



Neuroscientific approaches to the study of system justification

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Recent advances in the study of political attitudes and behavior have incorporated neurobiological methods to elucidate the basic affective and cognitive processes that support political decisions. This review integrates perspectives in political neuroscience research and focuses on the neurobiological bases of system justification — the motivation to regard the existing social system as legitimate and desirable. Neuroscientific evidence indicates that system justification and propensity to engage in political protest are associated with interindividual differences in amygdala structure. This suggests the possibility that our inclinations to protect versus protest the status quo are linked to our biological responses. Much of the promise of using neuroscience approaches in this interdisciplinary work lies in future investigations to help clarify outstanding questions about the palliative function of system justification and the neurocognitive bases of political participation.

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Current Opinion in Behavioral Sciences 2020, 34:205–210

This review comes from a themed issue on **Emotion, motivation, personality and social sciences** *Political Ideologies*

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<https://doi.org/10.1016/j.cobeha.2020.04.003>

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When a society is faced with vast structural inequalities or social challenges, its citizens often become divided not only on the question of what should be done to address such issues, but also whether these issues should even be considered problematic. How do some people decide that society is good enough and act to maintain it? How do others decide that society must be changed and act to transform it? Citizens of all stripes can express their societal perceptions and preferences by taking actions like voting for political candidates, endorsing

ideologies that justify or challenge the status quo, taking to the streets in collective protest — and even by doing nothing.

This review focuses on recent empirical work at the intersection of social psychology, political science, and cognitive neuroscience — termed *political neuroscience* [1,2*,3] — aimed at elucidating the affective and cognitive underpinnings of political attitudes and behavior. Specifically, I discuss the emerging political neuroscience research examining the neurobiological bases of system justification [4] — that is, a desire to regard the existing social system as legitimate and desirable — and related political behavior. I argue that neuroscientific approaches can enrich our understanding of political processes by connecting social behavioral outcomes to their constituent neurobiological processes. Neuroscientific evidence suggests that system justification and political behavior are forged in and reinforced by interindividual differences in basic affective processes. In other words, our inclinations to protect or protest the status quo are related to fundamental elements of our biology.

System justification theory

Scholars of psychology, sociology, and politics have long sought to understand how people become motivated to engage in the political behaviors that seek to maintain or change society [5,6], with theories abounding about the group-based frustrations and grievances that are necessary to spur demands for change [7–9]. More recently, political psychologists have identified interindividual differences in perceptions of the social system as a source of preferences to protect or protest the status quo. Specifically, system justification theory posits that people are motivated — to varying degrees — to maintain, bolster, and defend the social, economic, and political arrangements in which they live [4,10,11,12*]. This motivation is understood to vary as a function of interindividual differences in disposition, although it may also shift as a function of situational changes.

Research on system justification theory suggests that greater preferences to maintain the status quo are typically associated with outcomes that reinforce existing inequalities, such as greater endorsement of stereotypes [13–15], holding conservative ideological orientations [16–18], and accepting and promoting existing inequalities as justifiable

and even necessary [14,19].¹ Moreover, greater system justification is associated with a lower likelihood of engaging in collective action or political protest to reduce societal inequality [22*,23]. System justification motivation itself is posited to arise from interindividual differences in psychological orientations toward threat, uncertainty, and social relationships. That is, evidence suggests that heightened existential needs to achieve security and avoid threats, epistemic needs to attain certainty and closure, and relational needs to share reality with others and maintain conformity are related to system-justifying attitudes and behaviors [24,25]. Such work indicates that system-justifying preferences may provide a psychological link between interindividual differences in basic human needs to manage uncertainty and threat with more complex political attitudes.

The neuroanatomical basis of system justification

As investigations of the individual differences associated with political preferences have evolved, researchers have increasingly turned to measures of psychophysiology and neurobiology to understand the basic processes that support our social and political behaviors [2*,26,27*,28–34]. A neuroscience-based approach to examining system justification motivation contributes to our current understanding of the processes that underlie how and why people justify existing social arrangements across multiple, mutually informative levels of analysis.

Studies of brain structure may provide a particularly useful index of relatively stable interindividual differences in psychology or social preferences, especially because neural structure does not fluctuate moment to moment in the way that neural function does. Specifically, studies of neural structure measure grey matter volume, which comprises cortical thickness and surface area, and is generally understood as the computational capacity of a particular brain region [35].

Although studies of neuroanatomical structure are relatively uncommon in the literature on social and political behavior, two seminal studies suggested a potential link between the amygdala and system justification. The amygdala is a small, almond-shaped structure located bilaterally in the temporal lobe of the brain, and it has

been related to processing existential needs, such as fear or threat [36,37], epistemic needs, such as orienting attention to events that are uncertain or unpredictable [38,39], and relational needs, such as orienting attention to important social group members [40]. Overall, the amygdala can be understood as providing an alert system for acquiring motivationally relevant information in one's social or physical environment [41]—whether it is of an existential, epistemic, or relational nature.

