A Moralization Network Theory of Moralization

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Author note

All data in this proposal draft are either simulated or taken from the bfi data set in the *psych* r package. The data that will replace the current data will be archival data first collected and published in Wylie et al. (2022).

The authors made the following contributions. Matthew E. Vanaman: Conceptualization, Writing - Original Draft Preparation, Data Manipulation and Analysis, Writing - Review & Editing.

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Abstract

When something is morally wrong, it is in the *moral domain*, and when something becomes wrong, it is *moralized*. But how do we know when something is in the moral domain, and how can we tell whether something is becoming moralized? The empirical study of morality has historically approached these questions through two broad perspectives: cognitivism, which argues that people primarily or mostly use effortful thought to judge right from wrong, and emotivism, which sees these judgments as flowing from emotion. In reviewing these perspectives within the context of more recent that fails to fit neatly into either one, we increasingly find that the breadth and diversity of findings outpaces the explanatory power of these perspectives. How should we respond to the increasing complexity of morality? As it turns out, many fields both within and beyond psychology have developed tools and conceptual frameworks tailor-made for the study of complex phenomena. To show how these tools can be useful for theoretical development in the study of morality, I review the ever-growing application of network science and document their fruitful application within neighboring fields of psychology. Using an empirical example of cigarette smoking, I then use network analysis to model common indicators of moralization as a complex system of interacting lower-order parts. In so doing, I shed further explanatory light on the previously published finding that moralizing a behavior (smoking) predicts opposition to harm-reduction policies, or policies that reduce the behavior’s harmful consequences while allowing the behavior to continue (vaping). Using this ground-up exploratory analysis, I present novel hypotheses suggested by this view and its corresponding network model, and discuss how the subsequent directions of future inquiry could be productively guided by a view of morality as a complex system.

*Keywords:* moralization, moral judgment, moral psychology, network analysis, complexity science, public policy, public health

*Word count:* X

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The average American from 50 years ago would probably not have guessed that smoking would be considered an immoral thing to do. There was even a time when smoking was considered so classy that even a baby would be impressed (see Figure 1, Panel A). It would be a considerable understatement to say that Americans *today* are much less sanguine mixing smoking and child-rearing (see Figure 1, Panel B). As Rozin and Singh (1999) showed, smoking has become *moralized*: it is more than a personal preference or pragmatic public health issue. For many people, smoking has become rooted in their sense of moral right and wrong.



*Figure* *1.*  Representations of smoking in media, 1951 vs 2008. Panel A: *Marlboro 1951 Baby Advertisement* (1951); Panel B: *CONAC Chilean Corporation Against Cancer - "Brown"* (2008).

Moral values are often treated as objective facts, not matters of mere opinion (Scott & Skitka, 2020). For the average person, morality is unchanging - smoking is wrong, just like the sky is blue. Yet while people rarely change their mind about the color of the sky, history shows us that people - at least in the United States - *did* change their mind about smoking: According to Gallup, support for outright bans on smoking in hotels more than tripled from 1987 - 2007 (Pacheco, 2011), a span of only 20 years. Through this topical example, it is evident that the content of the *moral domain,* or that social category colloquially named “moral issues”, is more flexible than feelings of objectivity would suggest. Many, or perhaps *any* non-moral stimuli[^1] have the potential to enter the moral domain should just the right circumstances come about, a process commonly referred to as *moralization*. When things get moralized, there can be far-reaching consequences on society, and not all of them are always desirable from a normative point of view.

For smoking, moralization may actually interfere with preventing deaths. Smoking is linked to a variety of negative health outcomes, and while laws, taxation, and advertising campaigns have reduced the prevalence of smoking - between 1955 and 2005, rates of smoking dropped from about 58% of men and 38% of women to 22.3% and 17.4%, respectively (Warner, 2006) - there is a large segment of the population that persists in smoking. One potentially promising avenue for reaching smokers is to use a harm reduction strategy. In this strategy, we would encourage smokers to take up a similar, less harmful behavior that would allow the habit to continue while decreasing the probability of harm and death. For example, electronic cigarettes, or “vaping”, could be promoted as a substitute for traditional smoking or as an intermediate stage for quitting. One study found that if the rate of smoking cessation and vaping uptake between 2005 and 2014 were to continue until 2070, the general population would have 3.3 million extra years of life (Warner & Mendez, 2019) [[1]](#footnote-24). To the extent that someone moralizes smoking, they likewise oppose encouraging vaping as a harm reduction policy (Wylie et al., 2022). This phenomenon has been documented across at least a few other hot-button moral issues (MacCoun, 2013),

Whether it would make sense to promote a harm reduction strategy like vaping will very likely turn on how likely it is that receivers of the message would view smoking as a moral issue. But how we would recognize whether someone moralizes smoking in the first place? And what exactly drives the process of moralization, or likewise slows it down?

A good starting place might be to examine how moral psychology has tended to think about moralization and the moral domain. Historically, moral psychology has viewed morality through the theoretical lenses of *cognitivism* and *emotivism*. These perspectives offered powerful heuristics for thinking about and theorizing about people’s sense of moral right and wrong. More recently, *dual process theories* emerged, which loosely borrowed ideas from dual-process or System 1/System 2 theories of decision making (e.g., Kahneman, 2011) and applied them to moral decisions.

As we will see, morality has benefited from these heuristics, and we have learned a lot from their approaches. However, there is a general lack of work that focuses on moralization, or the process by which non-moral stimuli enter the moral domain. Furthermore, there is a growing list of findings within moral psychology that do not necessarily follow from the cognitive or emotivism perspectives, and are overlooked during debates about the relative contributions that cognition and emotion make to moral judgment.

Given the current state of the art, recent work has explicitly called for further theoretical and empirical development (Rhee, Schein, & Bastian, 2019). I propose that one way to answer this call would be to adopt a *complex systems* view of moralization, which has been fruitfully applied in numerous neighboring fields. This approach builds on previous theorizing by “zooming out” and examining morality from a different perspective, which may be crucial toward understanding how something like smoking goes from personal preference to moral issue.

But if we want to understand what moralization looks like from a complexity perspective, it is helpful to first understand how the empirical study of the moral sense arrived us here. As such, let us start by consulting the perspective that has been at it the longest: cognitivism. [^1]: Throughout this article, I use “stimuli” or “stimulus” generically to refer to anything that has the potential to elicit a moral judgment. This may include specific behaviors, political policies, or judgments of someone’s character, to name a few examples.

# Cognitivism: Morality Through Reason

How would we know if someone finds smoking immoral? Cognitivism would suggest we ask people what they think about it. This is because to cognitivism, morality is a conscious and deliberate act of thought. Indeed, the empirical study of moral judgment began with Piaget, whose was originally an intelligence researcher (Huitt & Hummel, 2003). Piaget started with the idea that social life requires cooperation, and that for cooperation to be successful, it logically requires rules based on justice, or the balancing of fairness and individual rights against the needs of the group (Piaget, 1932; Von Glasersfeld, 1991). Being the intelligent creatures that they are, people will use their capacity for rational, effortful thinking to recognize when cooperation is failing, and to come up with and enforce justice-based rules in response. Piaget called this ability *autonomous morality,* which he considered to be the last “stage” of moral development.

Piaget’s work was focused on how children create rules in the context of gameplay. Kohlberg’s theory of moral development (Kohlberg, 1976) expanded the scope of cognitivism to examine how children and adults make judgment about hypothetical real-world dilemmas, such as what a person might do if confronted with the choice between stealing from a doctor and saving one’s mother from a disease. Upon observing how people seemed to be thinking about these scenarios, Kohlberg’s account came to differ somewhat from Piaget’s: rather than use their intelligence to solve a practical social problem - cooperation - Kolhberg thought people’s intelligence naturally directs them toward recognizing justice as a moral principle in its own right[[2]](#footnote-25), irrespective of or *in spite* of any concerns about cooperation. One way of describing Kohlberg’s theory is that as a person develops the ability to think rationally, they tend to re-discover the rational philosophical moral truths as discovered and described by moral philosophers. Once a person has done this, she is considered morally mature.

Kohlberg and Piaget’s theories do not give us much to work with in terms of understanding why large numbers of people would suddenly moralize smoking. However, despite that they are no longer current, they were highly influential to *social domain theory*, which is the current state of the art within cognitivism. In social domain theory, the moral domain is defined as a set of concepts and patterns of thinking that people tend to have about justice, rights, and fairness (Smetana, 2013). More specifically, a stimulus is judged in moral terms if it satisfies the following criteria[[3]](#footnote-26) (Turiel, 1983):

1. Obligation: if given the opportunity to do or abide by a rule, one must always do so.
2. Universality: the rule applies to everyone equally, regardless of time and place.
3. Impartiality: the rule is immutable, fact-like, and derived from dispassionate rationality rather than opinion, sentiment, or emotion.
4. Authority-independence: the rule exists and must be followed regardless of social consensus, prevailing law, or the authority of other people.

Social domain theory argues that as a person becomes develops their cognitively and linguistically (Smetana & Braeges, 1990; Vera-Estay, Dooley, & Beauchamp, 2015), they become better be able to distinguish among three core types of social situations, or *social domains*: the moral domain, or concepts about justice; the *social domain*, or interchangeable rules that facilitate cooperation; and the *personal preference* domain, or rules and decisions that are left up to a person’s own tastes or interests. Social domain thus improves upon the cognitivism of Piaget and Kohlberg because it gives us a way to clearly delineate among moral- and non-moral domains. Indeed, smoking could be clearly described as having moved from the personal-preference domain (where the only stakes are what your baby thinks about your cigarette brand) into the moral domain, where the stakes are that one runs the risk of violating an objective and established rule of how to conduct oneself so as to not threaten the universal laws of justice.

While social domain theory reflects current thinking within cognitivism, the common thread across all three views is that morality is a matter of reason. But what of moralization, or moral change over time, such as what we see with smoking? While cognitivism has not tackled moralization directly, it has tried to explain the tangential phenomenon of moral disagreement. Two people may share the same concept of a justice, yet hold different *informational assumptions*, or reasoned beliefs about non-moral facts, that cause one person to apply justice to a stimulus while the other does not (Wainryb & Turiel, 1993). For example, Wainryb (1991) showed that parents tended to vary in whether they found spanking morally acceptable, yet all agreed spanking was immoral after being told that spanking does not help children learn. By this view, smoking would enter a person’s moral domain as soon as this person was educated on the harms of smoking and second-hand smoke.

# Emotivism: Morality from Emotion

In contrast to cognitivism, the view of emotivism is that if we want to know whether a person moralizes smoking, we should ask this person how they feel about it. This is because emotions, as emotivists argue, are the ultimate sources of our judgments of right and wrong. Sometimes emotivist scholars argue that moral judgments arise from something akin to implicit attitudes, or *intuitions*. In social psychology writ large, it has often been argued that people’s judgments are generally based on quick, sometimes-unconscious flashes of emotion or “gut feelings” (Kuhn, 1991; Kunda, 1990; Margolis, 1987; Perkins, Farady, & Bushey, 1991; Zajonc, 1980). The role of effortful, conscious reasoning is to provide a *post-hoc rationalization*, or a retroactive explanation for a judgment that has already been made (Nisbett & Wilson, 1977).

Seeking to apply these ideas to morality, Haidt (2001) proposed the *social intuitionist model* of moral judgmnet. This model argues that when a person encounters a stimulus with emotionally arousing content (e.g., a gross-smelling cigarette), this person will feel an intuition, or the experience that the stimulus as morally pleasing or offensive. This intuition, in turn, causes a conscious moral judgment (e.g., smoking is bad). Consistent with the idea of motivated reasoning, this person only uses reason after the judgment has been made, either to justify to oneself why the judgment was made or persuade others to share the intuition (e.g., by trying to convince others to be anti-smoking by appealing on-the-fly to the association between smoking and lung cancer). Although the social intuitionist model does allow for reasoning to influence one’s own judgment or intuition, this happens only rarely - people would predominately find smoking immoral because it arouses a strong emotion, not because it causes lung cancer, for instance.

The social intuitionist model was highly influential, generating much theorizing and inspiring many other models of moral judgment seeking to incorporate “intuitive” or emotional processes into our understanding of moral judgments. Almost always, these models argue for an important role for emotion, though they vary both in how central and distinct emotion is from reason.

With respect to how stimuli enter the moral domain, the purest form of emotivism argues that emotion alone is sufficient. Indeed, Haidt, Koller, and Dias (1993) and Rozin and Singh (1999) provided preliminary evidence that emotion, particularly disgust, may drive individual differences in what people find morally wrong, while longitudinal work suggests that smoking (Rozin, 1999) and meat-eating (Feinberg, Kovacheff, Teper, & Inbar, 2019) are at least in part driven by disgust.

Consistent with this idea, moral foundations theory argues that different emotions correspond to different kinds of moral concerns, which are taken as explanation for how those concerns became established. For example, *purity* values, or moral stances toward the body, sex, and food in general, are theorized to become moralized through disgust (Graham et al., 2013). Consistent with this idea, much work has shown that disgust correlates with purity judgments more strongly than with other moral concerns (e.g., F. M. A. Wagemans, Brandt, & Zeelenberg, 2018), though not exclusively so (e.g., Chapman & Anderson, 2014).

Beyond specific emotion correspondences, emotivism also spawned more general views relating emotion to morality: the *amplification hypothesis*, or the idea that emotion strengthens already-moralized judgments (e.g., increased condemnation), and the *moralization hypothesis*, or the idea that emotion causes neutral stimuli to be pulled into the moral domain. Some studies supported the amplification hypothesis by exposing participants to incidental disgust (e.g., foul odors), finding that participants exposed to disgusting stimuli gave stronger moral judgments than those who were not (A. Jones & Fitness, 2008; Schnall, 2011; Seidel & Prinz, 2013). Another study found some evidence that moralization may be driven by a combination of moral shock (e.g., emotion-provoking images) and attitude-relevant disgust (Wisneski & Skitka, 2017). Moreover, Tracy, Steckler, and Heltzel (2019) found some support for what one might call the *de*amplification hypothesis: participants who consumed ginger, which suppresses nausea (E. Ernst & Pittler, 2000; Lien et al., 2003), gave milder moral judgments on average than those in a control group. These studies provide some evidence that emotion might be pivotal for stimuli to take on moral relevance.

