UNINTENDED CONSEQUENCES OF SECURITY MOTIVATION IN THE AGE OF THE INTERNET: IMPACTS ON GOVERNANCE AND DEMOCRACY

Erik Z. Woody, Department of Psychology, University of Waterloo, Waterloo, Ontario N2l 3G1, CANADA (ewoody@uwaterloo.ca)

and

Henry Szechtman, Department of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, Ontario, L8S 4K1, CANADA (szechtma@mcmaster.ca)

Running Title: Perversions of Security Motivation
Figures: 3; Abstract: 122 words

Correspondence:
Dr. Erik Woody
200 University Ave West
Dept Psychology Rm 3032
University of Waterloo
Waterloo, ON N2L 3G1
Canada
ewoody@uwaterloo.ca
Phone: +1 (519) 888-4567 x33140

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ABSTRACT

There has been a striking recent shift in how political discourse seems to work, with, for example, partial information of sometimes dubious accuracy or relevance propagating very rapidly and widely on electronic networks and overriding clearer, more complete, more accurate information. In explanation of such phenomena, we address ways in which highly interconnected electronic networks may create vulnerabilities that involve tapping into special, relatively hard-wired motivational systems in the brain, particularly the security motivation system (Szechtman & Woody, 2004). We also discuss a mode of communication, sometimes described as "mass hypnosis," in relation to a motivational system that manages the dominance hierarchy. Rather than just affecting people's higher cognitions, political messages also tap into these motivation systems, generating surprising avenues for misuse.

KEYWORDS

Security motivation system; potential danger; threat detection; evolutionary psychology; neuroscience; mass hypnosis; politics; elections; social media; television; modes of communication; Trump; Clinton; yedasentience; feeling of knowing; gut feelings; reasoning; basket of deplorables

INTRODUCTION

Recently, particularly in the Western world, there has been a very marked and puzzling change in how political discourse seems to work. Namely, types of messages that would previously have been regarded as politically ineffective or even counterproductive have come to have considerable impact and outweigh more conventional messages. In particular, partial information of sometimes dubious accuracy or relevance overrides, or even seems to drive out, clearer, more complete, more accurate information. In addition, the incomplete information of doubtful pertinence propagates very rapidly and widely, far out of proportion to its logical relevance.

One very striking example of this is the recent Brexit campaign and vote in Britain. The Remain supporters, who wanted to stay in the European Union (EU), included the leaders of the main political parties and virtually all experts in business, banking, and academia. They put forth a steady stream of rational arguments and economic forecasts strongly favoring staying versus leaving, and clearly believed that once voters carefully considered the arguments on both sides, they would obviously vote to remain in the EU. The Leave supporters pursued a very different strategy: they put forth much simpler, much briefer, more intuitive messages that elicited a vague sense of economic insecurity and general unease about the flow of immigrants and refugees into the country. These Leave messages propagated virally on the social media, leading to a torrent of Brexit posts on a daily basis from both friends and strangers, which completely swamped the more elaborate, nuanced arguments of the other side. A researcher studying the impact of social media on the outcome of the EU referendum commented:

> *The overwhelming Leave sentiment across all social networking platforms was consistent and undeniable, yet many Remain supporters chose to ignore the voice of the Internet as something that has no connection with the real political world. They believed that Britain would never vote to leave the EU and discounted social media as a playground for trolls and teenagers. (Polonski, 2016)*

Another striking example of such a phenomenon is the success of Donald Trump in securing the Republican nomination to run for President of the United States, an outcome it is fair to say that virtually no expert predicted. Trump accomplished this by pushing, similar to the Brexiters, positions on economic protectionism and intolerance of immigration that most experts regarded as simplistic, unsupported by any detailed rational arguments, and unworkably extreme (e.g., building the border wall and making Mexico pay for it; immediately deporting millions of illegal immigrants living in the U.S.; etc.). As with the Brexiters, a major factor in Trump's success has been his mastery of the media, including frequent, vigorous use of social media such as Twitter. However, many experts have expressed their bafflement over why Trump's supporters respond so strongly to his bleak, vague views – for example, Trump supporters have been characterized as "people determined to live in a nightmare of their own imagining" (Krugman, 2016), who view Trump as follows: "He stands against a great tide of menace, from ISIS to immigrants, and only he understands the dimensions of the danger" (Cohen, 2016). Many experts have argued that a fuller, more rationally based view of the world is more optimistic (e.g., Norberg, 2016); for example, President Obama remarked, ""I think we all have to recognize these are turbulent times. ... But then when you look back over the course of eight years, actually you find out things have gotten better" (reported in Collinson, 2016). To the many who respond to Trump's message, such pronouncements seem patently absurd.

