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Visceral politics: a theoretical and empirical proof of concept

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While the study of affect and emotion has a long history in psychological sciences and neuroscience, the very question of how visceral states have come to the forefront of politics remains poorly understood. The concept of *visceral politics* captures how the physiological nature of our engagement with the social world influences how we make decisions, just as socio-political forces recruit our physiology to influence our socio-political behaviour. This line of research attempts to bridge the psychophysiological mechanisms that are responsible for our affective states with the historical socio-cultural context in which such states are experienced. We review findings and hypotheses at the intersections of life sciences, social sciences and humanities to shed light on *how* and *why* people come to experience such emotions in politics and what if any are their behavioural consequences. To answer these questions, we provide insights from predictive coding accounts of interoception and emotion and a proof of concept experiment to highlight the role of visceral states in political behaviour.

This article is part of the theme issue ‘The political brain: neurocognitive and computational mechanisms’.

1. Introduction

There is a growing consensus among politicians and citizens that liberal democracies are in crisis. The surrounding narrative often points to the dominant role that emotions have come to play in the public sphere. Whether one calls our era the time of anxiety [1], of fear [2] or of anger [3], feelings and emotions are at the forefront of the political behaviour of citizens and policy makers alike [4], acting as drivers as well as targets of politics [1]. The socio-political conditions of rising populism, climate change, and cultural wars that fuel social passions — from fear, anger and hatred to sadness, indignation, resentment and more — require us to go beyond long-standing but simplistic dichotomies between reason [5] and emotions [6]. Yet an empirically driven, critical analysis of the assumed emotional climate, in politics and, more importantly of its underlying neurophysiological basis is lacking. While we all experience uncertainty and polarization, for some of us they provoke anxiety, while for others they rather provoke anger or fear. How can we explain the existence and pervasiveness of such *nervous states* among citizens and their elected politicians, and what is their role in political behaviour? To answer these questions, we put forward the concept of *visceral politics*. Visceral politics offer a description at the intersection of the body’s physiology, experienced emotion, and political behaviour, and highlights the ways in which the physiological, emotive nature of our engagement with the social world shapes our political decisions and behaviour, and in turn how socio-political forces recruit physiology and emotions to influence our politics.

2. Interoception and body-politics

We are biological organisms that primarily deal with the problem of survival. The key process by which we ensure viability is homeostasis, that is the

maintenance of the body's integrity within a 'margin of safety', essential for life and well-being. The body's physiological states also give rise to affect, that is, a mental representation of how we feel. The seminal work of Damasio on somatic markers shows the importance of physiological states for cognition [7], and suggests that the ways in which we perceive our visceral states and become aware of our feelings are at the core of self-awareness [7,8], crucial for social cognition and behaviour. After all, cognition takes place within the context of that body of ours that firstly needs to stay alive, and secondly to be well. In a more radical view, brains evolved to regulate bodies in a social context [9]. Throughout life, the homeostatic and affective regulation of our bodies — and the brains that serve our bodies, remain critically dependent on social relations [10,11]. The term interoception, that is the perception of bodily states that are homeostatically salient, underlies the important role that bodily states (e.g. changes in heart rate) and their mentalization in terms of feelings (e.g. arousal) and emotions (e.g. anger, or fear, or surprise) play in cognition, in mental and physical health, and in social relations [12].

The brain has recently come to be viewed as a *predictive* organ that strives to predict future states of the world. Recent approaches have further refined such predictive models by viewing the body as a hyper-prior [13], suggesting that the brain must first and foremost predict future states of the body with the aim of achieving a dynamic regulation of bodily states through change. In other words, the brain strives to predictively adjust bodily states in response to actual and/or anticipated demands, a process which is called allostasis [14]. Allostasis is, therefore, the process of achieving stability — homeostasis — through physiological or behavioural change. For that to succeed, the organism must be in a position to track its current state *and* anticipate upcoming changes and the resources that will be required to return the organism to a stable desired state. The brain serves the body by maintaining pro-actively a healthy 'body-budget' [9] in anticipation of future situations that may put the organism at risk. Continuing uncertainty about the state of the organism's own natural environment (for instance, its own body) or about the social world that the organism inhabits may hinder this process of regulating physiological and affective states, placing the organism in a state of allostatic load [15], with grave consequences for cognitive function and well-being. Allostatic load reflects the cost of chronic exposure to elevated or fluctuating endocrine or neural responses resulting from chronic or repeated challenges that the individual experiences as stressful, a constant state of accumulated high arousal that wears out the body and the brain.