# The Cognition vs Emotion Debate In Moral Psychology

The emotivist perspective developed in response to the perception that cognitivism was out of touch with recent findings in social psychology, and that its view of morality as flowing from calm and collected deliberation failed to capture morality’s heated nature (Haidt, 2001). Anecdotally, the idea that people will drop closely-held moral convictions after having their factual flaws pointed out sounds ridiculous to anyone who has ever debated their relatives at holiday gatherings or attempted to rationally engage a stranger on the internet about a morally charged topic. In fact, expanded access to the internet seems to promote *mis*informational assumptions (Carpenter, Brady, Crockett, Weber, & Sinnott-Armstrong, 2021; Vosoughi, Roy, & Aral, 2018): people’s existing moral judgments do not tend to change, but are instead reinforced (Brady, McLoughlin, Doan, & Crockett, 2021) through moral emotions (Brady, Wills, Jost, Tucker, & Van Bavel, 2017; but see also Burton, Cruz, & Hahn, 2021).

It could be argued that people are rational when they want to be, and that what appears to be emotion-based motivated reasoning is in fact just cognitive laziness, over-reliance on heuristic thinking, and lack of attention in general rather than selective attention (Pennycook & Rand, 2019, 2021). However, this still cannot explain why people generally refuse to update their moral beliefs when they are directly presented new information (Royzman, Kim, & Leeman, 2015), choosing instead to avoid information that threatens to change their mind (Mata, Vaz, & Mendonça, 2022). People will sometimes continue to condemn a behavior even after admitting that the self-reported assumptions causing moral concern do not apply to the behavior at all (Haidt et al., 1993). It has even been found that people think it is immoral - in and of itself - to even use non-moral facts as input into one’s moral beliefs in the first place (Cusimano & Lombrozo, 2021; but see also Monroe & Malle, 2019).

Yet emotivism has experienced its own difficulties. For example, emotivism’s idea that emotion can moralize stimuli by itself is mixed and contradictory. Despite some promising work, evidence of emotion correspondences with particular moral judgments is on the whole weak (Cameron, Lindquist, & Gray, 2015) while some key findings have not replicated (Ghelfi et al., 2020). Furthermore, a few studies have failed to induce moralization of neutral stimuli using emotion; Wisneski and Skitka (2017) found that their moral shock effects did not affect neutral stimuli, while Jylkkä, Härkönen, and Hyönä (2021) was unable to find evidence that disgust led to harsher judgments when participants did not already moralize the stimulus.

While there is some work clearly pointing toward a role emotion in moralization (Feinberg et al., 2019; Horberg, Oveis, Keltner, & Cohen, 2009; Rozin, 1999), emotion *alone* may not be sufficient for moralizing neutral stimuli (Skitka, Wisneski, & Brandt, 2018), or even for amplifying judgments of already-moralized stimuli (Landy & Goodwin, 2015). The relationship between emotion and moralization thus remains inconclusive.

## Dual Process Model

Historically, the disagreement between cognitivism and emotivism has, at its essence, been about whether emotion comes before or after a moral judgment. The official stance of most cognitivism, at least within moral psychology historically, is that emotion is caused by having judged something immoral. Emotivists, meanwhile, have usually argued that emotion is upstream of judgment.

Paxton and Greene (2010)’s dual process model sought to carve out roles for both cognition and emotion.Loosely mirroring the System 1/System 2 model of decision-making (e.g., Kahneman, 2011), the dual process model argues that moral judgment indeed involves cognition, but also emotion, which interact to produce unique outcomes. When a person is weighing right from wrong, she will be influenced by emotion responses, such as aversion to harm, but also influenced by cognition, such as considering whether a moral rule is being applied consistently. Often, cognition will be overwhelmed by emotion, such as finding it too emotionally upsetting to kill one person even to save several others, while in some situations, cognition overrides emotion, such as suppressing one’s upset feelings and killing anyway based on the knowledge that several other people will be spared from death (Paxton, Ungar, & Greene, 2012).

# Evidence That Morality Is A Complex Phenomenon

## Cognition-Emotion Divide Is Overstated

While Paxton and Greene (2010)’s dual process model tried to bridge the divide between cognition and emotion, some have argued that the distinction between cognition and emotion required by the cognitivist, emotivist, and dual process heuristics is at least more complicated than it gets credit for (Evans & Stanovich, 2013; Stanovich, West, & Toplak, 2011). The idea that reason is slow and deliberate while emotion is fast and uncontrollable has been heavily criticized (Pennycook, Neys, Evans, Stanovich, & Thompson, 2018). For example, recent work has shown that emotion-based intuitions are sometimes felt with conscious awareness, and reason is sometimes conducted unintentionally (Melnikoff & Bargh, 2018). Even some activities that require effortful thinking (a feature of reason), such as reading and math, are sometimes done unconsciously [a feature of intuition; Sklar et al. (2012)].

We also now know that judgments of moral issues seem to recruit not just from emotion-based intuitions, but from several psychological and neurological mechanisms simultaneously (Van Bavel, FeldmanHall, & Mende-Siedlecki, 2015), each of which vary across time and context (Cunningham, Zelazo, Packer, & Van Bavel, 2007). This has led some theorists to reject a fine distinction between emotion or intuition and reason (Van Bavel, Jenny Xiao, & Cunningham, 2012), arguing instead that the reason-intuition distinction should be replaced with more complex models of mental processing (Melnikoff & Bargh, 2018).

As some others have argued, the distinction between cognition and emotion could be a valid one, but the distinction is at least more complicated than it gets credit for (Evans & Stanovich, 2013; Stanovich et al., 2011). Even in Paxton and Greene (2010)’s dual process model, real-world moral judgment involves distinct systems, but these systems interact. When a person is discerning right from wrong, she will be influenced by intuitive emotion responses, such as intuitive feeling that it is wrong to harm someone, but also influenced by reason, such as through working effortfully to apply a moral rule consistently. Often, reason will be overwhelmed by intuition [e.g., physically killing one person to save multiple others activates aversion to harm; Paxton and Greene (2010)]; in other situations, reason overrides intuitions [e.g., with time and effort, one realizes that allowing several people dying is more harmful than killing one person; Paxton et al. (2012)]. The idea that dual systems mutually interact is also evident in iterative processing models of moral judgment (Van Bavel et al., 2015, 2012). These models argue that fast, automatic, often emotion-based evaluations can influence and be *influenced by* slower, more deliberative acts of cognition (Cunningham et al., 2007).

While there are clear differences in their theorizing, these more recent complications of the dual process view are not wholly unlike how cognitivist theorists described the respective roles of cognition and emotion. As Turiel (2014) (p. 12) suggests, “a combination of emotional reactions to events (such as sympathy for the pain felt by [a] victim) and thought about what is occurring to the person who is victimized (including the formation of judgments that it is wrong…) produce moral judgments and evaluations about harm and welfare…Moreover, in this perspective, emotions are subject to reflection and critical evaluation. Emotional experiences can inform children’s development of thought and, reciprocally, thinking can inform the development and maintenance of emotions.” These ideas of dynamic and mutually-interacting cognitions and emotions point toward the very real possibility of feedback loops between cognition and emotion, but perhaps also within cognitive and emotional processes. Indeed, feedback loops in general may be important to moralization.

## Moralization Probably Involves Feedback Loops

A feedback loop is when one process, or part of a process, uses its own output as its input, either directly (i.e., a component causes itself) or indirectly by acting as input into another part of the system which, in turn, becomes input into the original system (i.e., component A causes component B, which in turn causes component A). Feedback loops are often self-sustaining and can exponentially escalate a system’s output.

While emotivist theories tend to adopt Zajonc (1980)’s view that emotion comes before cognition, contemporary clinical perspectives are more aligned with Lazarus (1982)’s view that emotion arises neither solely from stimuli nor solely from one’s environment, but from stimulus-environment interactions (Lazarus, 1991). This perspective, sometimes referred to as the *cognitive-appraisal* theory of emotion, is embedded into the theory behind cognitive behavioral therapy. As shown in Panel C in Figure 2, cognitive behavioral therapy holds the view that emotion causes behavior (and vice-versa), behavior causes thoughts (and vice-versa), and thoughts causes emotions (and vice-versa). Cognitive-behavioral therapy, and its perspective on emotion along with it, is one of the most powerful clinical interventions in patient outcomes (Barth et al., 2013; Beck, 2005; Cuijpers et al., 2020), so much so that it predominates first-line treatment in many countries (Hollon & Beck, 2013). Some argue that this is a good reason to take the cognitive-behavioral perspective, and its perspective on emotion along with it, as a strong theory (Fried, 2020). Given the success of appraisal theories of emotion in applied settings, it seems wise to consider how cognition and emotion might reinforce each other.

Moreover, since cognitivism and emotivism emphasize one-way causal relations between cognition or emotion and judgments toward stimuli, both seem to implicitly rule out feedback loops between stimuli and perception. Cognitivism generally (if implicitly) argues for a “top-down” relationship between the thinking mind and stimulus, where cognition alone determines how a stimulus is judged. Emotivism, on the other hand, sees the stimulus as the cause of emotion, which in turn determines cognition. Emotivism has, for this reason, been criticized for neglecting how the mind imposes patterns onto stimuli (Mikhail, 2007).

Although it is a truism that stimuli can and do cause emotion responses, recent work reveals how top-down processes can affect how people perceive a stimulus in the first place. The *moral pop-out effect*, for example, shows that morally-valenced stimuli can exceed the threshold of perception earlier than morally-neutral stimuli (Gantman & Van Bavel, 2014). In such cases, the stimulus is not the only input into judgment; perception seems attuned, in advance, toward guiding attention toward some stimuli over others (Gantman & Van Bavel, 2015, 2016). Although it has not been tested directly, at least to my knowledge, this evidence seems to suggest a stimulus-perception feedback loop. One could imagine that developing moral emotions toward a stimulus (Rozin, 1999) could in turn influence how much attention said stimulus receives from our perceptual system (Brady, Gantman, & Van Bavel, 2020). Indeed, at least some theorists argue that feedback loops are integral to moralization (Schein & Gray, 2016), though to my knowledge such accounts have yet to be tested empirically.

While the possibility or perhaps even inevitability that components of moralization can influence themselves through feedback loops, this possibility says nothing about what these components could be. One could imagine that moralization could be possible with one or a handful of components, but what do we actually know about its composition?

### Moralization Seems To Have Several Necessary-Yet-Insufficient Components.

Cognitivism and emotivism have identified several psychological constructs that correlate with moral judgment. Interestingly, many of these variables are only *sometimes* correlated with morality. That is, each of them show robust correlations with moral judgments in some studies, yet little to no correlation in others. We saw one example of this earlier in cognitivism’s idea of informational assumptions: there is evidence that they can matter, but other evidence suggests they might not. Moreover, while disgust has proven to be a robust correlate of moral judgments, the idea that disgust causes people to judge things as immoral is at odds with our everyday encounters of disgusting yet non-morally valenced stimuli. While there are certainly individual differences here, it is doubtful that people ordinarily find moral offense in vomit or moldy leftovers.

Another example can be seen in the theory of dyadic morality, which argues that concerns about harm, combined with emotion, are the necessary ingredients to moralization (Gray, Schein, & Cameron, 2017; Schein & Gray, 2016). While harm does show a strong, if the not the strongest, correlation with moral judgment (Gray, Schein, & Ward, 2014; Schein & Gray, 2015), at least some evidence suggests that moral concerns can persist in the absence of, or even subordination of, concerns about harm (MacCoun, 2013; Rottman, Kelemen, & Young, 2014; Wylie et al., 2022). Moreover, people sometimes do not condemn behaviors even when they acknowledge that a powerful agent is harming a vulnerable patient (Royzman & Borislow, 2022), or sometimes perceive *more* harm in certain morally obligatory (as opposed to condemnable) behaviors (Rai, Valdesolo, & Graham, 2017).

Moreover, as with psychology in general, much work within moral psychology is inconsistent or difficult to replicate (Cameron et al., 2015; Kupfer, Inbar, & Tybur, 2020; Landy & Goodwin, 2015; Parkinson & Byrne, 2017). Some have argued that this inconsistency, at least for replicability for psychology in general, is explained by the fact that psychological phenomena likely consist of many causal relationships, but which are weak or unresponsive to manipulation when considered and manipulated independently (Feldman-Barrett, 2021; Heino, Fried, & LeBel, 2017).

Given that so much of the evidence around moralization is correlational, and that experimental manipulations have been largely unsuccessful at meaningfully altering people’s moral attitudes, it seems reasonable to ask whether we are missing something important about how these constructs relate to people’s senses of right and wrong. One possibility is that the process of developing a sense of right and wrong has the characteristics of a complex phenomenon, and that extant work misses this complexity.

# The Complex Systems View of Psychological Phenomena

Why do people morally condemn smoking? Thus far, we have reviewed three common theoretical heuristics about moral judgment: cognitivism, emotivism, and dual process models. Interestingly though, there is another question that has been asked far less often: *by what process* does an issue become moralized (Rhee et al., 2019)? In the absence of a theory and in need of a conceptual framework, we might conclude from this review that the process of moralization is a complex phenomenon. How can we take the conclusion “moralization is complex” and turn that into a novel theoretical heuristic? Perhaps we might examine how other fields have conceptualized and studied psychological phenomena as complex systems.