Britain and the US are not the only places undergoing such shifts in political discourse. As *The Economist* (July 30, 2016) has pointed out, "Across Europe, the politicians with momentum are those who argue that the world is a nasty, threatening place, and that wise nations should build walls to keep it out" (p. 7). Intriguingly, it has characterized this position as "drawbridges up" (p. 17), stemming from messages that provoke the feeling of a need for protection from an assortment of bad things that might conceivably encroach on one's security. Moreover, a steady salvo of news portrayals of terrorist atrocities elicits frequent restimulation of this sense of insecurity and felt need for protective action. In recent times, ISIS and its supporters seem to specialize in ever more bizarre terrorist acts, such as slitting the throat of an 85-year old Catholic priest in his church. Expert commentators repeatedly point out that the likelihood of such events directly touching people's personal lives is vanishingly small – for example, Europeans are ten times more likely to die by falling down stairs than by a terrorist act (Norberg, 2016). Yet, news of such atrocities seems to have a compelling immediacy that rivets people's attention and crowds out other aspects of relevant discourse, such as broader explanatory perspectives and strategies.

As mentioned earlier, a recent social innovation that, at least in part, underlies these shifts is the fantastically interconnected world we now live in, bound together by internet and social media. Information and ideas now propagate over vast distances almost instantly and constantly, having far-reaching effects on social processes. Ramo

(2016) has noted that there is a "whole world of networks that surrounds and defines us everywhere now" (p. 11), and he has characterized the effect of these networks as the "compression of space and time" (p. 188). That is, electronic networks lend immediacy to information that would previously have been remote and seemingly irrelevant. Moreover, information can propagate virally, enormously increasing the numbers of people who are exposed to it.

One concern about this radically new level of interconnectedness that has received increasing attention is the presence of what have been termed *emergent vulnerabilities* in the complex software and computer systems that undergird it (Husted, 2013; Ramo, 2016). These vulnerabilities are inadvertent aspects of the complex technological systems that have nothing to do with what they were designed for, but that bad actors might exploit, with possibly very undesirable outcomes.

Our focus here is somewhat related, but different: We will address ways in which the new interconnectedness may open up the possibility of emergent vulnerabilities not in the technological systems of networks, but in the psychological systems that nature built into the people using them. These vulnerabilities, too, may entail surprising avenues for misuse, both inadvertent and deliberate.

THE SECURITY MOTIVATION SYSTEM

Potential dangers had great relevance for reproductive fitness over many thousands of years, leading to the evolution of a brain system specially adapted for handling them. This biologically ancient, "hard wired" system, which developed for managing possible threats like predation and contagion, has been somewhat variously labeled as the *defense system* (Trower, Gilbert, & Sherling, 1990) and the *hazard-precaution system* (Boyer & Lienard, 2006). In our own research, to emphasize the motivational nature of this system we have called it the *security motivation system* (Szechtman & Woody, 2004).

The security motivation system is hypothesized to be a relatively distinct, specialized module in the brain, which, like other specialized modules, has some important operating properties (Pinker, 1997; Tooby & Cosmides, 1990, 1992, 2006). First, it is devoted to the detection of particular classes of stimuli of special relevance for survival, and these types of stimuli serve as the system's inputs. Second, when activated by such stimuli, it operates as a motivational system that drives relevant responses that may reduce the potential risk (Kavaliers & Choleris, 2001). Third, these behavioural outputs of the system consist of a characteristic range of species-typical behaviors, and engagement in these behaviors is important for returning the system to a baseline state. Let's look in more detail at each of these key properties.

Extensive research on how animals manage the threat of predation in the wild has contributed greatly to our understanding of how the security motivation system works. Animals attend to subtle, indirect cues of uncertain significance as the signals of potential threat (Blanchard & Blanchard, 1988; Lima & Bednekoff, 1999). Moreover, evaluating these indirect cues of potential danger is a very different problem from recognizing and responding to imminent danger, such as the actual presence of a predator, which is handled by a different brain system (the "fight-or-flight" system). Processing of potential danger involves the assessing of what have been called *labile perturbation factors* (Wingfield et al., 1998) and *hidden risk* (Curio, 1993), such as subtle changes to the environment that might possibly signal the presence of a predator. In summary, the security motivation system is dedicated to the unveiling and evaluation of partial, uncertain cues of potential threat, rather than the detection of imminent danger.

Research on how animals manage the threat of predation also shows that relatively weak cues readily activate wariness and vigilance (Brown, Laundre, & Gurung, 1999). Moreover, this activation tends to be persistent, and ebbs only slowly even if no further, confirming cues are forthcoming (Curio, 1993; Marks & Nesse, 1994; Masterson & Crawford, 1982). Activation of the system plays a crucial role in motivating engagement in security-related behaviors. In summary, the security motivation system is designed to be readily activated, and its activation has a protracted half-life, which drives behavior.

Finally, research demonstrates that the resulting security-related responses consist of precautionary behaviors, such as probing the environment, checking, and surveillance to gather further information about any potential threats (Blanchard & Blanchard, 1988; Blanchard, Griebel, Pobbe, & Blanchard, 2011; Curio, 1993), and preventative behaviors, such as moving to a more secure location, that might ameliorate the danger if it were to come about. Moreover, based on the available research, we have argued that security-related behavior is inherently *open-ended*, in that, unlike consummatory behavior such as eating that satiates hunger motivation, the environment does not normally provide a terminator to signal goal attainment for security motivation—the absence of potential threat (Szechtman & Woody, 2004).