How can these features of our embodied human condition inform our understanding of politics? Across history, the question of how people are governed was linked to the broader questions of what politics are for. For example, consider Aristotle who suggested that the roles of the polis is to enable a 'good life' for its citizens, or Hobbes who advocated the role of the government in keeping citizens safe. While there is not a universally accepted definition of politics, we here consider a more extensive view of politics that defines them as present across the sphere of human social relations [16]. On this extensive understanding of the term, politics can be considered as 'an intimate part of the totality of interactions within and between both public and private institutions, formal and informal, in decision-making and implementation

of governance [...], as well as the prevailing norms, ideologies and cultures within the society' [16, p. 15].

Different twentieth-century social and political movements viewed politics as a means to create a more or less certain world for the people, to put in place the right conditions for the bodies and minds of the populace to remain within a 'margin of safety' and socially regulate our behaviour so that we can correctly infer how the social world makes us feel and how we should act [17,18]. The view that the human condition and its health is a constant challenge to preserve the body's equilibrium and integrity, which first emerged after World War I, revived the ancient 'body politic' metaphor — according to which the state or polity is an organic entity [19]. The German physician and anthropologist Rudolf Virchow, who was also the father of social medicine, had anticipated exactly this when he observed that 'medicine is a social science, and politics nothing but medicine at a larger scale' [20, p. 126].

Notwithstanding the medical advances of the last 100 years, the financial crises of 2008 resulted for the first time in a decline of life expectancy in developed countries. And even though for most countries that trend was reversed by 2015, the USA and UK [21,22] still show stagnating or continued declines in life expectancy, even before the COVID-19 pandemic. The worldwide burden of mental disorders has increased by 37% between 1990 and 2010 [23]. Large population surveys report that 34% of the population in the World Health Organization regions of the Americas, Europe and the Western Pacific are affected by an anxiety disorder during their lifetime [24]. Depression has become and remains one of the three leading causes of disease [25]. In 2017, eight in 10 Americans said they frequently (44%) or sometimes (35%) encounter stress in their daily lives (source Gallup: <https://news.gallup.com/poll/224336/eight-americans-afflicted-stress.aspx>), six in 10 find the current political climate to be a source of stress, and seven in 10 identify healthcare as a significant source of stress [26].

Decreases in social trust and cohesion, increases in political polarization, uncertainty about financial stability and health provisions all can contribute to rising levels of chronic stress and ill health and to the crisis of democracy. As such, objectively identifiable *and* subjectively experienced notions of uncertainty and crisis seem to have a tangible effect on the political animals of the twenty-first century: they place them in a state of allostatic load. If one of the key functions of the brain is to serve the body by maintaining a healthy 'body-budget', then chronic or frequent stress depletes this budget, causing wear and tear to our regulatory systems, resulting in an allostatic load. In other words, we lose our ability to flexibly regulate our bodies. This results in compromised recovery and contributes to disease and poor health, emotional dysregulation and cognitive decline, and a vicious cycle that exacerbates the conditions that promoted allostatic load in the first place [27].

Such depletions of the body-budget can have far-reaching political consequences. For example, insufficient sleep affects not only private behaviour but also political engagement such as citizens' willingness to vote, sign petitions and donate to charities [28]. Other lines of inquiry have also corroborated the intimate bidirectional link between politics and health. A study [29] spanning 170 countries between 1980 and 2016 showed that democratic experience better explains variations in mortality for cardiovascular diseases, transport

injuries, cancers, cirrhosis and other non-communicable diseases, than gross domestic product. According to a modelling of the 2016 US Presidential Election published in the *Economist* [30] that was based on data from the Institute for Health Metrics and Evaluation at the University of Washington, a reduction of 7% in diabetes prevalence in Michigan, a 5% reduction in heavy drinkers in Wisconsin and an 8% increase of people engaging in physical activity in Pennsylvania would have swung the states, resulting in a different outcome. Thus, voters with poor health were particularly important for the outcome. This analysis is also supported by empirical studies on the behavioural immune system, showing that population-level epidemiological profiles of infectious diseases may structure individual-level psychological preferences for authoritarianism as well as authoritarian governance [31,32].

