cognitive and personality factors (Figure 6). The study further revealed that impairments in strategic information processing, manifest in performance on executive functioning tasks associated with working memory and planning, were linked to more authoritarian, conservative, nationalistic, and religious tendencies. A difficulty in planning and executing complex action sequences in basic perception may thus increase people's reliance on coherent collective dogmas that simplify the world into absolute explanations and clear behavioural prescriptions. Furthermore, using drift-diffusion modelling (DDM) of trial-by-trial performance on two-forced choice tasks revealed that slower evidence accumulation of perceptual data (on the order of milliseconds) predicts a dogmatic thinking style. Notably, dogmatic individuals also exhibited tendencies towards impulsivity, suggesting that dogmatism may arise out

of a cognitive style characterized by premature decisions based on imperfectly processed evidence. Dogmatism in evaluating evidence could therefore reflect the individual's impairments in processing perceptual evidence. Moreover, the DDM parameter analysis suggested that response caution – defined as a preference for accuracy in the trade-off between accuracy and speed (where both are rewarded) – was related to more socially conservative and nationalistic worldviews. Cautious perceptual strategies may therefore percolate to cautious (i.e. conservative) ideological beliefs. Studying the relationship between ideological attitudes and individual differences in low-level perceptual and cognitive processing can therefore help illuminate the character of the ideological mind.