First, in an examination of the brain's role in how humans come to understand hierarchy, Kumaran, Melo, and Duzel [42] had participants learn the members of a novel social hierarchy comprising seven people with differing levels of power in a fictitious company. They found that better performance on identifying the rank of each individual in the hierarchy (in paired comparisons with other members of the hierarchy) was associated with larger grey matter volume in the bilateral amygdalae. Amygdala volume was not associated, on the other hand, with learning a non-social hierarchy (i.e. galaxies with differing levels of a precious mineral). That is, those who had larger amygdalae were more proficient at learning the structure of a novel hierarchy, but only in social contexts. This suggests that the amygdala provides an important neural basis for navigating hierarchical social systems in humans, which is consistent with the role of the amygdala in macaques [43,44].

Second, the notion that the amygdala may be a critical structure for considering social contexts was further suggested by Kanai, Feilden, Firth, and Rees [45], who reported a positive correlation between right amygdala volume and political conservatism. Together, these findings suggested that amygdala structure may be related to understanding hierarchical social systems and the formation of ideological orientations toward them.

To better understand why such a relationship might exist between amygdala volume and social hierarchy knowledge as well as ideology, Nam *et al.* [46*] explored the possibility that these relationships could be explained—at least in part—by individual variability in system justification, given that both the amygdala and system justification motivation are linked to existential, epistemic, and relational needs. Participants underwent a neuroanatomical scan and indicated their system justifying preferences [14].² In analyses

¹ System justification and political conservatism are terms that are often used interchangeably given that most of the research on system justification is done in Western democracies (primarily the United States and Canada). However, although correlated [e.g. Refs. 20,21], these constructs are conceptually distinct in this review. I discuss system justification as the *psychological* motivation and orientation toward society that can manifest as endorsement of an *ideological* orientation and policy preferences. Typically, this means that system justification and conservatism are positively correlated, insofar as the status quo is characterized by longstanding structural inequality [see Ref. 17]. Theoretically, if the social system being considered were characterized by widespread equality, one could expect that system justification would be positively associated with an ideology that prioritizes societal equality (e.g. liberalism).

² System justification was measured by Nam *et al.* [46*] with the general system justification scale [14], which assesses perceptions of society and includes items like “In general, you find society to be fair,” and “Everyone has a fair shot at wealth and happiness.” Although system justification is understood to be a goal-directed, motivated process to justify the status quo [47,48], the general system justification scale may be considered more precisely as a measure of system confidence—that is, simply the view that the status quo is good [see Ref. 49 for a review]. Future work may examine whether amygdala volume is associated with greater preferences to actively justify the system, such as by exhibiting heightened responsivity to system dependence, system threat, or system inescapability [47,50].

adjusting for age, sex, and whole brain volume, we found that system justification was positively associated with bilateral amygdala volume in a sample of 48 participants ($r = .29$), which was confirmed in a replication study of another 45 participants ($r = .49$). Alternative explanations for the association, such as more specific ideological beliefs or ideological extremity, were examined in a range of models that included political ideology, economic system justification,³ and attitudinal extremity. However, these other ideological variables did not provide consistent results in accounting for variability in amygdala volume; rather, models that included system justification as the primary predictor of interest provided the most parsimonious accounting of the data.

To understand whether the neuroanatomical basis for system justification might also have implications for political behavior, Nam *et al.* [46•] followed up with participants from the original sample approximately three years later to ask whether they had participated in any political protests in the time since the initial brain scan. Larger amygdala volume was associated with a lower likelihood of participation in a collective protest. Despite the small sample size,⁴ this link between amygdala structure and protest participation is suggestive of the possibility that the amygdala plays a role in willingness to take political action to demand societal change.

Together, the neuroanatomical evidence suggests that system justification and political behavior are forged in and reinforced by basic affective processes as observable in the brain. That is, people's decisions to protect or to protest the status quo may be explained in part by their neural predispositions and attendant affective tendencies.

³ It was expected that economic system justification might also be associated with amygdala volume, following work like Hennes *et al.* [25], who operationalized system justification with a measure of economic system justification to examine the link between basic psychological needs and attitudes toward political movements focused on economic issues. Although in some regression models reported by Nam *et al.* [46•], economic system justification was positively associated with amygdala volume, such a pattern was not consistent across the models, especially compared with the association between general system justification and amygdala volume. Economic system justification is understood as a specific type of system justification involving perceptions of economic inequality and the capitalist status quo in particular [51], as opposed to society more broadly. It may be that a general orientation toward society is more clearly linked to amygdala volume rather than opinions about the economic status quo per se, but further research is needed to examine any potential differences in types of system justification as related to neuroanatomical structure.