The political animals of twenty-first century western democracies seem evermore homeostatically and affectively dysregulated. We find ourselves in a social world of increased existential uncertainty, as concerns about healthcare provisions and financial stability consistently rank among the highest stressors [26], not to mention the most recent COVID-19 pandemic. The world right now is also one of increased informational uncertainty, driven by an ecosystem of informational overdose that relies on social media platforms that breed fake news [33] and belief polarization [34]. Under such conditions, visceral states have come to the forefront and manifest themselves as powerful dysregulated emotions in a socio-political world dominated by (narratives) of uncertainty and crises.

3 Epistemological synergies on interoceptive inference and emotions

The attempt to account for the visceral politics of our times is well served by the concurrence of three important parallel epistemological changes in the disciplines of history, political sciences, psychology and neuroscience. History has witnessed a new focus on the study of emotions whereby these are not merely viewed as the effects of historical circumstances, expressed in the aftermath of events, but are instead seen as active causes of events that can richly enhance historiographical theories of causation of socio-political events [35]. Political sciences, after a long period of inattention to emotions, have shown an increased interest in how emotions may influence political behaviour, especially since the 1990s. However, their primary focus has been on a rather incomplete 'outside-in' approach that infers the constitution and causes of emotions from verbal reports of experiences and observations of behaviour [36]. More recently, and largely thanks to advances in psychophysiology and affective neuroscience, a different 'inside-out' approach has emerged that allows direct investigation of the physiological and neural processes that engage affect. Thus, the political sciences have expanded their remit to include emotions and affective states as explanatory tools in the analysis of socio-political behaviour, albeit often in a correlational manner and with a limited understanding of the underlying neurophysiological mechanisms. For example, a seminal study has reported a correlation between physiological arousal when viewing repulsive images in ideologically conservative but not liberal participants [37]. However, recent failures to replicate the

finding have emphasized the methodological as well as theoretical shortcomings of such correlational endeavours [38–40]. Moreover, a radical reconceptualization of emotions and of their underlying neural mechanisms in neurosciences can inform a more nuanced understanding of what is at stake. More recent theories of emotion, in line with the view that the predictive brain actively and constantly tries to predict both the external [41] and the internal milieu, including changes in our visceral organs that give rise to affective states [8], suggest that emotions are constructions of the world, not reactions to it [9], as our brain creates our emotions from bodily sensations, past experiences and learned emotional concepts. The brain applies this inference toolbox to explain the causes of our sensations and actions, to make sense of changes in the body and in the world. Such an approach can pave the way for a reconciliation of the mechanistic approach of life sciences that looks for universal principles of human nature with the social constructivism of social sciences that interrogate the culture-specific historical determinants of the human condition.

4. A proof-of-concept study of visceral politics

Although political psychology and political sciences are increasingly focused on the role that emotions play in political behaviour, most of the empirical research to date has either focused on correlational designs between subjective reports of emotions and political preferences or on correlations between physiological responses to emotive stimuli and political orientation. Gaps still exist between different levels of analysis (e.g. from physiological states to psychological concepts) which must be bridged in order to achieve a mechanistic causal understanding of the link between emotions, and political behaviour [42]. To build that bridge we can no longer afford to ignore the underlying interoceptive mechanisms that underpin affect and emotion.