To illustrate, consider that checking which does not disclose the presence of a predator offers no guarantee of reduced risk (for example, the predator may be successfully hiding); in other words, successful precautionary behavior yields a non-event of uncertain significance (Curio, 1993). Hence, we have argued that what normally shuts down security motivation is the engagement itself in security-related behavior, which generates an internally generated signal of goal attainment that serves as the terminator. In summary, the activation of security motivation elicits precautionary and preventative acts, and it is the performance of these acts, rather than their somewhat indeterminate effect on the environment, that in turn serves as the essential terminator of the activation (Woody & Szechtman, 2013).

PHYSIOLOGICAL BASIS AND EMPIRICAL EVIDENCE FOR THE SECURITY MOTIVATION SYSTEM

We have advanced an integrated set of hypotheses about the neurobiological circuitry that underlies the security motivation system (Szechtman & Woody, 2004; Woody & Szechtman, 2011; Szechtman, Shivji & Woody, 2014). Figure 1 depicts the hypothesized functional components of the system as a flowchart. The Appraisal of Potential Danger

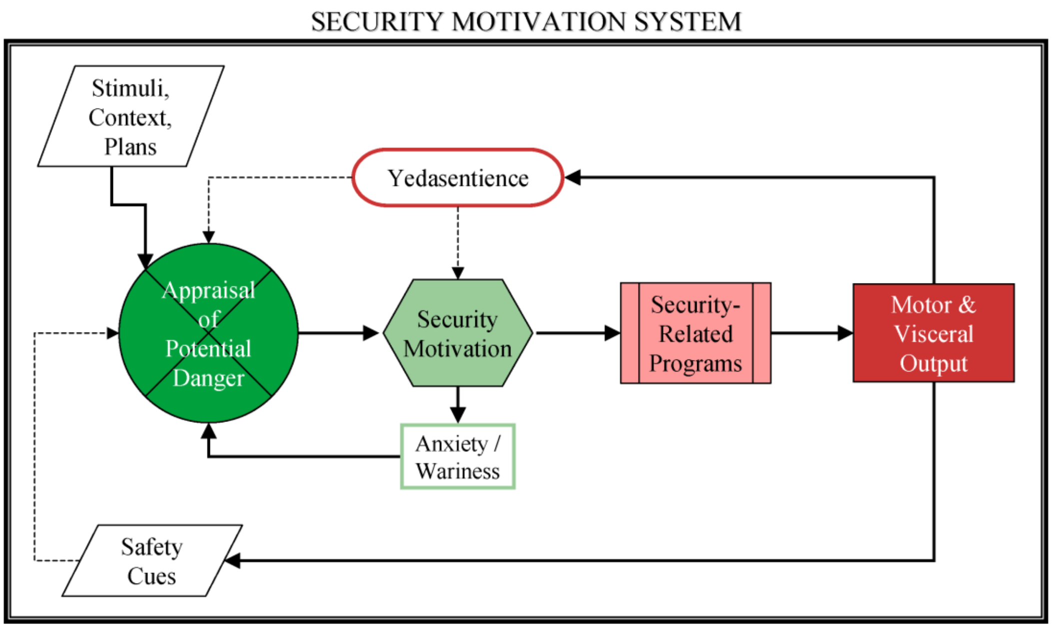

Figure 1 A conceptual model of the security motivation system. Solid arrows indicate excitatory and dashed arrows inhibitory stimulation, respectively. Yedasentience output does not act on environmental input but rather on the Appraisal of Potential Danger and the Security Motivation processors to inhibit their activity. Exposure through motor output to "safety" stimuli provides inhibitory stimulation to Appraisal of Potential Danger. Modified from Szechtman & Woody, 2004.

subsystem evaluates current environment stimuli to ascertain the possible presence of a potential threat, and if one is detected, sends an excitatory input to the Security Motivation subsystem, activating a protracted motivational state. This subsystem, in turn, generates Anxiety as a positive feedback signal that sustains the appraisal, as well as an excitatory input to the next subsystem, Security-Related Programs, which elicits engagement in precautionary and preventative behaviors. Performance of these acts produces Motor and Visceral Output, which, in turn, generates negative feedback for deactivating system. A crucial route of negative feedback is through the mediator, Yedasentience ("feeling of knowing", Woody & Szechtman, 2000). We coined this term to designate the internally generated phenomenological signal of goal attainment or task completion that is a byproduct of engagement in precautionary behavior and serves as a major terminator of activated security motivation. The flowchart also shows another possible route of negative feedback, through the enhancement of Safety Cues in the environment, which are hypothesized to have an inhibiting effect of the Appraisal subsystem. This path represents the slower influence of a *safety system*, proposed by Trower and colleagues (1990), which may co-act with but is otherwise separate from the security motivation system (Szechtman & Woody, 2006).