⁴ Nam *et al.* [46•] obtained a retention rate of 42%, recruiting 20 participants from study 1. Because not all participants from study 1 participated in the follow-up questionnaire, those who had only participated at time 1 were compared with those who also participated at time 2 to assess whether the two subsamples differed on key characteristics. Importantly, the two subsamples did not differ in age, sex, or political orientation.

Caveats

Research on system justification and political behavior using neuroscience methods is in its early days and primarily suggestive of interesting avenues of further inquiry. Neuroscientific evidence, such as the correlations reported by Nam *et al.* [46•], should not be interpreted as deterministic or in a reductionist fashion. A link between amygdala structure and system justification is inconsistent with the interpretation that larger amygdala volume guarantees an individual to reject social change and to rationalize the status quo. Rather, the association provides evidence of a basic psychological mechanism that accounts for some of the variability in the complex decision-making processes involved in political behavior — indeed, much like other findings in political psychology.

Moreover, it is critical to keep in mind that the connections between brain and behavior are never one-to-one and therefore scholars must be open to different potential interpretations of neural evidence. For instance, although the amygdala is often assumed to be active primarily in response to negative stimuli [35–37], it can also register appetitive or positively valenced responses [52]. An alternative account of the affective basis of system justification was put forward by Tritt *et al.* [53], who used electroencephalography (EEG) to assess the relationship between system justification and electrical activity in the brain in response to both positive and negative feedback. In contrast to prior work suggesting that system-justifying, conservative ideology is characterized by a biological negativity bias [30], Tritt *et al.* [53] found that system justification preferences were associated with reward-related neural activity (i.e. feedback-related negativity, or FRN), positing that FRN may index activity in the amygdala (as well as the ventral striatum, caudate, medial prefrontal cortex, and orbitofrontal cortex) in response to rewards [54]. In other words, the primary interpretation of the amygdala-system justification association described by Nam *et al.* [46•] rests on an assumption of amygdala volume as neural capacity for sensitivity to threat and uncertainty (such as the uncertainty posed by the prospect of social change); however, the Tritt *et al.* [52] results raise the possibility that an association between the amygdala and system justification may also be driven by sensitivity to rewards. It is my speculation that an individual's perception of social change as rewarding versus threatening may play a moderating role in the relationship between the amygdala and system justification. Such findings highlight the importance of considering potential moderators and situational factors in interpreting brain-behavior correlations, and future work will help to disentangle alternative accounts.

Future avenues of research

Broadly, experimental and longitudinal — in addition to observational — neuroscientific approaches hold the potential to clarify aspects of system justification theory

and studies of political behavior that have thus far eluded scholars, including ‘chicken and egg’ questions regarding the directions of influence between brain and behavior [2*,55]. Neuroscience techniques can also illuminate the processes that are occurring in the brain — such as reward or threat — *while* people are engaging with system-justifying or system-challenging ideas. This potential necessitates the broadening of investigation from neural structure to integrate focus on neural function (the moment-to-moment brain processes that can be observed through fMRI or EEG). Such studies can help to illuminate other neural regions that could be involved in system justification, such as the prefrontal cortex, insula, and nucleus accumbens [see Refs. 46*,56].

For instance, according to system justification theory, people rationalize the status quo in part because doing so serves a palliative function — the idea is that the act of justifying the system buffers or alleviates negative emotion that can come from being confronted with societal ills [20,21]. However, it has thus far been difficult for political psychologists to be certain that engaging in system justifying behaviors are affectively palliating (or rewarding) because of the challenges in measuring behavior and affect contemporaneously.

Although existing work on such a palliative function has not yet directly addressed the issue of examining affect as it accompanies behavior, some promising advances have been made on this front. Tackling the question of whether muted affective responses to inequality are associated with system justification, Goudarzi *et al.* [57*] used psychophysiological techniques to demonstrate that those holding greater economic system justification preferences exhibited lower physiological arousal and lower negative affect in response to examples of extreme economic inequality. Specifically, high system justifiers had a lower skin conductance response (i.e. less sweating) and lower activation of the corrugator muscle (i.e. less furrowed brow) when they considered imagery depicting extreme poverty and extreme wealth. Such work suggests that blunted affective reactions to inequality have a physiological basis that are associated with individual differences in system justifying preferences. In addition, examination of basic cognitive function using fMRI has suggested that although people exhibit a strong bias toward maintaining the status quo, the subthalamic nucleus (part of the basal ganglia important for action selection [58]), is particularly active when they decide to reject the status quo [56], providing clues for the neural regions that may be active when people consider system justifying versus system challenging responses. Further investigations of neurobiological processes involved in active defending or challenging of the societal status quo hold great potential to clarify key aspects of system justification theory and expand our understanding of when and how people take political action.

Conflict of interest statement

Nothing declared.

Acknowledgements

I would like to thank Samuel Jens and Victoria Smith for research assistance, and Kristin Laurin for astute and helpful comments on the manuscript.

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