Cardiovascular arousal that is relayed to the brain via signals from arterial baroreceptors can intensify feelings of fear and anxiety. Arterial baroreceptors fire in bursts after each heartbeat, and are quiet between heartbeats. This phasic nature of afferent signals from baroreceptors to brain can be used as a means of studying interoceptive influences on emotional and cognitive processes. The interoceptive pathways involved in baroreceptor firing are considered responsible for amplifying the somatic sensations of anxiety and fear [43]. An experimentally controlled way to study this mechanism entails the time-locking of stimulus presentation to the systolic phase of the cardiac cycle (on the heartbeat, when baroreceptors are active) or with the diastole (between heartbeats, when baroreceptors are quiescent). It has been shown that the processing of fear stimuli is selectively enhanced by these phasic signals [44], and that the perception of threat-related stimuli that are presented at systole, and hence during a state of heightened arousal, accentuates the expression of racial biases [45]. Taken together, baroreceptor firing increases the perception of threatening and fearful stimuli [43], suggesting that anxious and fearful states may be enhanced by these phasic signals, supported by their shared neural substrates in the amygdala and insular cortex [43]. Such heart-timing approaches illustrate the role of distinct interoceptive states in gating conscious access of emotionally potent material, in particular anxious- or fear-related [43].

As a proof-of-concept for an empirically driven visceral approach to political behaviour, we used this baroreceptor mechanism to study how cardiac signals may bias political leader choice. Following past research, we were interested in the effect that physiologically simulated arousal may have on political preferences. Information about the state of cardiovascular arousal is transmitted to the brain periodically at the systolic phase. While the presentation of stimuli at systole cannot be taken as evidence of manipulating anxiety or fear per se, past evidence suggests that this kind of physiologically simulated arousal is more strongly associated with anxious and/or fearful states as discussed above. Political psychology perspectives suggest that anxiety motivates us to avoid danger and seek a safer environment [46]. Fear is also often seen as an emotion that influences political behaviour, and it has been suggested that it can be exploited for political authoritarianism [2]. People who experienced fear about the terrorist attack at Charlie Hebdo were less likely to support an authoritarian party (e.g. the French Front National) than people for whom the primary response to the attack was anger and who showed increased support for more authoritarian leaders [47]. We, therefore, tested if and how the simulation of heightened physiological arousal at systole versus diastole could bias people's preference for more or less authoritarian looking leaders. We hypothesized that the induced physiological arousal would be more likely mentalized as an anxious and/or fear-related state, and lead to a preference for less authoritarian looking leaders, leaders whose facial characteristics are less dominant and more trustworthy looking.

(a) Methods

We adapted a political leaders' choice task which is designed to implicitly measure the preference for more or less dominant/trustworthy-looking political leaders. Peoples preference for more or less authoritarian looking leaders has been shown to reflect actual political preferences for more or less authoritarian ideologies across several studies [48–51]. On each trial, participants selected who they would vote for between a pair of presented faces. The presentation of the pairs of faces was synchronized to the participant's systolic or diastolic phase of their cardiac cycle.

(i) Participants

Forty-one participants were recruited and tested, but two were excluded owing to a computer failure. Thus, 39 volunteers (26 women, age $M = 28.92$, $s.d. = 11.65$) were included in the analysis. The study was approved by the Royal Holloway, University of London, Ethics Committee. We collected participants' age, gender, ethnicity, nationality political orientation (i.e. 1–7 Likert Scale, from very conservative — very progressive), social dominance with the 16-items Social Dominance Orientation Scale [52], and anxiety levels using the State-Trait Anxiety Inventory [53] in forms Y-1 (state or current levels of anxiety with 20 items, e.g. 'I am tense', $M = 33.54$, $s.d. = 8.78$) and general state anxiety Y-2 (with 20 items (e.g. 'I am happy', $M = 41.03$, $s.d. = 10.81$). Our sample was leaning towards progressive ideology ($M = 5.33$, $s.d. = 1.55$) and lower social dominance ($M = 2.16$, $s.d. = 0.879$). Participants were fitted with three disposable electrocardiogram (ECG) electrodes in a modified lead I chest configuration. Two electrodes were placed underneath the left and right

collarbone, and a third one on participant's lower left back side. Their heart rate signal was recorded using ECG at 1000 Hz (bandpass filter between 0.3 and 1000 Hz), with Powerlab 8/35 (Powerlab, ADInstruments, adinstruments.com) and LABCHART 8 Pro software.