Figure 2 depicts our proposed neuroanatomical circuit diagram for the Security Motivation System, with subcircuits identified for each of the functional components by

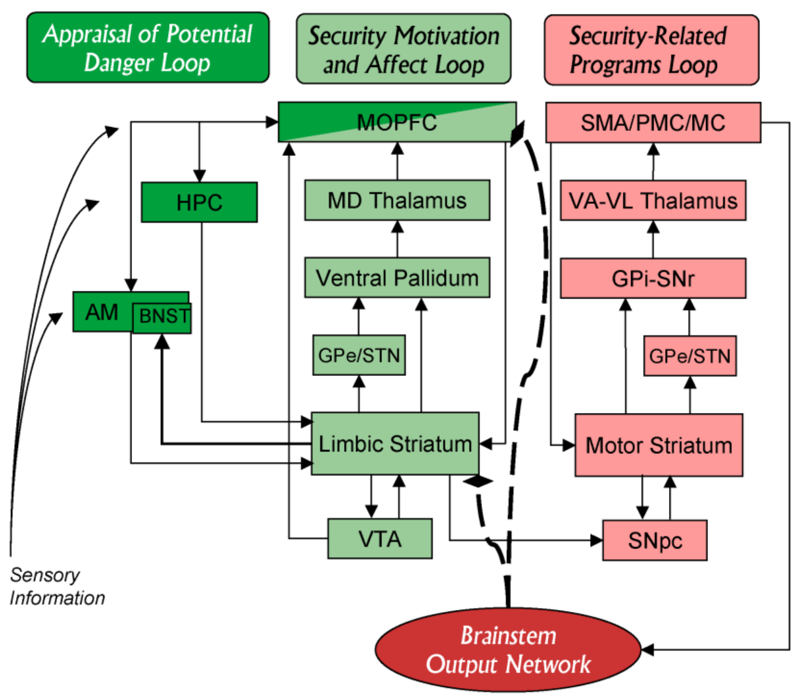

Figure 2 A neural circuit model of the security motivation system. Each of the 4 distinct subcircuits (loops) subserves one of the functional components in Figure 1 and identified by corresponding colors. The dashed line indicates possible sites of yedasentience feedback inhibition. *Abbreviations*: AM, amygdala; BNST, bed nucleus of the stria terminalis; GPe = external segment of the globus pallidus; GPi, internal segment of the globus pallidus; HPC, hippocampus; MC, motor cortex; MD Thalamus, mediodorsal thalamic nucleus; MOPFC, medial prefrontal cortex and orbital prefrontal cortex; PMC, premotor cortex; SMA, supplementary motor area; SNpc, substantia nigra pars compacta; SNr, substantia nigra pars reticulata; STN, subthalamic nucleus; VA, ventroanterior thalamic nucleus; VL, ventrolateral thalamic nucleus; VTA, ventral tegmental area. Reprinted by permission from Szechtman & Woody, 2004

using the same color scheme as in Figure 1 (Szechtman & Woody, 2004). The functional loops consist of cascades of cortico-basal ganglia-thalamo-cortical circuits (Alexander, DeJong, & Strck, 1986; Brown & Pluck, 2000), with feedback connections from the brainstem to terminate activity in these loops.

As shown in Figure 3, we have also described a network of physiological mechanisms involved in the operation of the Security Motivation System, including effects on regulation of the parasympathetic nervous system and activation of the hypothalamic-pituitary-adrenocortical (HPA) axis (Woody & Szechtman, 2011).