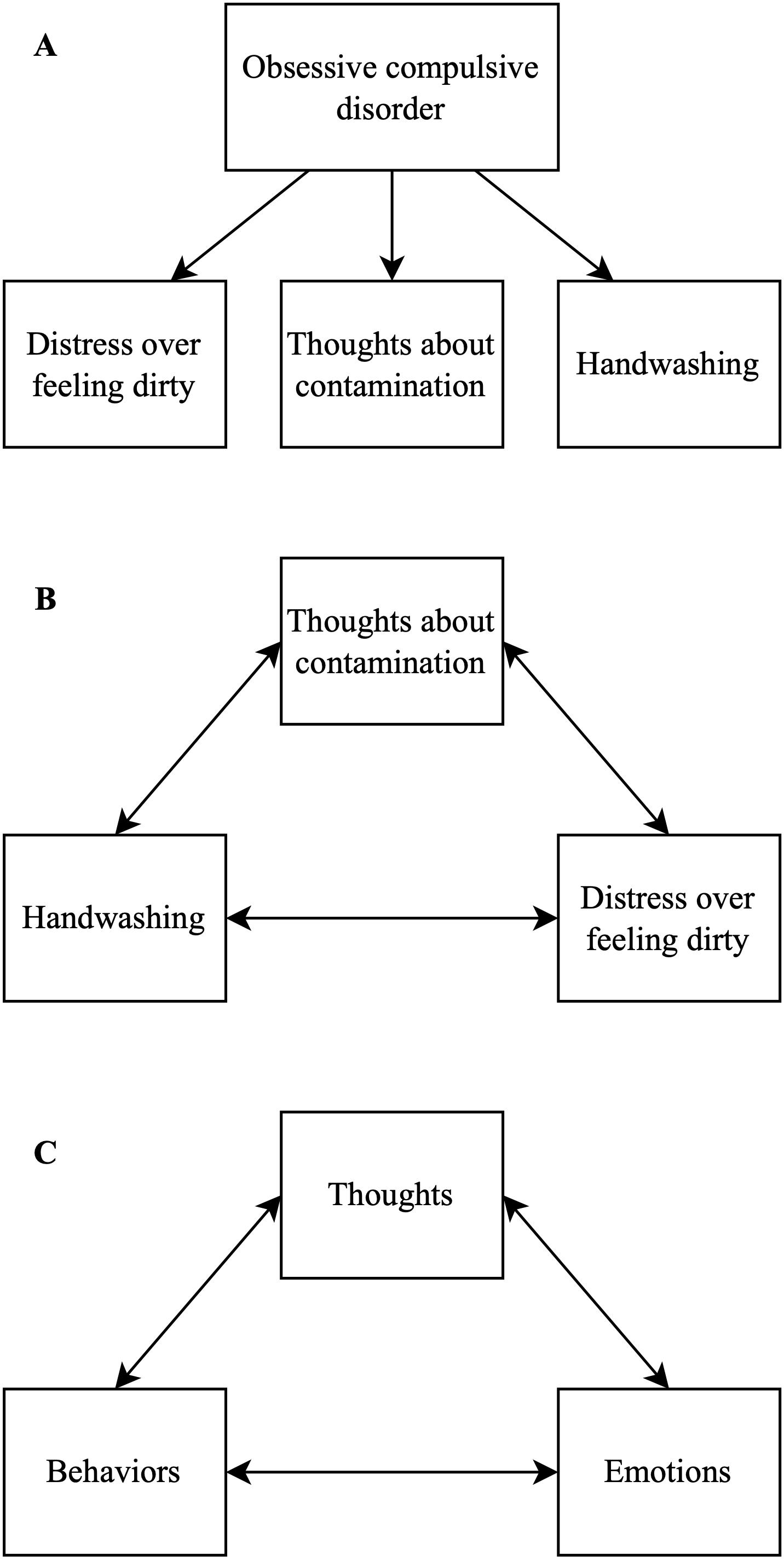
In recent years, some have argued that psychological constructs in general are more complicated than traditional mechanistic reasoning may imply (Borsboom, Cramer, & Kalis, 2019b). Following from this view, there has been a shift away from viewing psychological phenomena as reducible to a set of 1:1 mechanistic causal relations to a what we call here a *complex systems* approach. Rather than studying individual phenomena and using them as explanations of other phenomena, the complex systems approach considers the whole of the interactions of a set of psychological variables as the target phenomenon.

The idea of viewing psychological phenomena as complex systems is not new to psychology (Barabási, 2012). Over 100 years ago, Gestalt psychologists proposed that the *principle of totality* is crucial for understanding the mind, arguing that consciousness as a subjective experience is a system (or network, if you will) of interacting components of perception, best understood when considered globally rather than on the basis of each part separately (J. Wagemans et al., 2012). Consciousness, to Gestalt psychologists, is “greater than the sum of [its] parts” (Hsiao, 1934). Social network analysis, one of the earliest instances of complexity science, was actually developed by a scientist in the Gestalt tradition (Moreno & Jennings, 1938).

The principles of Gestalt psychology, at least with respect to the idea that *systems* should be the focus of study, has seen a resurgence in neighboring fields. But what does this look like in actual practice? Consider the case of psychopathology. Historically, psychological disorders as characterized in the *Diagnostic and Statistical Manual* (American Psychiatric Association, 2013), or DSM-V, have followed a medical model where a suite of symptoms are caused by a brain disorder (Insel & Cuthbert, 2015). To use an example (Panel A in Figure 2, reproduced from Box 3, left, in Borsboom et al., 2021), the symptoms of distress over feeling dirty, thoughts about contamination, and washing one’s hands are each caused by obsessive-compulsive disorder. In this view, symptoms tend to occur together because they share the common cause of the brain disorder, but typically this view would not consider whether symptoms cause *each other*.

In Panel B of Figure 2 (reproduced from Box 3, right, in Borsboom et al., 2021), we see the complex systems perspective. Here, the target of study is not the common cause of the symptoms, but rather in how the systems relate to each other. The causal relations among the symptoms comprise a complex causal network, the whole of which becomes “the disorder”, and the behavior which becomes the focus of study.

This complex systems perspective has been highly generative for the study of psychopathology, leading to insights that would not have otherwise been available. For example, we now know that remittance from depression is driven largely by resilience but not cognitive control (Hoorelbeke, Marchetti, De Schryver, & Koster, 2016); that its persistence is a function of the strength of the relationship between guilt and fatigue (C. van Borkulo et al., 2015); and that suicide attempts emerge mostly from internal entrapment and perceived burdensomeness (D. De Beurs et al., 2019). The network perspective has shown much utility across clinical psychology, yielding novel insights into obsessive-compulsive disorder (P. J. Jones, Mair, Riemann, Mugno, & McNally, 2018), panic disorder (Robinaugh et al., 2019), post-traumatic stress disorder (J. D. Russell, Neill, Carrión, & Weems, 2017), borderline personality disorder (Berdahl, 2010; Southward & Cheavens, 2018), psychosis (Isvoranu et al., 2017), comorbidity (Cramer, Waldorp, van der Maas, & Borsboom, 2010), and recidivism (van den Berg et al., 2020), among others Robinaugh, Hoekstra, Toner, & Borsboom (2020). From a theoretical perspective, the network view aligns our understanding of psychopathology with the well-supported cognitive-behavioral perspective (Panel B in Figure 2) which has long argued for what is essentially a systems-view of pathology.



*Figure* *2.*  Visualizion of the processes that follow from brain disorder, network, and cognitive-behavioral theories of psychopathology, reproduced from Reproduced from Box 3 in Borsboom, Deserno, et al. (2021) (A and B) and Figure 1 in Southam-Gerow, McLeod, Brown, Quinoy, and Avny (2011). Panel A shows the disease or “common cause” perspective on psychopathology, where Obsessive-Compulsive Disorder causes a set of symptoms. Panel B shows the network perspective, where symptoms share causal relationships among each other, and collectively constitute the disorder. Panel C shows Beck’s Triangle - the theoretical basis of cognitive behavioral therapy, where thoughts, emotions, and behaviors feed into each other in a viscious cycle.

Beyond clinical psychology, the network perspective has also seen productive application in areas more closely related to moral psychology. The *causal attitude network model* (Dalege et al., 2016), which draws from cognitive consistency theory (Gawronski, 2012; Gawronski & Strack, 2012), proposes that an attitude is not an underlying cause of various attitudinal-relevant judgments (e.g., that snakes are scary, dangerous, and to be avoided), but rather that these judgments share causal relationships among each other. If a person is prompted to judge a snake as dangerous, the psychological need for consistency will in turn cause the person to also judge the snake as scary (dangerous things are scary), in turn causing the judgment that snakes should be avoided (one should avoid dangerous and scary things). These judgments feed back into the first judgment: if a snake is both scary and to be avoided, there is yet even more cognitive incentive to judge it as dangerous too. This process continues until the causal relationships have become stabilized through self-reinforcement, at which point a stable system, or “strong attitude”, has formed. This self-reinforcing cycle account explains how attitudes become polarized (Dalege, Borsboom, van Harreveld, & van der Maas, 2018; van der Maas, Dalege, & Waldorp, 2020), why attitudes remain stable over time (Dalege et al., 2016), and how attitude strength connects political interest with voting choices (Dalege, Borsboom, van Harreveld, & van der Maas, 2019; Dalege, Borsboom, van Harreveld, Waldorp, & van der Maas, 2017).

Network models of emotion, to use another example, were introduced over 30 years ago (Singer & Salovey, 1988). Functionalist accounts of emotion, while not explicitly advocating for a network perspective *per se*, have argued that emotion recruits from many psychological (Lindquist & Barrett, 2012) and neurological (Van Bavel et al., 2015) components, which is consistent with a network perspective. Theories of basic emotions (e.g., Cosmides & Tooby, 1994) or “modular” theories, have also lately pointed toward a network perspective (Bertolero, Yeo, & D’Esposito, 2015; Kragel & LaBar, 2016; Saarimäki et al., 2018). Pessoa (2017), for example, proposed that the behavioral and psychological attributes of emotion arise from a network of neural pathways, the strength of which indicates the strength of emotion as experienced. The strength of an emotion can also be expressed as the strength of a network of higher-level behaviors and judgments (Bringmann et al., 2016). These ideas together are consistent with the finding that repeating behaviors and judgments reinforces neurological pathways (Fields, 2008; R, Rn, & Gr, 2012; Schlaug, Jäncke, Huang, Staiger, & Steinmetz, 1995). Indeed, there is an elegant theoretical symmetry to the idea that emotions can be constituted as networks of brain regions at one level of analysis (Pessoa, 2017), and as networks of behaviors and judgments at another (Bringmann et al., 2016), facilitating consilience across disciplines (Wilson, 1999).

Even beyond specific applications of psychology, it has been increasingly argued that the mind itself emerges from a complex network of interacting parts. Baars (2002), for example, argues that the mind is a network of smaller parts that each solve specific problems - memory, executive control, and auditory and visual perception - which when glued together with conscious experience can cumulatively solve problems that none of them could solve on their own. Tononi (2004) describes consciousness as a complex system in which there are a large number of lower-order, differentiated states which together form a unified conscious experience. In other words, information from individual states - sight, sound, and so on - pass information to each other, and the more information is passed among them, the more conscious an entity can be said to be. In this sense, we cannot quantify consciousness as an isolated cause-and-effect relationship. Rather, consciousness emerges from the behavior of constituent parts interacting with each other.

Suffice it to say that there has been tremendous progress in other fields resulting from reappraising their target phenomena as complex systems, or at least studying these phenomena at the systems-level (Barabási, 2012). Some have even called for using the complex systems approach to conceptualize and study psychological phenomena *in general* as complex systems (Schmittmann et al., 2013). While whether any old phenomenon should be conceptualized and studied at the system-level is beyond the scope of this discussion, at minimum we know that this perspective can be useful. Combined with the fact that moralization has been under-defined and under-studied, this complex systems view offers a promising opportunity for theoretical refinement and study of the phenomenon of moralization. How could we re-cast moralization as a complex system?

# Re-Casting Morality As A Complex System

Traditionally, moral psychology has sought to understand how one or a few factors influence people’s judgments of right and wrong. These relationships have been largely studied in isolation, leading to a variety of theories, models, and empirically observed relationships among a wide array psychological phenomena. Furthermore, the moral domain has traditionally be treated as a discrete category. By this view, we might say that the moral domain is one thing, and the process of moralization that pushes a stimulus into the moral domain is another thing.

To re-cast moralization as a complex system, we take these factors and their relationships and “zoom out” to examine their landscape as a larger system. Instead of studying any two or three factors in isolation, we study how the system as a whole behaves over time, and how this behavior can produce its own unique influences on the types of judgments and behaviors we typically consider as caused by a moralized state. This is similar - in fact, explicitly inspired by - how Borsboom (2017) conceptualizes psychological disorders, or how Dalege et al. (2016) conceptualizes attitudes. That is, moralization is a *network* of causally connected psychological phenomena that mutually influence each other over time.

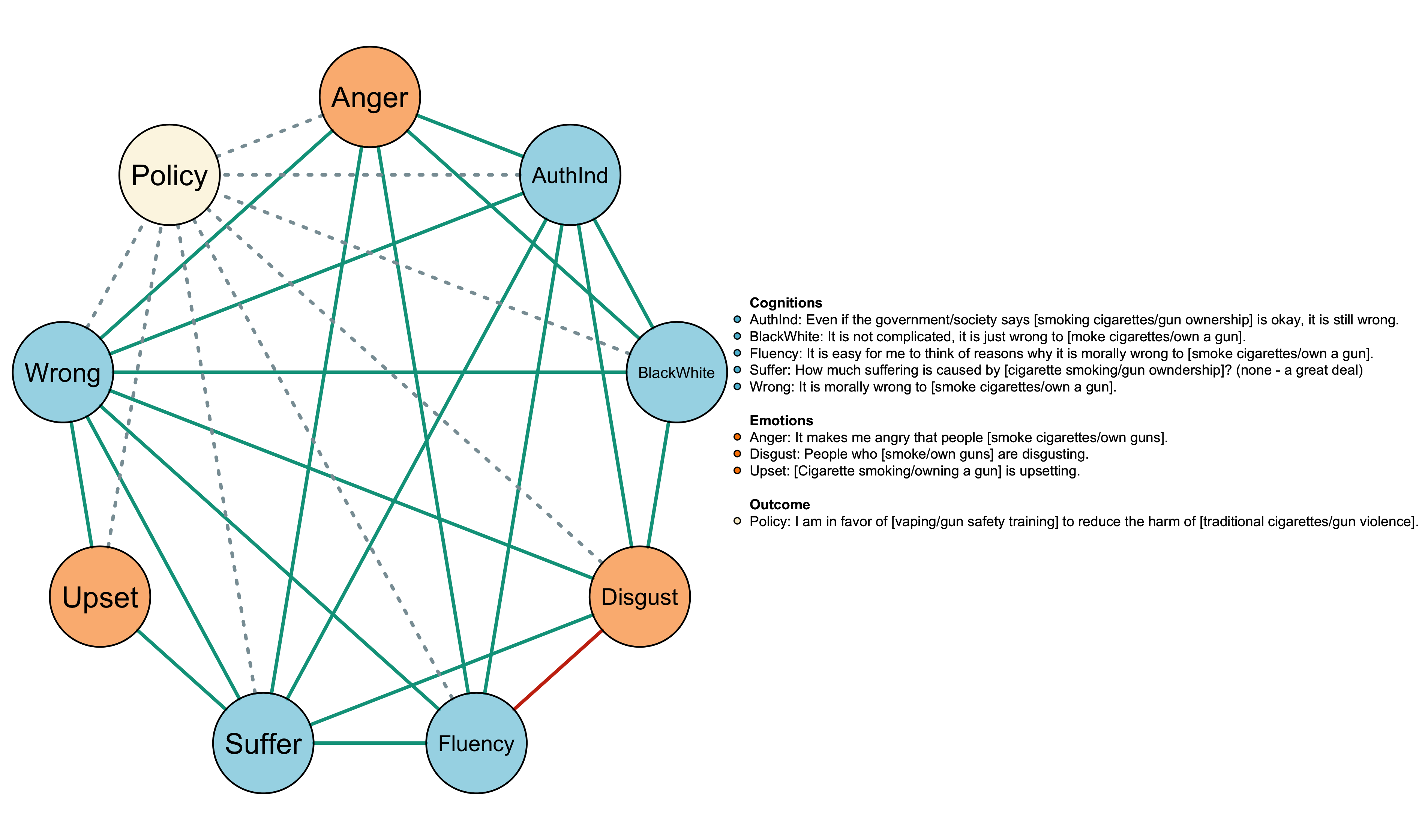
## What Are The Constituent Parts Of A Moralization Network?