(ii) Stimuli

In the leader choice task we used computer-generated faces (figure 1a), created in FACEGEN 3.1 (Singular Inversions) and controlled for their level of trustworthiness and dominance [54]. These stimuli have been successfully used in previous studies to elicit dominance and trustworthiness judgements both at the explicit and implicit level [55,56].

(iii) Political leader choice task

Participants were informed that pairs of face-like shapes will flash on the computer screen, which will then turn to computer-generated faces that would continue to flash. Their task was to choose, on every trial, which of the two faces they would vote for in a hypothetical national election (figure 1b). The fast output response of adinstruments.com detected the heartbeat online, by identifying the ECG's R-wave with a delay less than 1 ms after the amplitude exceeds individually defined threshold. In systolic trials, both faces were presented at $R + 200$ ms corresponding to the maximal representation of arterial baroreceptors in the brain [57,58]. In diastolic trials, both faces were presented at $R + 500$ ms, to preserve the heartbeat frequency of the cardio-visual stimulation, while introducing a consistent delay (i.e. phase shift) of the stimuli presentation in relation to the cardiac cycle.

(b) Analysis and results

For each participant and condition (systolic/diastolic phase), we computed a probability value that was indicative of the participant's preference towards a face with low perceived trustworthiness and high perceived dominance [55]. To compute the probability value, for each participant we ran two separate logistic regression analyses, one for each condition, to predict the face chosen by the participants as a function of the perceived trustworthiness and dominance dimensions. The extracted coefficient values were used to predict the probability of choosing a strong leader for all possible combinations of the factors of interest. The trustworthiness coefficient was set to negative, therefore, a high probability was associated with negative trustworthiness and positive dominance coefficients. In other words, a high probability value was given to participants that tended to choose a face with low perceived trustworthiness and high perceived dominance, whereas a small probability value was given to participants that tended to choose the opposite. All intermediate values were possible. This analysis provided one probability value for systolic trials and one diastolic trial, per participants. These were first entered into a paired *t*-test to investigate the difference between conditions. To control for potential covariates, we ran a linear mixed-models analysis using demographics, Social Dominance Scale, political orientation, and State-Trait Anxiety Inventory as fixed-effect factors and participant identity as random-effect factor. All analyses were performed in R (4.0.0) and MATLAB R2019b (The Mathworks, Inc.).

In general, participants tended to choose a leader with higher perceived trustworthiness and lower perceived