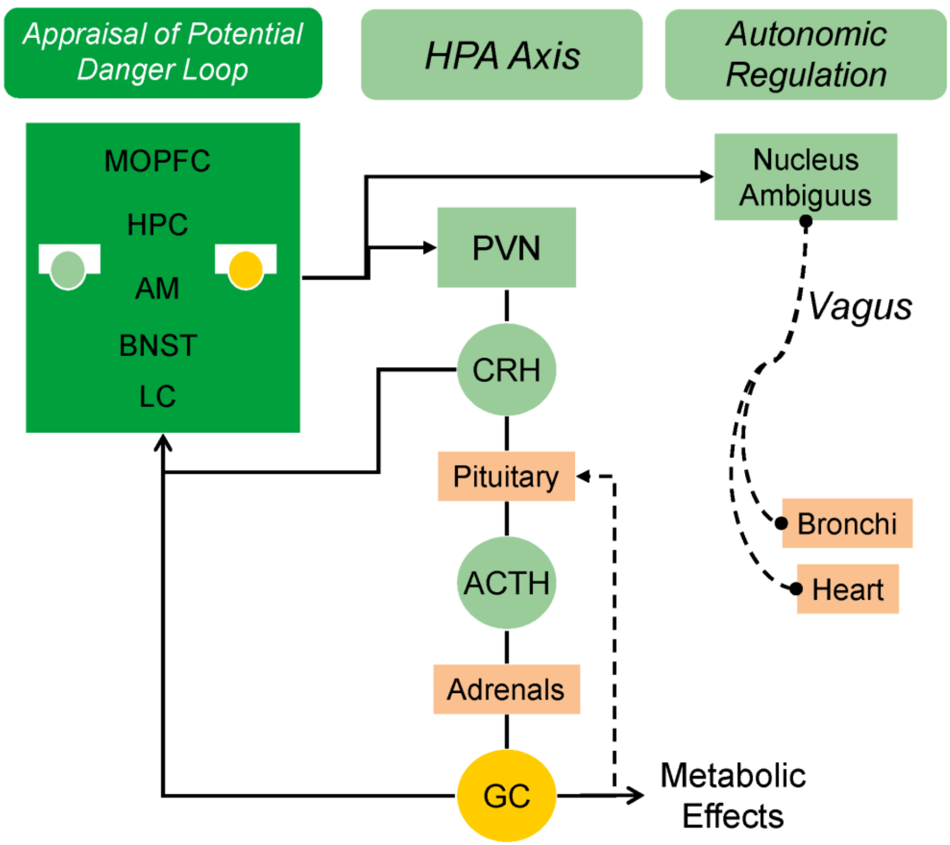

Figure 3 The physiological network associated with security motivation. The Appraisal of Potential Danger Loop of Figure 2 connects with the HPA Axis, which has both input from and output to the Appraisal Loop. Within the Appraisal Loop there are receptors for CRH and GC, denoted by the respective circles in white rectangles, by which HPA can modulate it; CHR also acts as a neurotransmitter within the Appraisal Loop. Finally, the Appraisal Loop affects Autonomic Regulation, by which the myelinated vagus modulates the bronchi and heart. *Abbreviations*: AM, amygdala; BNST, bed nucleus of the stria terminalis;CRH, corticotropin-releasing hormone; GC, glucocorticoids; HPC, hippocampus; LC, locus coeruleus; MOPFC, medial prefrontal cortex and orbital prefrontal cortex; PVN, paraventricular nucleus. Reprinted by permission from Woody & Szechtman, 2011.

Consistent with these hypotheses, we have shown that activation and subsequent deactivation of the security motivation system can be monitored both by tracking people's subjective ratings, such as anxiety and the urge to engage in precautionary behavior, and also by tracking physiological changes, particularly respiratory sinus arrhythmia (Porges, 2007), based on heart-rate variability (Hinds, et al., 2010). In a series of experiments using these measures, we have garnered support for the hypothesized operating characteristics of the security motivation system. First, the system is indeed readily activated by even weak, partial, and uncertain cues for potential danger (Hinds et al., 2010, Experiment 1). Second, once the system is activated, the activation persists, decreasing only very slowly if there is no subsequent precautionary behavior (Hinds et al., 2010, Experiment 2). Third, for most people engagement in precautionary behavior is indeed highly effective in deactivating the system (Hinds et al. 2010, Experiment 1; Hinds, Woody, Schmidt, Van Ameringen, & Szechtman, 2015, Experiment 1). Perhaps most remarkably, we have shown that once the system has been activated by uncertain cues, supplying further cognitive information that clearly disconfirms the potential threat does not deactivate the system, unlike engagement in precautionary behavior (Hinds et al., 2010, Experiment 3). Thus, when activated, the system relies critically on performance of precautionary behavior, rather than cognitive reappraisal, to deactivate.

A parallel series of experiments has tested our hypothesis that obsessive-compulsive disorder (OCD) stems from a dysfunction of the security motivation system (Szechtman & Woody 2004; Woody & Szechtman, 2005). OCD patients tend to be strongly preoccupied with potential danger, such as the possibility of harm to oneself or close others (Reed, 1985; Wise & Rapoport, 1989). We hypothesized that security motivation is activated comparably in OCD patients and non-patients, but for OCD patients, subsequent engagement in precautionary behavior fails to shut down this activation in the normal way. Consistent with this hypothesis, experimental results demonstrate that exposure to cues for potential danger activates security motivation similarly in OCD patients and control participants; however, a subsequent period of precautionary behavior readily returns the non-patients to baseline, but has no significant effect on activation levels of the OCD patients (Hinds, Woody, Van Ameringen, Schmidt, & Szechtman, 2012; Hinds, Woody, Schmidt, Van Ameringen, & Szechtman, 2015). This reduced effectiveness of engagement in precautionary behavior explains why OCD patients tend to repeat these behaviors over and over, yet remain preoccupied with the possibility of potential danger.

For the present context, the allusion to OCD has importance beyond adumbrating the nature of empirical support for the security motivation system. Like other evolved special-purpose modules in the brain, this system is hypothesized to operate relatively autonomously and automatically, with its internal processes not available by introspection (Fodor, 1983). In other words, it mainly functions apart from the realm of volitionally directed higher cognition, and its outputs enter awareness intuitively as feelings. This distinction between a feeling-based system and rational analysis is somewhat hidden from us in everyday life because the two types of processing often appear to be aligned; however, the difference is laid bare in OCD. OCD patients feel strongly driven to persist in obsessive concerns about potential danger and to repeat precautionary behaviors over and over, even though at the same time they realize rationally that these concerns and behaviors are excessive and unreasonable (Hollander et al., 1996). Thus, OCD shows that an intuitive, feeling-based module like the security motivation system is powerful enough to override rational control of behavior.