To answer this question, let me first clarify that the view of moralization I take here is that moralization is a subjective state, which is to say it is a property of the mind. This assumes that as a person’s state becomes moralized, behaviors change as a result, and in turn these behaviors cause further changes in moralization in some way. Likewise, the pattern of many people sharing a common subjective moralized state can influence higher-level social, cultural, or economic phenomena, which can in turn have a downward influence of people’s subjective state of moralization, to the extent that downward influence exists independent of horizontal influences between individuals[[4]](#footnote-39).

Table 1: Theoretical perspectives and empirical studies suggesting associations between node pairs. Parentheses indicate whether a judgment is theorized as representing a cognition or emotion. Columns 3 and 4 list literature suggesting an association in the direction indicated by the column header. A superscript indicates a positive association, a negative association, indicates no association, and indicates that the study found a correlation but did not have a reason to posit a particular direction. Lastly, ?’s indicate that no literature was found indicating assocations between that node pair in that direction. As an example for reading the table, consider the first row: Landy and Piazza (2019) argued that negative emotions, like Anger, positively influence the cognitive judgment of Authority Independence.

| Judgment 1 (Type) | Judgment 2 (Type) |  |  |
| --- | --- | --- | --- |
| Anger (Emotion) | Authority Independence (Cognition) | Landy and Piazza (2019) | ? |
| Anger (Emotion) | Black-White Thinking (Cognition) | Gable, Poole, and Harmon-Jones (2015) | ? |
| Anger (Emotion) | Disgust (Emotion) | ? | ? |
| Anger (Emotion) | Fluency (Cognition) | Cheng, Lu, and Hao (2021) | ? |
| Anger (Emotion) | Suffering (Cognition) | Gutierrez and Giner-Sorolla (2007) | Chapman (2018); Hechler and Kessler (2018); Batson, Chao, and Givens (2009) |
| Anger (Emotion) | Wrongness (Cognition) | Graham et al. (2013) | Batson et al. (2007); Hechler and Kessler (2018) |
| Anger (Emotion) | Upset (Emotion) | Tetlock, Kristel, Elson, Green, and Lerner (2000) | ? |
| Authority Independence (Cognition) | Black-White Thinking (Cognition) | ? | ? |
| Authority Independence (Cognition) | Disgust (Emotion) | ? | Karinen and Chapman (2019) |
| Authority Independence (Cognition) | Fluency (Cognition) | ? | Vera-Estay et al. (2015) |
| Authority Independence (Cognition) | Suffering (Cognition) | ? | Turiel (1983); Smetana (2013) |
| Authority Independence (Cognition) | Wrongness (Cognition) | Turiel (1983) | ? |
| Authority Independence (Cognition) | Upset (Emotion) | ? | ? |
| Black-White Thinking (Cognition) | Disgust (Emotion) | ? | Sherman, Haidt, and Clore (2012); Chen, Pu, Feng, and Zhu (2016) |
| Black-White Thinking (Cognition) | Fluency (Cognition) | ? | ? |
| Black-White Thinking (Cognition) | Suffering (Cognition) | ? | ? |
| Black-White Thinking (Cognition) | Wrongness (Cognition) | Zarkadi and Schnall (2013) | Sherman and Clore (2009) |
| Black-White Thinking (Cognition) | Upset (Emotion) | ? | ? |
| Disgust (Emotion) | Fluency (Cognition) | Haidt (2001); S. P. Russell and Giner-Sorolla (2013); S. P. Russell and Giner-Sorolla (2011c) | ? |
| Disgust (Emotion) | Suffering (Cognition) | Schein, Ritter, and Gray (2016); Vanaman and Chapman (2020) | Tybur, Lieberman, and Griskevicius (2009); Chapman and Anderson (2014), Karinen and Chapman (2019) |
| Disgust (Emotion) | Wrongness (Cognition) | Rozin (1999); Feinberg et al. (2019) | Giner-Sorolla and Chapman (2017) |
| Disgust (Emotion) | Upset (Emotion) | ? | ? |
| Fluency (Cognition) | Suffering (Cognition) | Haidt (2001); Yilmaz and Saribay (2017); Wright and Baril (2011); Isler, Yilmaz, and Doğruyol (2021) | Gray et al. (2014) |
| Fluency (Cognition) | Wrongness (Cognition) | Laham, Alter, and Goodwin (2009); Nadarevic and Kroneisen (2020); Turiel (1983); Vera-Estay et al. (2015); Turiel (1983) | Haidt (2001) |
| Fluency (Cognition) | Upset (Emotion) | ? | ? |
| Suffering (Cognition) | Wrongness (Cognition) | Gray et al. (2014); Skitka et al. (2018) | Schein and Gray (2016) |
| Suffering (Cognition) | Upset (Emotion) | Miller, Hannikainen, and Cushman (2014) | ? |
| Upset (Emotion) | Wrongness (Cognition) | Miller et al. (2014) | ? |

As such, I start here by considering how moral psychologists have traditionally tried to measure a person’s sense of right and wrong i.e., what are the content-valid indicators of a moralized state? While there are many good candidates, Wylie et al. (2022) identified a strong set of content-valid items through an extensive literature review of the moral psychology literature. Wylie and colleagues were generous enough to share these items and data with me, the full list of which are visualized in Figure 3 (note that this is not the complete list of items - see “Method” for practical and theoretical rationales behind the exclusion of certain items).



*Figure* *3.*  Visualization of the documentated relationships among quintessentially moral judgments. Circles are nodes, which represent judgments of cigarettes. The legend shows the wording of each judgment, while the color indicates whether the judgment is theorized to belong to a cognition or emotion system, or “community”. In this graph, missing edges indicate gaps in the literature i.e., that relationships between those two nodes have not yet been investigated empirically.

## How Does A Moralization Network Behave?

While these items are content-valid indicators of a moralized state, how would they behave in the context of a moralization network?

To understand morality as a complex system, consider Huxley (1874)’s steam train. In order for a train to move, several mutually-reinforcing processes must work in unison: coal must be burning, pistons must be firing, and wheels must be on the tracks, to name a few. Despite being individually correlated with the movement of a train, none of coal, pistons, or wheels alone can cause a train to move. But when the coal burns, the pistons begin to fire; when the pistons fire, the wheels begin rotating; and soon this collective process instigates the emergent property of the train moving down the tracks. We even get a cool whistling sound - an epiphenomenon, or a by-product, of the collective activity of the train’s coal, pistons, and wheels.

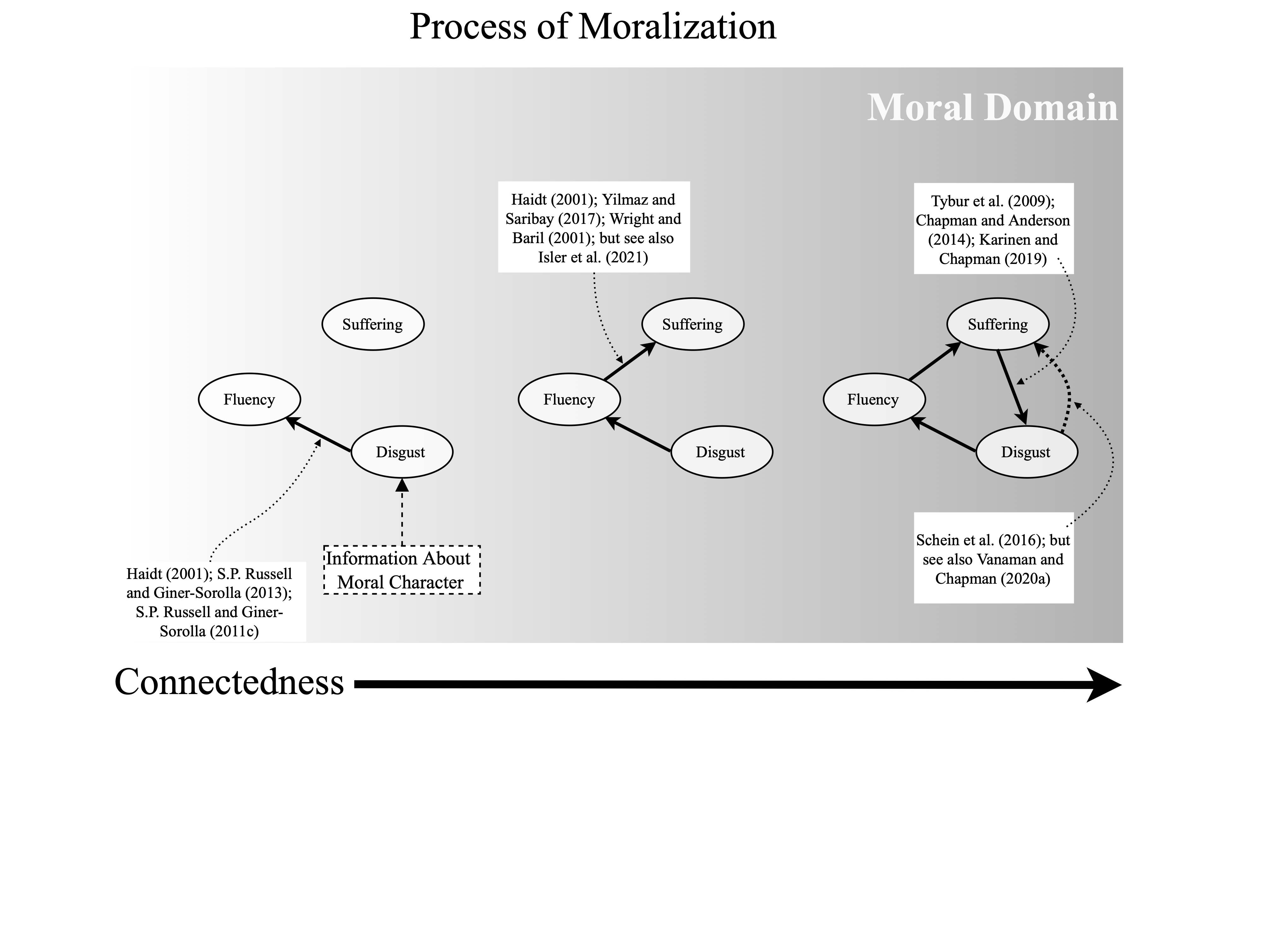
Translating this train analogy into morality: “to moralize” means to establish and strengthen the causal connections among a suite of morally-relevant psychological factors - “getting the engine running”, as we might say. The “moral domain”, then, refers to the continuum of possible states of connectedness, ranging from minimally to maximally connected. If moralization is the behavior of the engine, then the moral domain is the train tracks, and it is the process of moralization that moves the morality train down the tracks. Lastly, the subjective feeling-state of morality illustrated in folk expressions like “what an awful thing to do” or “that ain’t right” is epiphenomenal to the process of moralization. As the old adage goes, moralization “is not about the destination, it’s about the journey”.

Why would a system of moralization work this way? As I’ve reviewed, much work from the cognitivist, emotivist, and dual-systems perspectives has established numerous mechanisms between a wide array of theoretically-important factors. One benefit of the systems approach to morality is that it allows us to “connect” these disparate theories together by viewing them as the coal that keeps the engine running. But in order for this view to work, we should also have theoretical or empirical rationale for believing that there could be causal connections between the items. I therefore supplemented Wylie and Colleague’s review with a second literature review searching for evidence of potential causal connections among their items. Results are in Table 1 and visualized in Figure 3.

With the help of this literature review, let us consider the deliberately-simplified example of network-based causal unfolding of moralization as visualized in Figure 4. Here, we recast moralization and the moral domain two sides of the same coin, which is to say they operate much the same way as a steam train. We’ll replace coal, pistons, and wheels with *disgust toward people who smoke* (“disgust”), the *ease with which we can find reasons to condemn smoking* (“fluency”), and the *perception that someone is suffering as a result of smoking* (suffering). Say that Person A were to learn something about their friend - Person B, who happens to be a notorious chain-smoker - that causes A to see B as a morally bad person. According to Chapman (2018), this new information about B’s moral character will cause A to feel disgust toward B. Now that A’s “disgust toward people who smoke” (or least one toward person who smokes, anyway) has been dialed higher, prior work suggests that A will in turn become motivated to think up reasons for why smoking is wrong (fluency). This establishes a connection between disgust and fluency, increasing the *connectedness* of the system. Coal is burning, and the process of moralization has begun.

What happens next? Prior work further suggests that fluency tends elicit the perception that someone is suffering, regardless of whether suffering is objectively observable in the original stimulus (the *indelible victim effect*, DeScioli, Gilbert, & Kurzban, 2012). This establishes a new connection between fluency and suffering, further increasing the connectedness of the system, and making smoking a bit more moralized.

Yet *further* work has established that concerns about suffering tend to cause disgust, in turn establishing a third connection between suffering and disgust, which feeds back into fluency, then suffering, and so on. The morality train is whistling down the tracks, and Jane is starting to feel like smoking just rubs her the wrong way.



*Figure* *4.*  A moralization network. Figure 3 in Borsboom (2017) shows how this process has been applied to pathologization; moralization network theory argues merely that we can apply this same process to moralization.