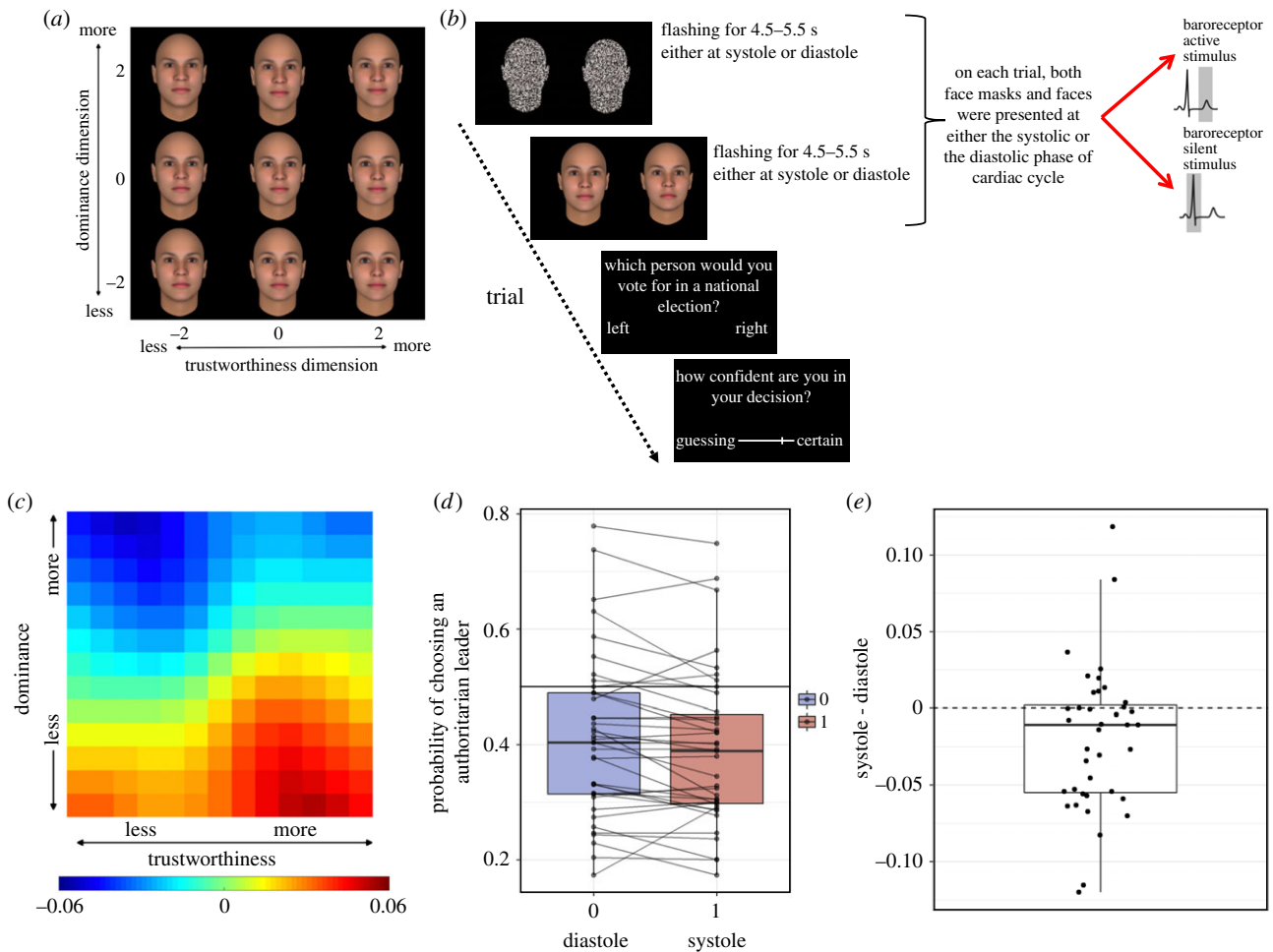


Figure 1. (a) Stimuli in the leader choice task. Each face was characterized by two dimensions: perceived dominance and trustworthiness in a range of -2 to $+2$ points with an increment of 2 points. The stimuli included every combination of perceived dominance and trustworthiness in this range resulting in nine faces. Stimuli were always presented in pairs in which the faces were 2–4 points different from each other on at least one dimension (dominance or trustworthiness). This resulted in 36 pairs of faces. (b) Trials started with a fixation cross for 300 ms, followed by the presentation of two shapes of faces (masks) flashing side-by-side on the computer screen. The masks were flashing for 4000 or 4500 ms in synchrony with either the participant's systolic or diastolic phase of their cardiac cycle. Following this, the masks were replaced with two computer-generated faces, varying in both dominance and trustworthiness. These continued to flash for 7500 or 8000 ms with the same rhythm (total trial length was 12 000 ms), before disappearing and giving participants 3 s to answer to 'Which person would you vote for in a hypothetical national election?' by choosing either 'left' or 'right' face with arrow keys. Following this, they had to respond to 'How confident are you in the decision you just made?' using a computer mouse on the continuous scale from 0 (not confident at all) to 100 (extremely confident). If they failed to respond, the task auto-advanced to the next trial with an intermediate interval of 100 ms. The inter-trial interval of 1200 or 2200 ms, included additional variable delay to detect an R-peak for the systole condition (from 1 ms to the average inter-beat interval). The faces were presented in a counterbalanced and randomized order on either the left or right side of the screen. The task comprised 90 trials, 45 per each block, with a 3 min break in between. (c) A heatmap for the probability of choosing a face as a leader according to trustworthiness (X-axis) and dominance (Y-axis). Values are changes in probabilities as a difference of systolic versus diastolic trials. (d) Boxplot and distribution of probabilities of choosing a dominant/trustworthy leader. Each pair of linked dots represent the probabilities of each participant in the two conditions (diastole: 0; systole: 1). (e) Difference between probability pairs in the two conditions. The dotted line with intercept at zero indicates no difference. Negative values indicate that the probabilities at systole was smaller than the probabilities at diastole. (Online version in colour.)