In summary, the feelings produced by the security motivation system are potent, immediate, and phenomenologically compelling, but they are not necessarily aligned to objective, rational analysis or logical inferences. Essentially, they are powerful intuitions that worked well in our remote past, but may inadvertently have limited relevance to a current situation.

VULNERABILITIES OF THE SECURITY MOTIVATION SYSTEM IN THE INTERNET AGE

Some idea of the ancestral world in which humans evolved can be gathered from accounts of pioneers who made a life for themselves in still-wild areas, such as the interior of British Columbia in the early 20th century (e.g., Edwards, 1981; Gould & Edwards, 1979; Turner & McVeigh, 1977). In such an environment, there are many extremely serious potential threats, including dangerous and unpredictable predators like grizzly bears, and life hangs on the edge of possible disaster and death. However, for these many serious potential threats, there are only scattered and subtle cues, like a patch of crushed grass in the morning or some broken twigs along a path, and these fragmentary clues need to be followed up thoroughly, in a search for other partial, indirect signs, which often are not immediately forthcoming. In summary, our ancestral world was one of many potential threats but relatively few and often subtle cues, which therefore needed to be noticed and probed carefully.

Our present, internet-connected world is very different from this. Many of the ancestral potential treats, such as predators, are long gone; nonetheless, there is now a virtually limitless supply of potential-threat cues, many of which are only very weakly connected to any real source of danger likely to impinge on the individual. Consider, for example, someone who sees a video snippet of a grisly act of ISIS-related terrorism. It will be electronically linked to thousands of other potential-threat cues, including the alarmed comments of many other people about the event, accounts of similar past and current terrorist events, commentary on new risks possibly revealed, and so forth. Thus, when the person “probes” for other signs of potential danger, these signs, rather than being scattered and subtle, seem omnipresent and relentless, inundating the person with activating, but relatively tangential cues.

Along these lines, there are several very interesting implications of having the security motivation system connected, so to speak, to the internet. First, because the security motivation system is tuned to partial, indirect, uncertain cues, its business is hints, inklings, whiffs, and foreshadowings—not relatively complete, balanced, rational perspectives. Hence, it would follow that fragmentary information, even of uncertain accuracy or relevance, would readily activate the system, and would tend to override clearer, fuller, more rationally balanced information. Second, activation of the system leads to motivated actions that especially include probing for further cues of potential danger, which in the ancestral environment were in limited supply, precious, and often readily exhausted. In contrast, the virtually unlimited supply of such stimuli on the internet would be expected to lead to a positive-feedback effect, in which probing, rather than exhausting the readily available cues, would turn up more and more cues, sustaining a sense of alarm rather than reducing it. Moreover, these subjective feelings of potential threat (anxiety and wariness), activated by cues that may be quite tangential to the person’s life circumstances, are unlikely to map well onto the reality of potential threats.

Third, recall that once the security motivation system is activated, it becomes action-oriented—that is, the persistent motivational state is normally terminated through engaging in some kind of precautionary behavior, rather than through cognitive reassessment. To quote Ramo (2016, p. 76), our reaction to media-conveyed news of potential threats is “Hey, do something!”—in the face of which what we can actually do seems woefully limited. However, readily available to everyone is a particular kind of action that may help to terminate elicited security motivation, namely, sending the activating content onward to lots of other people—family, friends, and strangers alike, on social media, contact lists, and the like. It would follow, then, that partial, concrete information of uncertain relevance would propagate very rapidly and widely, and tend to outweigh more complete, rationally balanced information, which is less likely to activate the security motivation system. That is, partial indicators of potential threat (e.g., unease about immigration suggests the possibility that massive terrorism might conceivably be on the doorstep) are what readily engage people’s attention and therefore get propagated virally on social media, whereas the consensus views of experts,, more balanced perspectives, and so on, although intellectually relevant, do not elicit security motivation and therefore do not get propagated. In short, the internet seems inadvertently destined to amplify attention to partial signs that might indicate potential danger, and to devalue, in turn, careful analysis of wider, possibly more valid data.

The action-oriented nature of the security motivation system may also help to explain another seemingly perplexing aspect of the current political scene. Namely, in the face of potential threats, why are claims by politicians for bold action, even in the absence of any supporting plans or basic facts, so appealing to many people? Examples mentioned earlier are Trump's signature positions in the Republican primaries: building an "impenetrable, physical, tall, powerful, beautiful, southern border wall" and making Mexico pay for it; and, immediately upon being elected, deporting millions of illegal immigrants living in the U.S. We would suggest that, insofar as the intuitively based security motivation system is concerned, precautionary action is the right answer in the face of potential threat; in addition, big actions are what intuitively correspond to what feel like big potential threats. Moreover, support for politicians promoting bold action is itself an action, engagement in which may help to ameliorate activated security motivation.