# The Benefits of The Complexity Perspective

As I’ve proposed, it is possible to re-cast moralization from a complex systems points of view. However, to the average moral psychologist, this is likely a novel and unusual way of looking at things. While it does fill a gap in the sense that there are not many explicit theories of moralization currently being worked on, it is not unreasonable to ask: what benefit to we gain from reworking moralization in this way?

## Shifts Focus From Content to Process

One prevailing theme of the empirical study of morality is a focus on *content* over *process* when trying to understand moralization and the moral domain. This is to say that our heuristics of cognition, emotion, and their duality have attended mostly to what qualities moral stimuli have in common that non-moral stimuli do not have. This is on contrast to potential questions we could ask about the longitudinal unfolding of a moralized state.

Efforts to catalog moral content have been extremely useful and generative for understanding which issues are morally valenced for people. This has been useful in many ways, one way in particular being that behaviors and experiences that have previously been studied from the perspective of prejudice, tribalism, or anti-sociality have been expanded to include their possible moral (from the perspective of a given person) underpinnings as well (Graham, Haidt, & Nosek, 2009; see e.g., Haidt & Graham, 2007; Schein & Gray, 2015). This is true even of my own work, which suggests that opposition to freedom of bathroom choice for transgender people is, in addition to prejudice, probably a genuine moral concern for many people (Vanaman & Chapman, 2020). Findings like this are predicted from functional and evolutionary perspectives on morality (Graham et al., 2013; e.g., Tybur et al., 2009), which provide important explanations for what morality does once it is established.

With respect to moralization though, focusing on cataloging the content of the moral domain over how the moral domain is established could, from one perspective, unduly inflate the sheer number of moral content categories or functional principles to intractability. Numerous theories have offered candidate categories: dyadic morality proposes one category (Schein & Gray, 2015); Shweder, Much, Mahapatra, and Park (1997) three, and Asao and Buss (2016), another three; relational models theory proposes four (Rai & Fiske, 2011); the model of moral motives proposes six (Janoff-Bulman & Carnes, 2013); morality-as-cooperation proposes seven (Curry, Chesters, & Van Lissa, 2019); the theory of universal basic values proposes ten (Schwartz, 1994); and moral foundations theory proposes somewhere between five (Graham et al., 2011) and eleven (Graham, Meindl, Koleva, Iyer, & Johnson, 2015; Iyer, Koleva, Graham, Ditto, & Haidt, 2012; Meindl, Iyer, & Graham, 2019), to name some examples, each of which supported to greater or lesser degrees by extant empirical evidence. Each of these content categories are more or less distinct from each other, or so that is the claim of the theories. However, each of them assess largely the same pool of moral behaviors through a different theoretical lens. At this juncture, there seems to be between one to forty-five slices to the moral domain pie.

Why has the list of prototypical moral concerns grown so large, and seem to be growing larger? One explanation is that there are indeed numerous unique content categories of morality, and that each theory highlights an important aspect of morality. More boringly, some theories might just be plain wrong about morality. Perhaps the more interesting hypothesis is that there is no inherently non-moral content (Shweder, Mahapatra, & Miller, 1987). If this is true, then the content categories are no longer relevant to understanding the moral domain; rather, it could be more productive to study how the moral domain gets established in the mind through moralization.

These theories have at minimum offered sound organizing principles that may guide our understanding of how people orient their moral concerns, and help us draw the line for what has and has not yet been moralized by a person, group, or society. At the same time, given the prospect of moralization as a complex system, even the soundest of content- or principle-based theories will need a complex process-based account of moralization in order to fully understand how moral attitudes change over time. Adopting a complex systems approach therefore serves the additional and much-needed purposes of stopping the gaps left by the content-cataloging approaches about moral change.

## Provides Foundation for Theory Building

As we have seen already, moral psychology has established many theoretically-motivated connections between judgments. Studying relationships in isolation may be misleading. Those of us who study morality know that there is a massive “crud factor” (Orben & Lakens, 2020) where negatively-valenced judgments toward prototypically moral stimuli are highly correlated. While controlling for more variables and changing methods (e.g., from linear regression to LASSO) might help identify true relationships, the complex systems approach has methodological tools, such as exploratory network analysis, that designed to help build theory from the bottom up. Combined with the fact that psychological phenomena are probably massively moderated (McGuire, 1983), meaning that individual mechanisms are likely conditional on others, an exploratory approach may lead to insights about where true relationships are and why they are there, as well as directions that future directions could take in unpacking any relationships that are found. Using this exploratory approach, we can iterively update our theoretical understanding to provide a better match between theory and data. Indeed, tools and procedures for theory-building within a systems-based approached are being developed and implemented right now (Borsboom, van der Maas, Dalege, Kievit, & Haig, 2021; Robinaugh, Haslbeck, Ryan, & Fried, 2021). Adopting the complex-systems view eases access to these much-needed theory building tools.

Furthermore, while a reliable finding is interesting in isolation, it tends to stay isolated. But by zooming out and taking a systems approach, we can rethink these isolated theories as complementary. As suggested by the example in Figure 2, theories that connect any two phenomena can gain additional theoretical value over and above their intended purpose by being granted the role of supplying connections between judgments within a complex, causal system. While the finding that disgust can lead to fluency is interesting in itself, it would also be interesting to consider the consequence of that connection being formed. Does disgust-driven fluency actually initiate a causal feedback loop as visualized in Figure 2? If so, there could be implications beyond the effect of activating disgust - not only can we expect greater fluency, but we would also want to anticipate down-stream effects on suffering and, surprisingly, disgust itself. This allows for the perspective of e.g., Haidt (2001) to be accurate and interesting in itself, but also provides new predictions for how manipulating the factors within that perspective affects the behavior of the causal system. In summary, by seeing moralization as a process of building connections, we might say that the complex systems view allows us for form theoretical “connections” across previously-disparate theoretical perspectives.

# The Current Research: Answering Three Questions About The Morality-As-Network Perspective

Why did smoking enter the moral domain? The answer to this question depends on a theory of moralization. Recently, there have been a call to develop such a theory (Rhee et al., 2019) as well as calls to conceptualize psychological phenomena as complex systems (Barabási, 2012; Borsboom, Cramer, & Kalis, 2019a; Hipólito, Geert, & Pessoa, 2023; Schmittmann et al., 2013). This work began by reviewing how three theoretical heuristics - cognitivism, emotivism, and dual process models - which have dominated the study of moral judgment. It then reviewed evidence that moralization can be better characterized as a complex system than as a straightforward extension of the cognitive, emotive, and dual-process heuristics used by most moral psychology to date. Other sub-fields have already transitioned to the complex systems approach, and in doing so have provided a guide for how re-conceptualize moralization as a network of interacting lower-order psychological judgments.

I argued that there are at least two benefits to adopting the complex systems view. First, it complements the content-cataloging approach of moral judgment research by providing an new area of inquiry that could explain how moral content becomes moralized in the first place - the network itself - which brings with it novel ways of thinking about and testing hypotheses about moralization. Second, in studying the behavior of the network itself, this perspective argues that heretofore stand-alone mechanisms can work together to produce emergent outcomes over and above those between the two focal variables.

Now we turn to putting a complex systems approach into empirical practice. I will show, through the use of a single dataset, that complexity thinking provides a wealth of questions that we can ask about moralization of exploratory, confirmatory, and somewhere-in-between nature.

I focus here on the work by Wylie et al. (2022), who “compiled decades of scholarship on morality to create a novel meta-ethical moral opposition scale which captures the many facets of moral cognition and moral emotions (Goodwin & Darley, 2008; Rozin, 1999; Skitka, Bauman, & Sargis, 2005; Skitka & Mullen, 2002; Tetlock et al., 2000; Turiel, 1983)” (p. 15). The goal of their work was to test whether having a moralized stance toward a behavior, whichever behavior it may be, predicts opposition to behavior-relevant harm reduction policy. They’re work was largely successful: the more a someone moralized a behavior, the more they opposed a hypothetical policy that would allow a less-harmful version of that behavior to continue.

This work builds on the work of Wylie and colleagues’ by re-conceptualizing their moralization scale as a network of mutually-reinforcing judgments with the goal of answering novel questions about moralization as a process. Specifically, it assesses whether the process of moralization proposed by the network perspective is also domain-general, or whether this process is specific to a given target stimulus. Wylie and colleagues examined a wide range of behaviors: cigarette smoking, risky sex, gun ownership, and unemployment, which predicted opposition to vaping, PrEP (pre-exposure prophylaxis), gun safety training, and government benefits, respectively.

I focus here on smoking and gun ownership because of theoretically-important differences in their salient content. Unlike gun control, the prospect of inhaling smoke could arouse a unique kind of moral concern associated with keeping the body clean and pure, independent of physical harm (Graham & Haidt, 2012; Graham et al., 2018; Koleva, Graham, Iyer, Ditto, & Haidt, 2012; Meyer-Rochow, 2009). Gun ownership, on the other hand, does not involve ingestion or inhalation of any foreign substance. This qualitative difference between smoking and gun ownership mirrors longstanding theoretical debates in moral psychology about whether different in moral concerns reflect different processes of moralization or, more specifically, whether emotions such as disgust aroused by e.g., inhaling smoke can moralize a behavior independent of concerns about harm and suffering (Graham, 2015; Graham & Iyer, 2012; Gray, 2014; Gray, DiMaggio, Schein, & Kachanoff, 2022; Gray & Keeney, 2015; Gray, Young, & Waytz, 2012; Kollareth & Russell, 2022; Landy & Piazza, 2019; Rottman et al., 2014; S. P. Russell & Giner-Sorolla, 2011a; F. M. A. Wagemans, Brandt, & Zeelenberg, 2019; Young & Saxe, 2011). These same debates have been had with respect not just to individual behaviors, but to policy preferences as well (Graham et al., 2009; Schein & Gray, 2015; Vanaman & Chapman, 2020).

With respect to understanding whether moralization is domain-general or specific, there is theoretical reason to predict either case. The structure of a smoking-based moralization network may differ from a gun ownership-based network to the extent that salient features of smoking activate emotion moreso than in gun control, which lacks those features (Haidt et al., 1993; Molho, Tybur, Güler, Balliet, & Hofmann, 2017). On the otherhand, some views predict no difference in structure, either because harm - not disgust - is always the primary moralizer (Gray et al., 2014; Schein & Gray, 2016) or because disgust *always* contributes to moralization (Chapman & Anderson, 2014). A third perspective called the *affective harm account of moral judgment* proposes that disgust and harm always play some role but that disgust and harm “are neither competing nor independent but intertwined” (Gray, MacCormack, et al., 2022, p. 2). To this view, disgust and harm both always contribute, but their relative contributions are moderated by salient qualities of the stimulus. What it means to be “intertwined” can be understood a number of ways, and the network view can be used to test multiple hypotheses about intertwinedness.

In summary, this work asks three questions about moralization, which take on both exploratory and confirmatory forms.

**Question One: What Is The Structure Of Moralization?** The first step in describing a complex system is to examine its structure. By “structure”, I mean the pattern of connections among the constituent items within the network. As seen in Figure 3, the prior literature on moral judgment provides some expectation about what the structure of the network could look like, which in turn could provide insight into the possible causal associations among the items within the network. As such, an exploratory goal of the current work is to examine how well (or not) an empirically-observed network compares to what the extant literature suggests it should look like, and whether this structure is shared by both the smoking and gun network.

**Question Two: What Drives The Process of Moralization?** A second important step to understanding moralization is identifying its primary drivers - that is, which items in the network are most central to the process of moralization? This question is important because it suggests which items are most likely to initiate or disrupt the causal unfolding that moralizes or demoralizes a behavior. Therefore, an exploratory goal of this work is to identify the most central nodes of the smoking and gun networks. Moreover, given the hypothesis predicted by e.g., Graham et al. (2013) and Gray, MacCormack, et al. (2022) that emotion - particularly disgust - is more prominent for behaviors that entail bodily morality, a confirmatory goal of this study is to test whether disgust is more central to the smoking network than for the gun ownership network, and likewise that harm is more central to the gun ownership network than the smoking network. This hypothesis is further broken down into strong- and weak-form versions of the hypotheses. The strong-form hypothesis is that the disgust item will satisfy both of the following criteria: it will be a) more central to the smoking network than to the gun network, and b) more central compared to harm within the smoking network. The inverse will be true for the harm item: it will be a) more central to the gun network than to the smoking network, and b) more central compared to disgust within the gun ownership network.

**Question Three: What Drives Support for Harm Reduction Policy, And Through What (Potential) Causal Mechanism Does It Do So?** Wylie et al. (2022) found that moralization may drive opposition to harm reduction policy. This work extends that finding by examining whether viewing moralization as a network can reveal the mechanism by which it does so. As such, an exploratory goal of this research is to identify the which item has the most (in)direct influence on support for vaping (policy that reduces harm of smoking) and for gun safety training (policy that reduces harm from gun ownership). In addition, given the hypothesis predicted by e.g., Graham et al. (2013) and Gray, MacCormack, et al. (2022) that emotion - particularly disgust - is more prominent for policies that regulate bodily morality, this work will test two related hypothesis: a) for smoking, disgust will be more (negatively) related to support for harm-reduction policy than harm is related to (positive) support, while b) for gun ownership, harm will be more (positively) related to harm reduction support than the (negative) relationship of disgust.

## Method

### Choice of Modeling Framework.

When choosing a modelling framework, the first decision point is whether the study is exploratory or confirmatory. Would we want to test the viability of a specific set of connections, or let the model return a set of connections that it discovers for us? While the prior literature does a specific network structure, I opt here for the exploratory approach that will discover a set of connections. My rationale is three-fold.

First, there is the possibility that some connections previously documented in the literature are conditional on other effects, which are incorporated here using the network approach. As such, it is more informative to see how well a freely-estimated structure of connections reproduces what is already established in the literature, and likewise to see where it fails to reproduce the literature.

A second rationale is that there are also cases where the extant findings in the literature suggest competing directions. For example, Haidt (2001) suggests a positive association between Disgust and *Fluency* (disgust motivates use of post-hoc justifications) while e.g., S. P. Russell and Giner-Sorolla (2013) suggests a negative association (disgust decreases use of justifications).