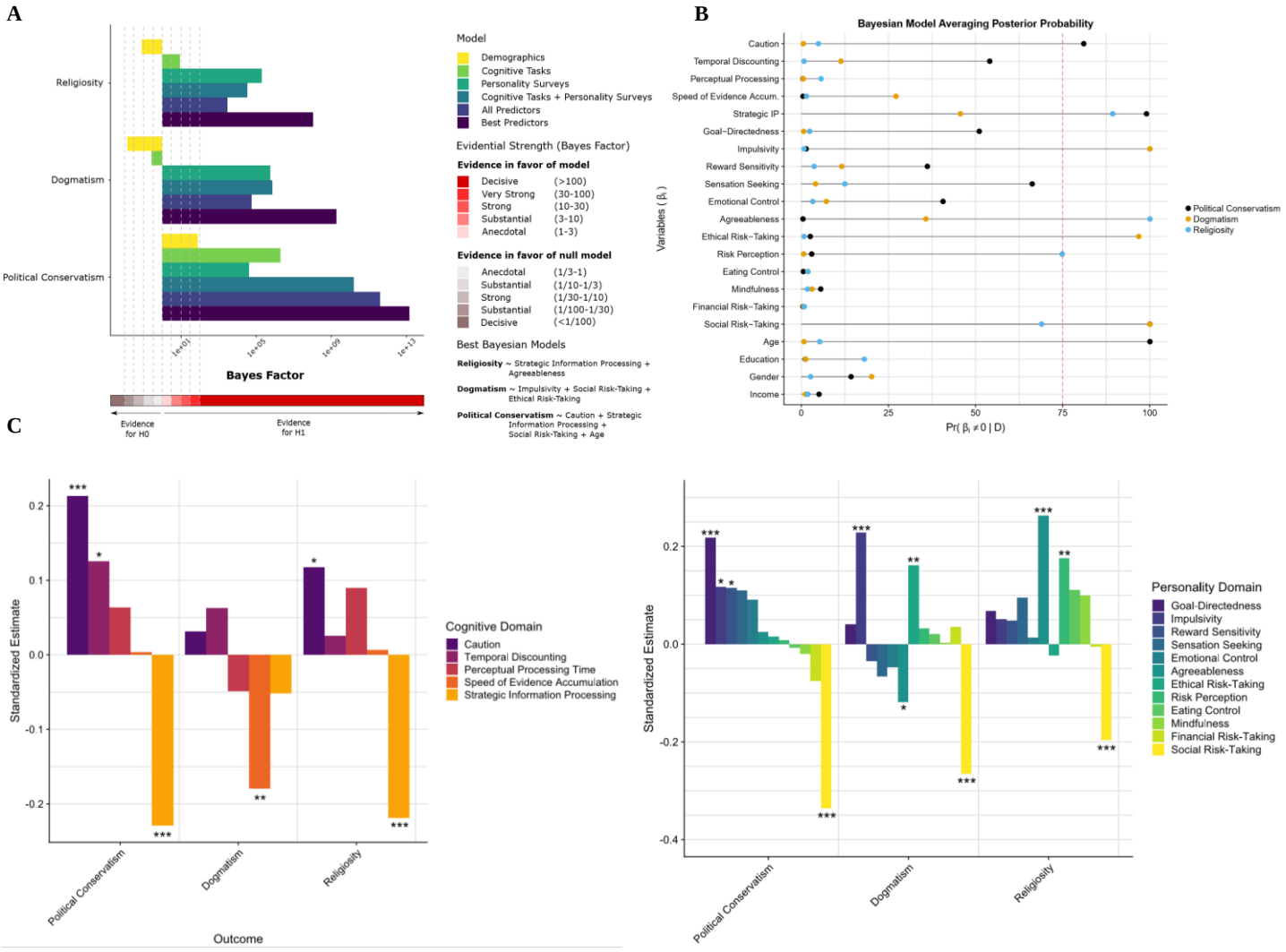

Figure 6. (A) Bayes factors models predicting religiosity, dogmatism, and political conservatism. (B) Posterior probability that each cognitive and personality variable (β_i) is non-zero given the data, D, (in %) following Bayesian Model Averaging. (C) Standardized estimates of cognitive and personality variables for each ideological factor. *p<.05, **p<.01, ***p<.001.

Conclusions

In *The True Believer* (1951), the thinker Eric Hoffer wrote about crowds and mass movements, "*All movements, however different in doctrine and aspiration, draw their early adherents from the same types of humanity; they all appeal to the same types of mind.*" Hoffer tapped into an important idea: there may be a certain "*type of mind*" that is particularly drawn to adopting an ideology, almost regardless of its content or ambition. This dissertation has sought to empirically demonstrate that an emphasis on the structure of ideological thinking, rather than the content of ideological beliefs, allows us to unearth what is unique and what is universal about ideological cognition. It has argued that we can unlock the key to this type of mind – the ideological mind – by investigating the low-level perceptual and cognitive mechanisms by which the brain processes information and reacts to its environment. One of the most profound results from the current studies is that ideologically-neutral cognitive processes are related to higher-level ideological convictions and beliefs. Specifically, there was a parallel between individuals' rigidity, caution, and sensory evidence accumulation processes in perceptual decision-making and their *ideological* rigidity, caution, and insensitivity to evidence. This is indicative of *domain-general* and *time-invariant processes* and strategies that operate on multiple time scales and across a variety of contexts. Hence, ideological beliefs are amenable to careful cognitive and computational analysis, and cultivating this knowledge may have essential political and philosophical ramifications.

Future research will need to consider the tangible consequences of this burgeoning field for how we understand the contemporary moment and our collective history, and how we help those who are most susceptible to the allure of collective ideologies. By adopting research practices such as relying on large samples, integrating assessment methods from cognitive and social psychology, and utilizing both frequentist and Bayesian statistical techniques, the current investigation was able to overcome many methodological concerns in social and political psychology regarding biased hypothesis generation, reproducibility, and siloed theoretical traditions. As this field matures into a comprehensive cognitive science of ideology, it will need to be biologically-informed and socially-sensitive, and guided by both theoretical considerations and data-driven analytics. It will aim to deconstruct the complex cocktail of neurobiological, cognitive, and situational factors that shape an individual's vulnerability to ideological extremism. It is in these insights that we can discover *antidotes* to the effects of ideologies on the human mind and to begin to wonder what a life untinged by ideological indoctrination and harsh social categorizations might look like – and whether it is even possible.

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1. **Zmigrod, L.,** Rentfrow, P. J., & Robbins, T. W. (2018). Cognitive underpinnings of nationalistic ideology in the context of Brexit. *Proceedings of the National Academy of Sciences*, *115*(19), E4532-E4540.

2. **Zmigrod, L.,** Rentfrow, P. J., Zmigrod, S., & Robbins, T. W. (2019). Cognitive flexibility and religious disbelief. *Psychological Research*, *83*(8), 1749-1759.

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4. **Zmigrod, L.,** Zmigrod, S., Rentfrow, P. J., & Robbins, T. W. (2019). The psychological roots of intellectual humility: the role of intelligence and cognitive flexibility. *Personality and Individual Differences*, *141*, 200-208.

5. **Zmigrod, L.,** Rentfrow, P. J., & Robbins, T. W. (2019). Cognitive inflexibility predicts extremist attitudes. *Frontiers in Psychology*, *10*, 989.

6. **Zmigrod, L.** (2020). The role of cognitive rigidity in political ideologies: theory, evidence, and future directions. *Current Opinion in Behavioral Sciences*, *34*, 34-39.

7. **Zmigrod, L.,** Eisenberg, I. W., Bissett, P., Robbins, T. W., & Poldrack, R. A. (conditional acceptance). A Data-Driven Analysis of the Cognitive and Perceptual Attributes of Ideological Attitudes. *Nature Human Behaviour*

8. Rollwage, M., **Zmigrod, L.,** de-Wit, L., Dolan, R. J., & Fleming, S. M. (2019). What underlies political polarization? A manifesto for computational political psychology. *Trends in Cognitive Sciences*, *23*(10), 820-822.

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