A MODE OF COMMUNICATION

The security motivation system is not the only system active in the brain, and so we may wonder about the role of higher critical, rational faculties that are also processing and evaluating incoming information, possibly in very different ways. Some commentators, disgruntled by developments like Brexit and Trump, have speculated that these higher faculties in people have somehow become inactivated:

> *Tolstoy wrote of "epidemic suggestion" to describe those moments when humanity seems to be gripped by a mass hypnosis that no force can counter. ... We find ourselves in such a moment. (Cohen, 2016, p. 14).*

It is not particularly clear what it means to say that a politician has subjected his or her followers to "mass hypnosis." However, some politicians have mastered a mode of communication that seems, indeed, to bypass critical faculties and encourage people to go along, relatively unreflectively, with the message being conveyed. Here is an example of such a communication, from a speech by Trump (a rally in Albany, April 11, 2016):

> *You are going to be so proud of your country. Because we're gonna turn it around, and we're gonna start winning again. We're gonna win so much. We're going to win at every level. We're going to win economically. We're going to win with the economy. We're gonna win with military. We're gonna win with healthcare and for our veterans. We're gonna win with every single facet.*
>
> *We're gonna win so much, you may even get tired of winning. And you'll say, "Please, please. It's too much winning. We can't take it anymore. Mr. President, it's too much." And I'll say, "No, it isn't."*
>
> *We have to keep winning. We have to win more. We're gonna win more. We're gonna win so much.*

Through repetition, this type of communication stays "on message," almost to the point of caricature. More importantly, it presents no line of argument or supporting material whatever that would call for higher thought. Such communication, which can be effective in person, is similarly effective when replayed on media as video. By contrast, it becomes ineffective in print, where its paucity of intellectual content is painfully obvious.

Another important characteristic of this mode of communication is that the manner of expression does not draw any critical attention to itself. Hillary Clinton, who sometimes tries to adopt this seemingly off-the-cuff mode, has provided an interesting example of how to get it entirely wrong:

> *To just be grossly generalistic, you could put half of Trump's supporters into what I call the basket of deplorables. Right? (quoted in Cassidy, 2016)*

The words "grossly generalistic" invite a critical meta-perspective even before she has got to what she wants to say; the word "half" is spuriously precise, inviting skepticism; people do not come in a "basket;" "deplorable" is not normally a plural noun; and the question "Right?" differentiates what she is saying from what the listener may be thinking. Such a communication is guaranteed to engage listeners' critical faculties (whereas something like "A lot of Trump supporters aren't socially progressive," which says essentially the same thing as what she meant, would not).

This mode of communication has a long history. For example, a famous speech by General George Patton to the U.S. Third Army (on June 5, 1944; reprinted in O'Reilly & Dugard, 2014) is similar to the foregoing extract from Trump in its relentless emphasis on winning, its focus on very straightforward points, and its lack of anything for the intellect to reflect critically on.

Woody and Szechtman (2007) linked this mode of communication with a motivational system that manages the dominance hierarchy, with the listener in the subordinate position: "The critical motivationally driven processes elicited by this subordinate position include suppression of one's own will in favour of the will of the dominant individual" (p. 249). This motivational system evolved to coordinate a group under a dominant leader (Jaynes, 1976; Wilson, 1975), and activation of the system, we posited, "has the relatively automatic effect of entraining group members' perceptions and actions to the views and wishes of a leader" (p. 250). Somewhat akin to the quote at the beginning of this section, we also speculatively linked this dominance system with some phenomena in hypnosis.

A mode of communication that minimizes critical reflection and independent agency is important in certain circumstances, such as on the battlefield. However, the battlefield is a very different circumstance from that of voters in a democracy trying to exercise their reasonably independent critical judgment. Thus, the problem is that network-based promulgation of this mode of communication may spread it well beyond its normal range of applicability.

CONCLUSION

Perhaps because the internet is such a fantastic intellectual accomplishment, there is a tendency to regard communication on it in a similarly intellectual way—namely, as content that may change people's thoughts. In addition, a prevailing theme in this strongly cognitive era in psychology is that if we change people's cognitions, their feelings will follow suit.

Nonetheless, in a sense the basic theme of the present article is the opposite of this. Messages do not just affect people's higher cognitions; they can also tap into their motivational systems. The internet connects not only people's minds, but also their guts. To a disconcerting extent, if someone can grab people by the gut (that is, tap into motivational systems), their minds will follow.

ACKNOWLEDGEMENTS

This work was supported by grants from the Canadian Institutes of Health Research (MOP134450 and MOP-64424) and the Natural Sciences and Engineering Research Council of Canada (RGPIN A0544 and RGPGP 283352-04).

REFERENCES

Alexander, G. E., Delong, M. R., & Strick, P. L. (1986). Parallel organization of functionally segregated circuits linking basal ganglia and cortex. *Annual Review of Neuroscience, 9*, 357-381.

Blanchard, D. C., & Blanchard, R. J. (1988). Ethoexperimental approaches to the biology of emotion. *Annual Review of Psychology, 39*, 43-68.

Blanchard, D. C., Griebel, G., Pobbe, R., & Blanchard, R. J. (2011). Risk assessment as an evolved threat detection and analysis process. *Neuroscience and Biobehavioral Reviews, 35*(4), 991-998.