The third rationale is more practical: the more complex a network is, the more difficult it is to interpret. Given that strong connections are more valuable in terms of understanding and intervention, I choose to instead focus on estimating a network that is biased toward sparseness, which is to say that the modelling framework returns a network with relatively fewer edges by prioritizing sensitivity (discovering true connections) over specificity (discovering true absences of connections).

Because I’ve opted for the exploratory approach, confirmatory models like structural equation modeling are ruled out. I instead opt here for *exploratory network analysis*, which is a popular and recommended choice for network discovery and bottom-up theory-building, particularly when modeling multivariate psychological data (Borsboom & Cramer, 2013; Borsboom, Deserno, et al., 2021; Costantini et al., 2015; Dalege, Borsboom, van Harreveld, & van der Maas, 2017; Derek De Beurs, 2017; Epskamp, Borsboom, & Fried, 2017; Epskamp & Fried, 2018; Marsman et al., 2018). It also has practical advantages over the alternative of exploratory directed acyclic graph estimation, namely that compared to acyclic graphs, network models allow for saturation (i.e., there are connections among all of the items in the network), does not have statistically equivalent models, and relaxes the assumption of acyclicity [i.e., no feedback loops among sets of items; Epskamp, Rhemtulla, and Borsboom (2017); Epskamp, Waldorp, Mõttus, and Borsboom (2018)].

More importantly, the language and metrics used to assess a network model and its structure map relatively more cleanly onto the theoretical description of moralization as a complex system and the questions that moralization reseachers want to ask about it. These terminology and metrics minimize the gap between theoretical questions about moralization and the interpretations that the statistics used to answer them.

### Brief Overview of Exploratory Network Modeling.

**Assessing Structure**. The first goal of the current work to answer the question, “what is the structure of moralization, and is that structure domain-general or domain-specific?”, and does so using archival data generously shared by Wylie et al. (2022). To assess whether the network model answers these questions, we will need to know that *nodes* represent the moralization items e.g., Anger or BlackWhite, or the circles in Figure 3). *Edges* refer to the connections between any pair of nodes e.g., the green line that runs from Anger to BlackWhite. Edges, however, are really just visualizations of *weights*, which are numeric, non-zero, and non-directional magnitudes of association between the nodes.

More specifically, weights are the partial correlation coefficient between the two nodes, e.g., the correlation between Anger and BlackWhite after controlling for all associations they share with any other node in the network. A green edge thus signifies a positive weight, meaning that as Anger increases, so too does BlackWhite, and vice versa. A red edge thus signifies a negative weight, while an absent edge indicates absence of association. Importantly, in cross-sectional networks, edge weights cannot tell us the direction of the relationship nor indicate the presence of bidirectionality or feedback loops. What they can tell us, however, is whether we should have confidence that a causal relationship between two nodes is possible.

**Assessing Drivers of Moralization**. When asking what the driver of a moralization network is, the real question is about which node has the highest centrality. Centrality quantifies how much change we would expect in the other nodes in the network if we dialed up (or down) a given focal node. Some nodes will be lower in centrality, meaning that dialing them up or down only mildly affects the values of the other nodes. A focal node with higher centrality will, when dialed up (or down), result in relatively more dramatic changes in the other nodes.

**Assessing Drivers of Support for Harm Reduction**. If we want to asses how much e.g., Disgust influences Policy, we would want to quantify how much this influence travels through the network from Disgust to Policy. This influence can travel from Disgust to Policy through however many combinations of edges and nodes are between them. However, for any pair of nodes, there is one path that is always the shortest, called the *shortest path*. The shortest path is a function of both the number of connections between two nodes and the magnitudes of those edges. The shortest path in the network from Disgust to Policy is therefore the path which minimizes the number of edges needed to get from Disgust to Policy, as well as the number of nodes between them, while maximizing the absolute value of the (inverse) weights of the edges between them. If Disgust were to share a direct connection to Policy with edge weight 1.20, the path length from Disgust to Policy would be . Now consider an indirect path from Disgust to BlackWhite to Policy, where the weight from Disgust to BlackWhite were -1.43 and the weight from BlackWhite to Policy were 2.22. The path length from Disgust to Policy through BlackWhite would therefore be . In this case, while Disgust can influence Policy directly, it has a stronger net influence through BlackWhite. As such, the network model will reveal which single node has the shortest path to Policy, as well as which of Disgust and Harm has a relatively shorter path to Policy.

**A minimum criterion for network interpretation**. Lastly, one important issue lies with the interpreting the network in light of the validity of the items. The *Wrong* node (“it is morally wrong to [smoke cigarettes/own a gun]”) could be argued to have such sheer face validity that it would seem odd to call it a “moralization network” if *Wrong* were to fail to connect to anything else in the network. As such, if the resulting network models reveal a network where *Wrong* does not share any edges to other nodes, I will not interpret the models as moralization networks.

### Node Selection.

I report how I determined the sample size, all data exclusions, all manipulations (if any), and all measures in the study (Simmons, Nelson, & Simonsohn, 2012). Because this work uses archival data generously shared by Wylie et al. (2022), there is the question of how to deal with the researcher degrees of freedom entailed by the process of selecting data and items from their data sets, of which there are several. While subjective decisions were made, all decisions, be they about exclusion, variable selection, scoring, model selection, sensitivity analyses, and any other areas affording researcher degrees of freedom, were made in advance based on theory and my own substantive judgment, and are explained through the methods section.

After making these decisions, the analytic strategy was tested and evaluated for its adequacy to the research questions using a separate archival data set: the bfi data set publicly available from *psych* R package. This data set was used to generate all tables, figures, and model statistics that will be examined in the final study. This methods section, as it is currently written, and all of the tables and figures presented within it were first run using the bfi data and then preregistered by publishing this document (written in R Markdown) along with all supporting code to a GitHub repository [link]. As with any GitHub repository, the date of publishing and any changes made to the repository are all time-stamped. I did not not fit any models to anything other than the bfi dataset prior to publishing the repository. The only difference between the preregistered models and models in this study are changes to the data set (from bfi to Wylie and colleagues’ data), increases to the number of bootstrap replicates (from 500 to 20,000 for all bootstrapping), and any additional exploratory analyses that were added *post-hoc*. All non-preregistered analyses will be clearly labeled as non-preregistered where they occur.

### Participants, Exclusions, and Missingness.

This study uses archival data from Study 3 (*n* = 335, after exclusions) and Study 4 (*n* = 388, after exclusions) of Wylie et al. (2022)[[5]](#footnote-55), leading to a combined sample size = 723. Exclusions were identical to Wylie et al. (2022), with a total of 22 participants excluded due to failed bot and attention checks. All data were cross-sectional, independent at the sample level i.e., no participant was in both Study 3 and Study 4, and dependent at the behavior level i.e., all participants provide responses for identical items with respect to smoking, support for vaping as harm reduction, guns, and support for gun safety training as harm reduction. Participant demographics are reported in Table 2, and are nationally representative (for the United States) in terms of age, gender, and ethnicity. Because the network comparison analysis (see below) requires equally-sized groups, missing data will be handled through listwise deletion at the level of participant will be conducted prior to calculating any statistics. If listwise missingness exceeds 20% of the sample, I will conduct additional robustness checks by re-fitting the models with missing data imputed using maximum likelihood estimation.

Table 2: Participant Characteristics.

|  |  |  |
| --- | --- | --- |
| Variable: | M (SD) | Histogram |
| Age | 29.65 (10.87) | ▇▆▃▂▂▁▁ |
|  |  |  |
| Gender Identity | N (%) |  |
| Female | 367 (68.3) |  |
| Male | 170 (31.7) |  |
|  |  |  |
| Racial or Ethnic Identity | N (%) |  |
| White | 263 (49.0) |  |
| Black or African-American | 106 (19.7) |  |
| Hispanic | 86 (16.0) |  |
| Asian | 54 (10.1) |  |
| Native American | 12 (2.2) |  |
| Specified Another Race or Ethnicity | 10 (1.9) |  |
| Pacific Islander | 6 (1.1) |  |
|  |  |  |
| Education | N (%) |  |
| High School/GED | 275 (51.2) |  |
| Some College | 87 (16.2) |  |
| 2-Year Degree (Associate's) | 84 (15.6) |  |
| Some High School | 50 (9.3) |  |
| Less than High School | 41 (7.6) |  |

### Measures.

Wording for all nodes i.e., moral and policy judgments are visualized in Figure 3 and were rated on 7-point Likert scales. For *Upset,* 1 = *not at all* to 7 = *highly*; for *Suffer*, 1 = *none* to 7 = *a great deal*; for all others, 1 = *strongly disagree* to 7 = *strongly agree*.

In Wylie et al. (2022), support for harm reduction policy was scored using six items derived from MacCoun and Paletz (2009), MacCoun (2009), and Skitka and Bauman (2008). To facilitate simplicity in interpretation and avoid invoking a latent variable by taking a composite score, I selected the most face-valid policy support item and excluded the others. The same was true for for harm perceptions - while there were items asking about perceptions of vulnerability, harmfulness, threat, and suffering, I chose the suffering item after judging it as having the best face validity given the theoretical importance of the perceived ability to suffer to moral judgment (Gray & Wegner, 2009).

I also excluded items assessing offensiveness and outrage because Anger and Disgust have been conceptualized in the research literature as different facets of of moral outrage (Tetlock, 2003) yet have been shown to demonstrate important psychological differences (e.g., Giner-Sorolla, Kupfer, & Sabo, 2018; Gutierrez & Giner-Sorolla, 2007; S. P. Russell & Giner-Sorolla, 2011b, 2011a, 2013). As such, it could be difficult to interpret the effects of offensiveness and outrage, given each could be seen as overlapping topologically with either disgust or anger, yet unclear which one because of the distinct characters of anger and disgust documented in the research literature.

Lastly, there is some variation among studies with respect to which items were included. For example, the item assessing how much time one spends thinking about the behavior is present in some of the studies that also assess harm, but not others. Likewise, unemployment was assessed but only for one study. To strike a balance between theoretical and statistical rigor, I opted to maximize sample size by combining all the studies that included the harm item - regardless of whether they included the “thinking about” item - so as to increase sensitivity (true positives) of connections among items and to minimize error around their estimation and estimation of centrality.

### Procedure.

Participants in Wylie et al. (2022) underwent the following procedure: after providing consent, participants imagined that they were policy makers in the United States evaluating society’s problems. Participants were given some relevant information about traditional cigarette smoking, after which they were presented information about a (fictional) harm-reduction policy that would promote vaping as an alternative to smoking. Participants rated the policy items, after which they made each of the nine moral judgments with respect to smoking traditional cigarettes, the latter of which were presented in random order. Demographics came last, followed by study debriefing. No deception was used, and all information regarding smoking and vaping was scientifically verified.

### Analyses.

All analyses were performed in R Statistical Software (R version 4.2.3 (2023-03-15), R Core Team, 2022). All data are available at [*link*], and all R code, including for this document, are available at [*link*]. I fit exploratory network models to smoking and gun ownership data using the graphical LASSO estimator (Friedman, Hastie, & Tibshirani, 2008) from the *bootnet* package (Epskamp, Borsboom, et al., 2017) i.e., bootnet::estimateNetwork() with function defaults. This estimation process automatically searches for the best-fitting undirected regularized Gaussian graphical network based on the Extended Bayesian Information Criterium,(also known as the EBICglasso estimator (Foygel & Drton, 2010). EBICglasso penalizes collinearity by removing connections whose weights are close to zero; this process is repeated for 100 different values of the lambda tuning parameter for the LASSO, meaning that the connections present (absent) are what they are because they minimized the EBIC criterion i.e., provided the best overall fit to the data. Estimation was conduction on the Spearman correlation matrices to head off potential issues with estimations, specifically zero-cell values in the polychoric correlation matrices. While polychoric correlations are a recommended strategy for dealing with violations of multivariate normality (Epskamp, S., 2016), Spearman correlations are very closely related though unlike polychoric correlations, they do not make any assumptions about the underlying distribution form of the construct under assessment.

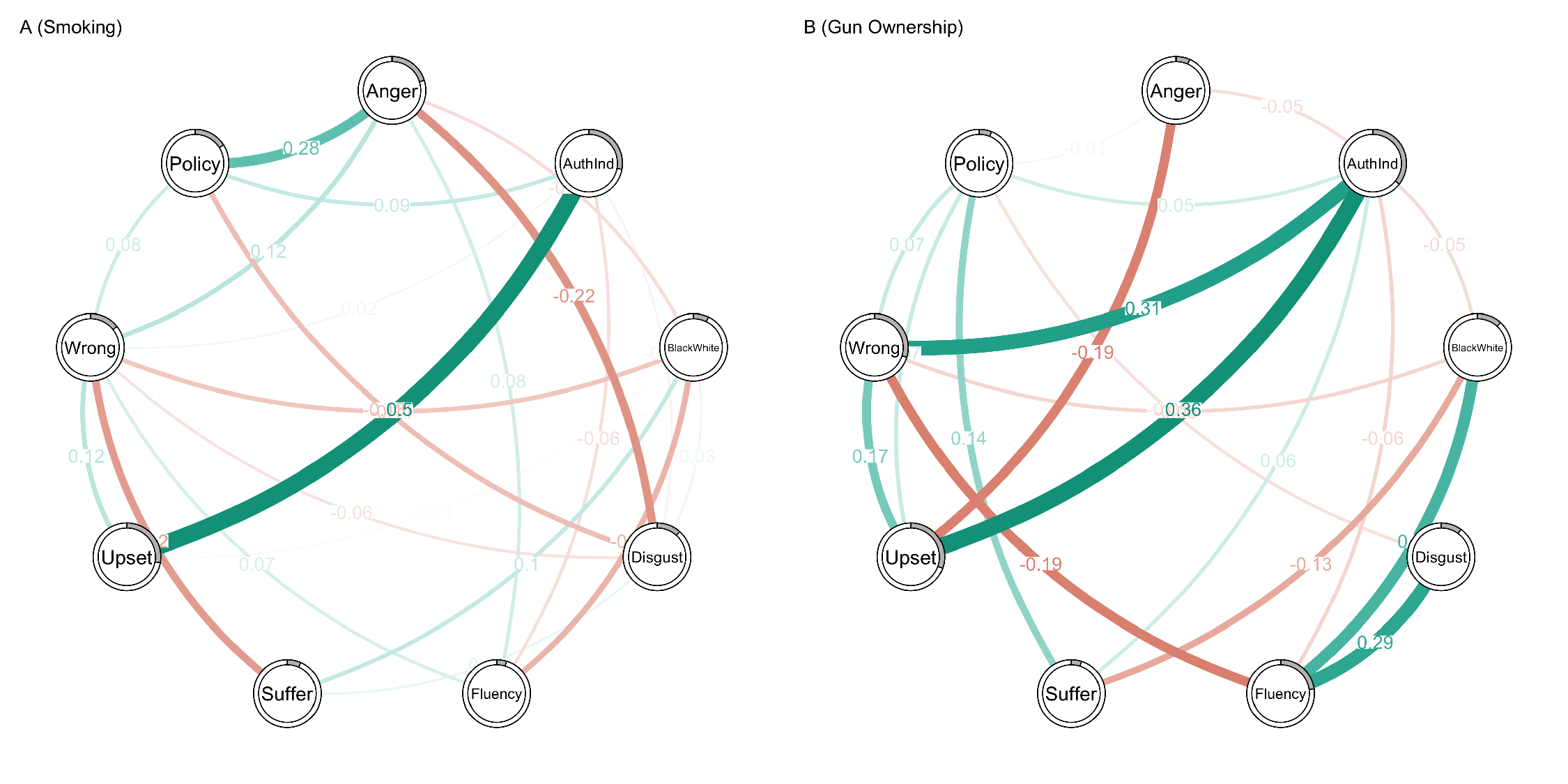
Table 3: Descriptive statistics for network nodes.