dominance ($M_{\text{diastole}} = 0.411$, $\text{s.d.}_{\text{diastole}} = 0.140$; $M_{\text{systole}} = 0.391$, $\text{s.d.}_{\text{systole}} = 0.133$), most probably because our sample was in general liberal (median = 6 on a scale from 1 to 7, where 1 was 'conservative' and 7 was 'liberal'). Importantly, the paired t -test revealed that the difference within participants between probabilities at systole and diastole was statistically significant ($T_{38} = -2.69$, $p = 0.01$, confidence interval (CI) $(-0.035, -0.005)$, see figure 1d), suggesting that their leader choice was modulated by the cardiac cycle phase. At systolic trials, participants were more likely to choose a more trustworthy/less dominant looking leader, relative to diastolic trials. We next used linear mixed-effects models to predict the observed probabilities. None of the

possible confounding variables (i.e. demographics, Social Dominance Scale, political orientation and State-Trait Anxiety Inventory) was significant. The model that best explained the data included condition (i.e. systole/diastole) only ($\beta_{\text{systole}=1} = -0.2$, $\text{CI} = (-0.04, -0.01)$), indicating an increased preference for a more trustworthy and less dominant looking leader when faces were presented at systole. Importantly, participants reported comparable confidence in their judgments across conditions ($T_{38} = -1.738$, $p = 0.09$, $\text{CI} = (-2.46, 0.18)$), ruling out the possibility that the cardiac systolic trials may simply reflect increased physiological noise-to-signal ratio that may selectively affect people's responses in one condition over the other.

(c) Discussion

This proof-of-concept study illustrates a mechanistic approach to visceral politics and provides preliminary evidence for the role that interoceptive signals may play in biasing political leader choices. Given the past research that links the systolic firing of the baroreceptors with physiological arousal that accompanies anxious and fearful states, we tentatively interpret the observed pattern as suggestive evidence that physiological states associated with arousal may attenuate the choice for authoritarian leaders [47], consistent with recent views that anxious [46] or fearful [47] states can lead to political preferences for more trustworthy, less authoritarian leaders. In addition, as the growing body of research cardio-cognitive influences on visual perception [59,60] and memory [61,62] suggests, the baroreceptor firing may also impact the kinds of political behaviour studies here via cognitive processes other than affect and emotion. Thus, future studies could use such an approach to further explore the effects of visceral states and their mentalization on political behaviour, in larger-scale studies with a broader set of control conditions and more extensive use of socio-demographic and ideological variables. Such an experimental approach can pave the way for research programmes that go beyond the correlation between self-reported emotion or physiological measures and political ideology, towards studies that will articulate the complex links between interoceptive visceral states, their mentalization as affect and emotions and political behaviour. Lastly, and as explained in the following concluding section, an interoceptive predictive coding framework can reconcile a mechanistic understanding of the physiological processes involved with a socio-historical appreciation of contextual modulations of our visceral states.

5. Directions for future research

The political and social context within which humans historically find themselves is important for the social construction of the emotions that they experience. With the mechanistic approaches offered by the life sciences, we can begin the integration of hypotheses from political sciences on the role of distinct emotions with their 'bottom-up' visceral influences in different contexts of allostatic overload, or lack thereof. The question of what people *actually* experience as conscious emotion in any given context requires an additional perspective given by social sciences and the humanities. As recent work has demonstrated [39,63] one of the pressing issues that political psychology and neuroscience are facing is how exactly to align physiological responses and reactions, that are often unconscious, with the subjectively experienced conscious emotion. Understanding the relationship between the two holds the promise of shedding more light on the emotional roots of political ideology and behaviour, especially because we may not be as good as we think we are at identifying our emotions. How then should we think of politics if people may *not* know what they want because they may not know what they *feel*?