|  |  |  |
| --- | --- | --- |
| Variable | *M (SD)* | Histogram |
| *Smoking* |  |  |
| BlackWhite | 4.81 (1.16) | ▁▁▁▁▅▇▇ |
| Disgust | 4.77 (1.11) | ▁▁▂▁▆▇▇ |
| Suffer | 4.30 (1.24) | ▁▂▃▁▆▇▃ |
| AuthInd | 3.45 (1.48) | ▃▅▃▁▇▅▂ |
| Upset | 3.18 (1.53) | ▅▇▅▁▆▅▂ |
| Fluency | 2.93 (1.58) | ▇▇▅▁▅▅▂ |
| Policy | 2.76 (1.55) | ▇▇▅▁▅▂▂ |
| Anger | 2.52 (1.35) | ▇▇▅▁▃▂▁ |
| Wrong | 2.52 (1.32) | ▇▇▅▁▃▂▁ |
|  |  |  |
| *Guns* |  |  |
| AuthInd | 4.63 (1.15) | ▁▁▂▁▆▇▆ |
| Suffer | 4.63 (1.13) | ▁▁▁▁▅▇▃ |
| Upset | 4.58 (1.30) | ▁▂▁▁▅▇▆ |
| Wrong | 4.53 (1.37) | ▁▂▂▁▃▇▆ |
| Policy | 4.45 (1.17) | ▁▁▂▁▆▇▃ |
| BlackWhite | 3.28 (1.59) | ▅▇▃▁▇▅▃ |
| Fluency | 3.11 (1.46) | ▅▇▆▁▇▃▂ |
| Disgust | 3.00 (1.60) | ▇▇▅▁▆▅▂ |
| Anger | 2.34 (1.39) | ▇▇▃▁▃▂▁ |

## Results

All results are reported according to best practices for reporting on cross-sectional network analysis (Burger et al., 2022).

### Comparing Network Structure.



*Figure* *5.*  Visualization of the empirically observed moralization network. The circles around the node indicate the node-wise prediction for the given node, i.e., the more full the circle is, the more variance is explained in that node by all other nodes in the network. Edges between nodes represent the unique associations between any two nodes after conditioning on all other nodes in the network, with the numeric label and width indicating the weight, or the magnitude of the association between a given pair of nodes. In this graph, absent edges are those that were zeroed out by the LASSO regularization process. Note that the position of the nodes was set using the ‘circle’ setting; node positions should not be interpreted.

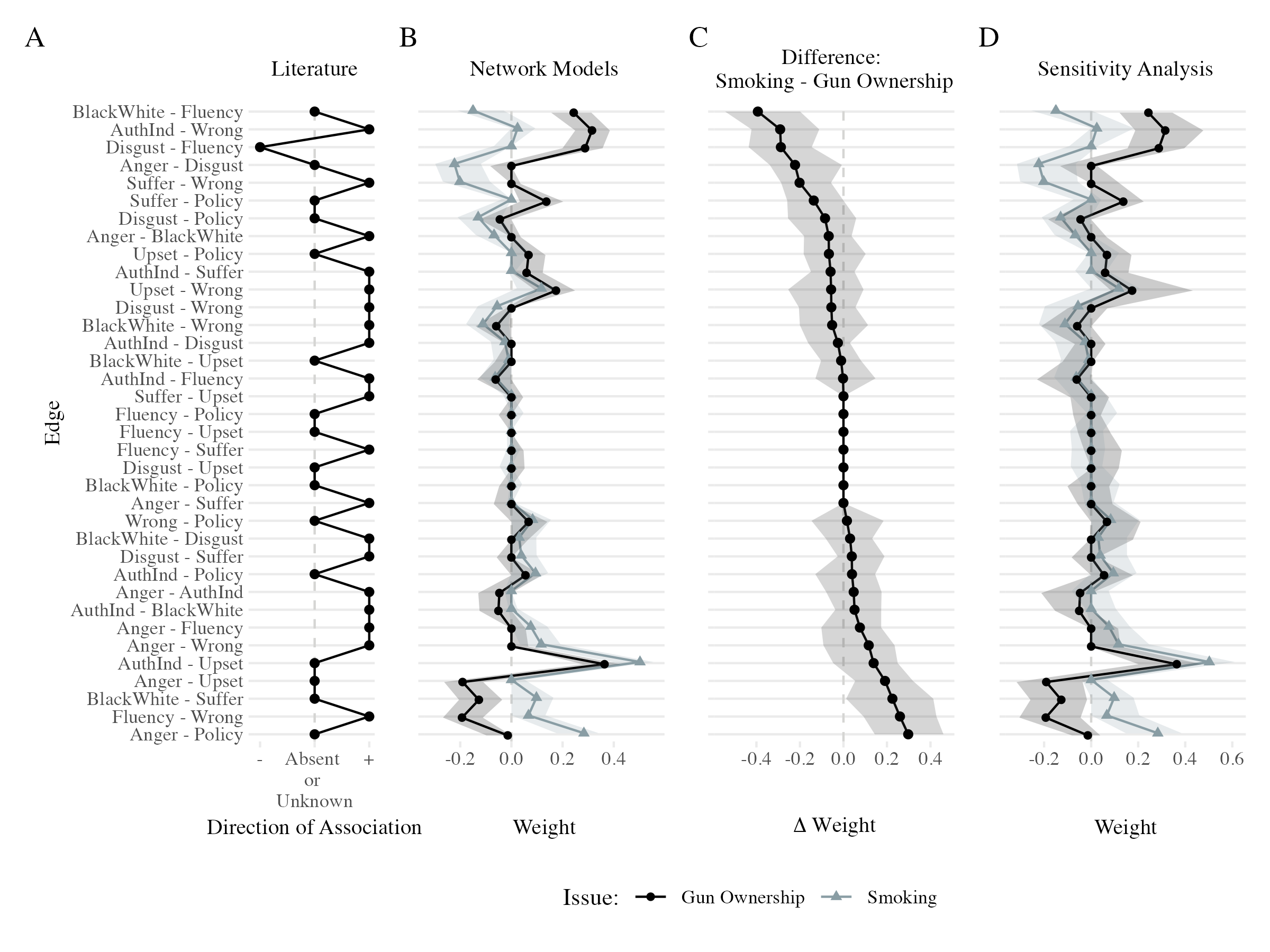
**Testing Differences in Global Network Structure**. Figure 5 shows the resulting networks visualized using the *qgraph* package (Epskamp, Cramer, Waldorp, Schmittmann, & Borsboom, 2012). Before carrying out comparisons on local properties of the networks (edge weights, expected influence, and shortest paths), I first conducted invariance tests on global characteristics of the networks using the *NetworkComparisonTest* package (C. D. van Borkulo, 2019), which uses permutation testing (Annis, 2005; M. D. Ernst, 2004; C. D. van Borkulo et al., 2022; C. van Borkulo et al., 2015). One limitation of this package is that the power for dependent data has not been well-studied. As such, I supplemented the results of these tests with 95% percentile confidence intervals calculated using bootstrapping (*N*\_{replicates} = 500), which provides a margin of error around the ’s. Bootstraps were clustered by participant to account for cross-network dependency (i.e., to account for the fact that each participant completed items for both smoking and gun ownership networks). Results are determined to be in agreement if both the -value is less than the cutoff and when the confidence interval does not include zero.

The first invariance test is the network invariance test, which checks whether the maximum edge difference between the two networks is statistically significantly different. This test serves the same function as an omnibus test in Analysis of Variance: there is no point in comparing any further differences in edges if the largest difference is not statistically significant. Results from this test revealed that the largest difference in edge weights between between smoking and gun networks (was statistically significant/not statistically significant), Largest Edge = 0.39, 95% Cluster-Bootstrapped CIs [], . Given that the confidence interval (does/does not) include zero, the results of the two tests (both agree/disagree as to whether) there is at least one significant difference in edge weights between the smoking and gun ownership networks.

The second invariance test is the global strength invariance test, which assesses whether the networks differ in their overall connectivity. From a theoretical standpoint, this test could indicate whether smoking or gun ownership is relatively more moralized in this population. Statistically, global strength refers to the weighted sum of all edges in a network, and global strength difference refers to the absolute value of the difference in weighted sums. Results from the global strength invariance tests revealed that the two networks (differed/did not differ) in global strength, Global Strength = 0.49, 95% Cluster-Bootstrapped CIs [], .

**Testing Differences in Individual Edges**. Individual edges between nodes for each network are visualized for each network in Figure 5. Panel A of Figure 6 shows the edges predicted by the moral psychology literature, while Panel B shows the edges of the smoking and gun ownership networks with their respective 95% confidence intervals calculated with ordinary non-parametric bootstrapping () conducted with the *bootnet* package (bootnet(..., signed = TRUE, weighted = TRUE) function, with otherwise default settings). Importantly, one should avoid interpreting these confidence intervals in terms of whether or not they include zero, as the LASSO procedure has already decided which edge weights are zero.

Panel C of Figure 6 shows differences in individual edge weights between the two networks. The confidence intervals around the differences were calculated using clustered bootstraps () and are adjusted for multiple testing using the Bonferroni procedure. Any differences in statistical significance between the results from the NetworkComparisonTest package and confidence intervals are noted here [list of differences, if any].



*Figure* *6.*  Visualizations of the edges as implied by the literature, and edges and edge weight accuracy for the smoking model, gun ownership model, and the difference between the smoking and gun ownership models. For the smoking and gun ownership models, shading indicates the 95% percentile confidence intervals. For the difference in edge weights between smoking and gun ownership, shading indicates 99.86% percentile confidence intervals.

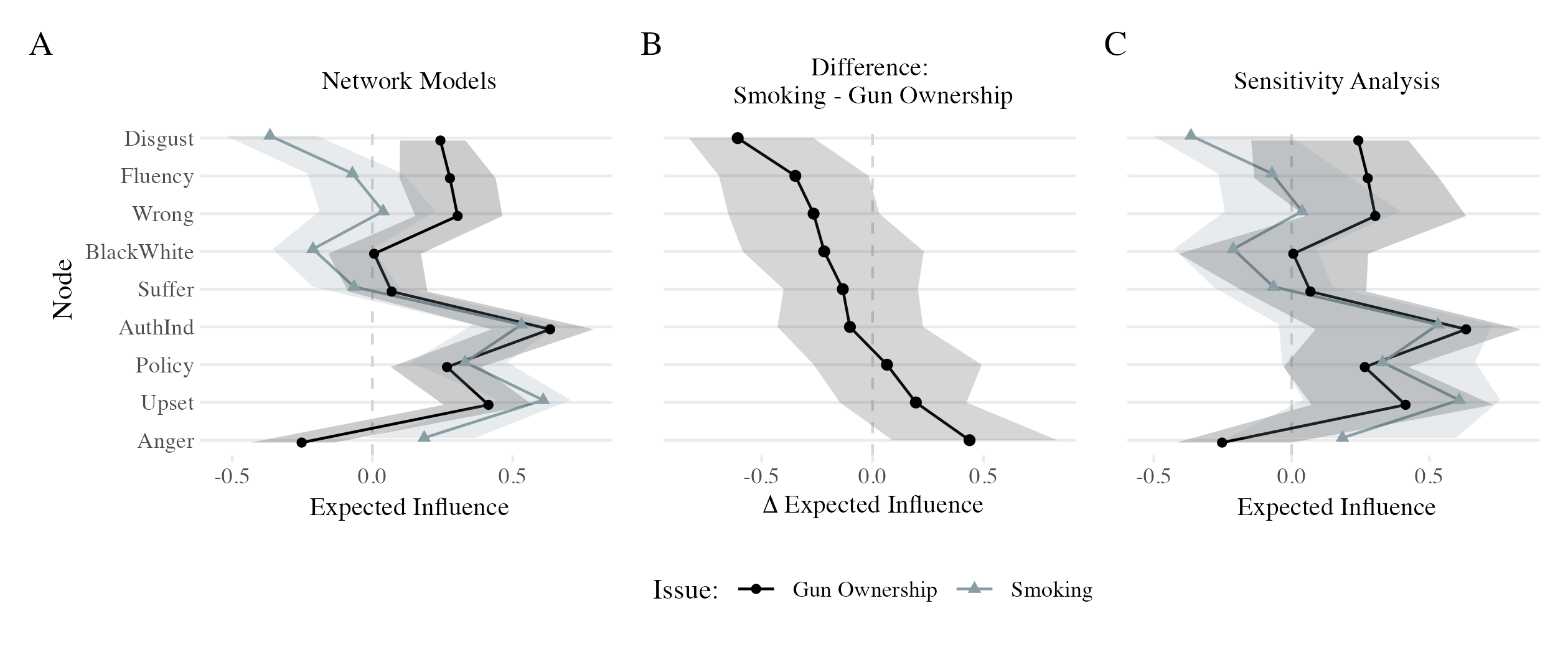
**Sensitivity Analysis**. Lastly, I carried out a sensitivity analysis to determine how robust these findings are to the choice of node selection. To my knowledge, there is no established procedure for checking sensitivity to node selection. I thus opted to use two-stage cluster bootstrapping (; see Appendix for rationale for this number of replicates) where stage one is the random selection of 8 out of the 9 total nodes without replacement, and stage two is the selection of *N* participants with replacement where *N* is the length of the original sample. My rationale for this choice is that any edge weight is subject to two sources of sampling variability: the sample of nodes from a larger population of possible nodes and the sample of participants from a larger population of participants. As such, confidence interval around an edge from this analysis should quantify the variability in sampling from joint distribution of randomly sampled combinations of nodes and participants.