It would, therefore, be important to explore how specific social contexts impact our allostatic load and dysregulation, and how these can in turn impair our ability to accurately mentalize physiological states. The framework of visceral politics predicts that dysregulation and allostatic load will make citizens more susceptible to the externally constructed emotional meaning of their physiological states. Consider how much has

been written over the last decade about the 'age of anger' or the 'age of fear' that we seem to be experiencing. Such affective labelling can construct the experience of anger or fear. Political leaders, social groups and social media users share their affective labels in response to ongoing socio-political events. Such labels may act as signifiers of people's physiological states. An affective label (such as, you are angry/afraid) provided by an exogenous source, and even more so by a politically powerful source, gives some context to our unidentified or unregulated physiological states and in a way may 'construct' the conscious experience of that particular emotion. In other words, it shapes the *social* inference of our emotions and its political consequences. As an example, Donald Trump said in a political rally that 'The Democrats' shameful conduct, has created an angry majority, and that's what we are, we're a majority and we're angry' [64]. Different parts of the populace, given their political and ideological attitudes, may be exposed to different labels of affect — and this, to the extent that an emotional prescription (such as 'you should feel...') and affect-labelling (such as 'anger'), can function as the context within which people will construct their emotions. In relation to the proof-of-concept study we present here, future research can investigate how such states of simulated interoceptive arousal at the systolic phase of the cardiac cycle can be experienced as different emotions (e.g. fear, or threat, or anger) given specific affective labels and contexts, and what, if any, will be their distinctive effects of political behaviour.

It remains an open yet timely question to understand how physiological states coupled with individual differences in political attitudes may pre-dispose some people to experience anger in a given socio-political context, while others may experience fear or anxiety. Such subjective experiences are likely to influence people's political behaviour, as is also the case for cognitive predispositions [65]. From a predictive coding point of view, the future directions that we identify here resonate with recent accounts that conceive of social behaviour as a 'sense of should' [18], whereby we must conform to other people's expectations because doing otherwise would be metabolically costly. Therefore, the different socio-political contexts and groupings within which we find ourselves may be important for the social construction of the emotions that we experience, the inferences that we make about how our politicians and political systems expect us to behave, for the very *sense of should* [17]. The future study of the interaction between top-down social processes of affect-labelling and the mentalization of our visceral states may be central in understanding the emotional microclimates of different social groups and the political consequences.

6. Conclusion

As Epstein [66, p. 1] notes 'The body is the political object par excellence. It is what [the states] aim to keep safe, and healthy'. The concept of visceral politics places our physiological integrity and its mentalization at the centre of what politics is for: to create a more or less certain world, to enable us to stay within a 'margin of safety', so that we are capable of inferring correctly how the social world makes us feel, but also to be equipped with the right physiological and mental resources to deal with uncertainty. Social certainty and uncertainty have concrete yet far-reaching biological effects. Just as their causes are social, political and cultural in nature, so their solutions

must be social, political and cultural. Looking ahead, it is likely that we will experience more stressors of biological and socio-political uncertainty: the anxiety caused by the destructive effects of climate change, the current health crisis of the COVID-19 pandemic and its economic and social fallout, and future pandemics. There will also be new forms of digital welfare whose implementation may be accelerated as a result of the COVID-19 pandemic, a greater conflation between the physical public space and the digital space, and an informational ecosystem with increased dissemination of 'alternative facts' and fake news, competing with truthful communication.

Politics have always been visceral. We have always faced existential threats and looked to our political systems to attempt to address them. Equally, our bodily states and their regulation, our emotions and their expression have always been integral to our political life and societal organization. Understanding the specific ways in which this viscerality interacts with our current political practices will

help to explain why the uncertain world we live in *now* feels the way it does.

Ethics. The study was approved by the Royal Holloway, University of London, Ethics Committee

Data availability. Data related to the study presented in this manuscript are available at <https://osf.io/mk49c/>.

Authors' contributions. M.T., R.T. and N.V. designed the study. N.V. collected the data. R.F. analysed the data. M.T. wrote and led the writing-up and R.F. and N.V. contributed to the writing-up of the methods and results.

Competing interests. We declare we have no competing interests.

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