The results of the sensitivity analysis about edge weights are visualized in Panel D of Figure 6. Because each confidence interval is being compared to zero, I adjusted the confidence level of the intervals using the Bonferroni procedure i.e., dividing the alpha that defines the lower and upper bound by the number of comparisons. An edge is said to be robust to node selection when the confidence interval a) includes the edge weight estimate from the original model and b) does not include zero. [note any edges lost to sensitivity]

### Comparing Node Centrality.

**Within-Network Node Centrality**. Panel A of Figure 7 shows the expected influence of each node in the smoking and gun ownership networks along with 95% percentile confidence intervals (). [describe pattern of expected influence for smoking, then network]. Panel C shows the results of a sensitivity analysis conducted by calculating the Bonferroni-corrected (dividing the alpha that defines the lower and upper bound by the number of comparisons) percentile confidence intervals using two-stage cluster bootstrapping (; see Appendix for rationale for this number of replicates) with nodes randomly sampled without replacement. [note any differences between original and sensitivity analyses]

**Between-Difference Node Centrality**. Differences in expected influence between smoking and gun ownership networks are shown in Panel B of Figure 7. Inferences about differences were assessed using the NetworkComparisonTest package as well as with bonferroni-adjusted intervals calculated using clustered bootstrapping (). [Note any differences between what NCT and bootstrapping suggest about differences in expected influence here].

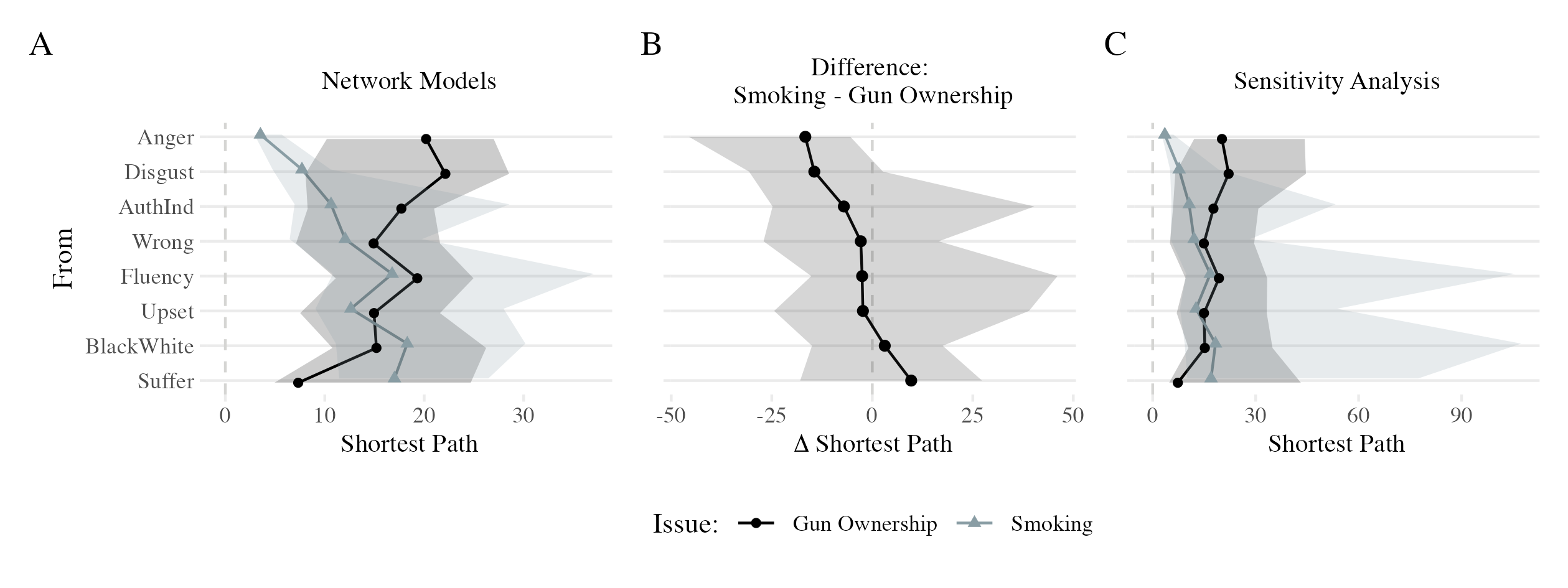


*Figure* *7.*  Visualizations of expected influence per node. Panel A shows the expected influence of smoking and gun ownership networks with shading indicating the 95% confidence intervals. Panel B shows the differences in expected influence with shading indicating the cluster-bootstrapped 99.44% confidence intervals. Panel C shows the results of the sensitivity analysis i.e., shading in this case represents the 99.44% confidence intervals calculated from the two-stage cluster-bootstrap procedure.

### Comparing Shortest Paths To Policy.

**Identifying Shortest Paths to Policy Within Each Network**. Panel A of Figure 8 shows the shortest path to the Policy node within the smoking and gun ownership networks along with 95% percentile confidence intervals () [note pattern]. Panel C shows the results of a sensitivity analysis conducted by calculating the Bonferroni-corrected (dividing the alpha that defines the lower and upper bound by the number of comparisons) percentile confidence intervals using two-stage cluster bootstrapping (; see Appendix for rationale for this number of replicates) with nodes randomly sampled without replacement. [note any differences between original and sensitivity analyses]

**Identifying Differences in Shortest Paths to Policy Between Networks**. Inferences about differences between smoking and gun ownership networks were made using a combination of the NetworkComparisonTest package and 95% Bonferroni-correct percentile intervals calculated using clustered bootstrapping (). [note any differences]



*Figure* *8.*  Panel A shows the shortest path from a given node, indicated by the y-axis, to the Policy node, for smoking and gun ownership networks. Shading indicates cluster-bootstrapped 95% percentile confidence intervals. Panel B shows node-wise differences in the shortest path to Policy between smoking and gun ownership networks, with shading indicating the 99.38% Bonferroni-corrected percentile confidence intervals caluclated using clustered bootstrapping. Panel C shows the results of the sensitivity analysis i.e., shading in this case represents the 99.38% confidence intervals calculated from the two-stage cluster-bootstrap procedure.

# Discussion

## Limitations

If moralization indeed arises from a latent variable, then measures of centrality can be distorted (Fried & Cramer, 2017). Also, the same issues with variable selection in regression, where including or excluding some variables can moderate the parameters of variables already in the model (Simpson, 1951), apply to network analysis as well. This means that e.g., centrality estimates and other local network properties may change if other nodes are included or excluded from the network (Bringmann et al., 2019; Fried et al., 2018). It is possible, or maybe even likely, that theoretically relevant nodes have been excluded from this particular network (see Future Directions). As such, it is important to interpret these results with caution. Moreover, the problems of using cross-sectional data to make causal claims apply to network analysis just as much to any other analysis. As such, it is important to see these results as possibilities rather than sure-fire claims of causal relationships. And while feedback loops and bi-directional relationships among nodes seem plausible and even likely, estimates of such effects cannot be derived from cross-sectional data.

Lastly, an important claim of MNT is that moralization occurs over time, such that the more tightly connected the overall network is for a person, the more that person could be said to have moralized the given stimulus. However, it is difficult to learn much about within-person processes using cross-sectional data which, by nature, can only estimate between-person structures (Borsboom, Mellenbergh, & van Heerden, 2003; Brandt & Morgan, 2022). It should also be made extremely clear that applying a network analysis to psychological data *imposes* the assumption of a complex system. Results of a network analysis should only be interpreted in line with the goal of this article, which is to demonstrate the potential utility of MNT at generating novel ways of thinking about moralization as a process.

## Future Directions

One avenue, of course, will be to test MNT’s claim that moralization is best characterized as a complex system. In addition to this, it will also be of theoretical interest to see which external influences are effective at activating or deactivating specific nodes (or groups of nodes), and under what condition these (de)activations initiate the kinds of ripples of causality proposed by MNT. There are a litany of potential external influences, one potentially important one being changes in cultural norms. For example, being exposed to the new norm that a gross food is now delicious, at least by consensus, may decrease disgust at people who eat gross foods. This in turn may cause the person to view the food less abstractly (Chowdhry, Winterich, Mittal, & Morales, 2015). This shift away from abstract thinking in turn causes a milder judgment of wrongness (Eyal, Liberman, & Trope, 2008). This process seems plausible, given that Americans initially found sushi disgusting before it became mainstream in the United States (Ruby & Rozin, 2019). It therefore stands to reason that future research could harness MNT to better understand cultural differences in moralization by examining cultural differences in network structure and node centrality.

Furthermore, once we begin to ask how each constituent part of a moralization ought to relate to the other in theory, we may find that we have excluded important nodes from our network. For the sake of theoretical simplicity, I have thus far limited the candidates of the network to cognition and emotion. Emotion, though, could be further divided up into emotions beyond anger, disgust, and degrees of upset (Ekman, 1992; but see also J. A. Russell & Barrett, 1999). Cognition could be further divided into reasoning about rule-consistency (Paxton & Greene, 2010) or mental states (Cushman, 2015), to name a few. Social psychology, furthermore, highlights the importance of social roles (Willemsen, Newen, & Kaspar, 2018), status (Gilbert & McGuire, 1998), psychological distance (Eyal et al., 2008), and construal level (Napier & Luguri, 2013), among others, as potentially important components of morality. Thus, the task of figuring out what should go into a network will be a lengthy one, and the inclusion of of nodes should be theoretically justified where possible. Luckily, complexity science is quickly developing organized methods for iteraively defining and refining complex theories (Robinaugh et al., 2021), which may provide a unique advantage to theoretical development.

Lastly, previous work has proposed similar theories of attitudes (Dalege et al., 2016, 2018; Dalege & van der Maas, 2020). Moral psychologists have long debated whether morality is something special apart from strong attitudes (Skitka et al., 2005) or not (Knobe, 2018). This likely will turn on whether morality is experienced differently than strong adherence to a norm (Stich, 2018), a strong attitudes (Petty & Krosnick, 2014) or personal preferences (Theriault, Waytz, Heiphetz, & Young, 2017). One important future direction will thus be to determine whether a moralization network behaves differently from attitude networks in meaningful ways.

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# Appendix

## Spearman and Polychoric Correlations

## Elaboration on Sensitivity

The confidence interval around any one edge quantifies the effect of sampling variability from a population of networks where a) the two nodes are included, b) there is a non-zero edge between the two nodes, and c) the participants generating responses to the two nodes in these networks are sampled from the same larger of population of participants. Importantly, a node will on average be excluded in every 9th sample, and so too will any constituent edge weight that could have been produced. This means that the number of bootstrap replicates from a single procedure of *n* replicates will in actuality produce bootstraps per edge, where nodes. To achieve 500 bootstrap replicates around a given edge, the actual number of bootstraps needed is thus , or approximately 944 replicates.

1. Is vaping actually a safer alternative smoking? This is a controversial question, even among public health experts. Some data suggests that vaping is a “gateway drug” that leads to further uptake of traditional smoking (Chatterjee, Alzghoul, Innabi, & Meena, 2018). However, Warner and Mendez (2019) present much literature demonstrating the relative safety of vaping, and Levy et al. (2019) found in multiple, nationally representative data sets that there is an inverse relationship between rates of vaping and smoking uptake. Whether vaping as a general policy would be net benefit seems to be an open question at the time of this writing. [↑](#footnote-ref-24)
2. It should be noted that Kohlberg considered the concept of morality “a philosophical (ethical) rather than a behavioral concept” Kohlberg (1971), p. 152. In this sense, Kohlberg’s moral domain was neither empirical nor descriptive, but rather interpretavist and prescriptive. From Levine, Kohlberg, and Hewer (1985), p. 95, “Kohlberg’s theory and stage interpretations are not value-neutral; they are based upon certain normative-ethical criteria of adequacy which enable one to adopt a stance regarding the greater or lesser moral rationality of the reasoning being interpreted.” With respect to *moralization*, Kohlberg referred strictly to the person. In other words: stimuli do not take on moral relevance over time; that is determined philosophically, in advance of judgment. Rather, it is the *person* that moralizes i.e., what changes over time is a person’s ability to reach correct moral conclusions about inherently moral stimuli Kohlberg (1976). [↑](#footnote-ref-25)
3. It is unclear to this author whether the moral domain of social domain theory is taken as purely descriptive - the justice domain is simply an observation about how people naturally think - or whether as with Kohlberg it is taken as an *a priori* principle. For the purposes of this paper, I treat the theory in purely descriptive manner since I am interested in describing morality as it happens rather than doing moral philosophy or advocating for a specific moral position on philosophical grounds. [↑](#footnote-ref-26)
4. I should clarify that my conceptualization of moralization follows from my strong inclination toward what philosophers of social scientists call *methodological individualism*, which loosely speaking is the idea that the locus of scientific explanation of human behavior generally lies at the level of the person. Many of what appear to be higher-level laws governing the behavior of social groups, cultures, and markets - the focus of study for *methodological holists* - will ultimately be explainable in terms of individual-level variables. This is sort of like saying that the behavior of bird flocks does not have its own laws independent of the psychological laws that govern any single bird’s mind, though perhaps that is an opportunistically biased example on my part since, to my knowledge, there are many psychologists who are particularly opinionated about the behavior of bird flocks. To be sure, this a hotly contested issue in philosophy of social science, and incidentally is an enduring source of friendly debate and banter between this author and his philosophically-inclined friends. [↑](#footnote-ref-39)
5. I exclude data from Studies 1 and 2 because they do not include a measure of perceived suffering, which may be theoretically important to the network. Furthermore, between the time data was collected for Studies 2 and 3, a few deaths and injuries from vaping went viral in the news. Limiting the data to Studies 3 and 4 therefore rule out a possible moderating third variable of media exposure to vaping harm. [↑](#footnote-ref-55)