Boyer, P., & Lienard, P. (2006). Why ritualized behavior? Precaution systems and action parsing in developmental, pathological and cultural rituals. *Behavioral and Brain Sciences, 29*(6), 595-613.

Brown, J. S., Laundre, J. W., & Gurung, M. (1999). The ecology of fear: Optimal foraging, game theory, and trophic interactions. *Journal of Mammalogy, 80*(2), 385-399

Brown, R. G., & Pluck, G. (2000). Negative symptoms: the 'pathology' of motivation and goal-directed behaviour. *Trends in Neurosciences, 23*(9), 412-417.

Cassidy, J. (2016). Hillary Clinton’s “basket of deplorables” gaffe. *The New Yorker*, September 11, 2016. Available at http://www.newyorker.com/news/john-cassidy/hillary-clintons-basket-of-deplorables-gaffe

Cohen, R. (2016). Trump and the end of truth. *New York Times International Weekly*, July 30, 2016, p. 14.

Collinson, S. (2016). Obama suffers the slings and arrows of a restive world. *CNN Politics*, September 6, 2016. Available at http://www.cnn.com/2016/09/05/politics/obama-putin-duterte-xi-erdogan-g20-reception/index.html

Curio, E. (1993). Proximate and developmental aspects of antipredator behavior. *Advances in the Study of Behavior, 22*, 135-238.

Economist (July 30, 2016). The new political divide; Drawbridges up. *The Economist*, *420* (9000), p. 5 & 16-18.

Edwards, I. K. (1981). *Ruffles on my longjohns*. Surrey, BC: Hancock House.

Fodor, J. A. (1983). *The modularity of mind: An essay on faculty psychology*. Cambridge, Mass: MIT Press.

Gould, E., & Edwards, R. (1979) *Ralph Edwards of Lonesome Lake*. Surrey, BC: Hancock House.

Hinds, A. L., Woody, E. Z., Drandic, A., Schmidt, L. A., Van Ameringen, M., Coroneos, M., & Szechtman, H. (2010). The psychology of potential threat: Properties of the security motivation system. *Biological Psychology*, *85*(2), 331-337. doi: 10.1016/j.biopsycho.2010.08.003.

Hinds, A. L., Woody, E. Z., Van Ameringen, M., Schmidt, L. A., & Szechtman, H. (2012). When too much is not enough: Obsessive-compulsive disorder as a pathology of stopping, rather than starting. *PLoS ONE 7*(1): e30586. doi:10.1371/journal.pone.0030586

Hinds, A. L., Woody, E. Z., Schmidt, L. A., Van Ameringen, M., & Szechtman, H. (2015). In the wake of a possible mistake: Security motivation, checking behavior, and OCD. *Journal of Behavior Therapy and Experimental Psychiatry*, 2015 Apr 11. pii: S0005-7916(15)00047-6. doi: 10.1016/j.jbtep.2015.03.016.

Hollander, E., Kwon, J. H., Stein, D. J., Broatch, J., Rowland, C. T., & Himelein, C. A. (1996). Obsessive-compulsive and spectrum disorders: Overview and quality of life issues. *Journal of Clinical Psychiatry, 57 Supplement 8*, 3-6.

Husted, N. W. (2013). *Analysis techniques for exploring emergent vulnerabilities and attacks on mobile devices*. PhD thesis, Indiana University. Available at http://www.cs.indiana.edu/~nhusted/docs/proposal.pdf

Jaynes, J. (1976). *The origin of consciousness in the breakdown of the bicameral mind*. Boston, MA: Houghton Mifflin.

Kavaliers, M., & Choleris, E. (2001). Antipredator responses and defensive behavior: ecological and ethological approaches for the neurosciences. *Neuroscience and Biobehavioral Reviews, 25*(7-8), 577-586

Krugman, P. (2016). Delusions of chaos. *New York Times International Weekly*, July 30, 2016, p. 15.

Lima, S. L., & Bednekoff, P. A. (1999). Temporal variation in danger drives antipredator behavior: The predation risk allocation hypothesis. *American Naturalist, 153*(6), 649-659.

Marks, I. M., & Nesse, R. M. (1994). Fear and fitness: An evolutionary analysis of anxiety disorders. *Ethology and Sociobiology, 15*(5-6), 247-261.

Masterson, F. A., & Crawford, M. (1982). The Defense Motivation System - A theory of avoidance-behavior. *Behavioral and Brain Sciences, 5*(4), 661-675.

Norberg, J. (2016). *Progress: Ten reasons to look forward to the future*. London, UK: Oneworld.

O'Reilly, B., & Dugard, M. (2014). *Killing Patton: The strange death of World War II's most audacious genera*l. New York: Henry Holt.

Pinker, S. (1997). *How the mind works*. New York: Norton.

Polonski, V. (2016). Impact of social media on the outcome of the EU referendum. *Oxford Today*, June 28, 2016. Available at http://www.oxfordtoday.ox.ac.uk/features/views-oxford-eu-referendum-result#

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology, 74*(2), 116-143.

Ramo, J. C. (2016). *The seventh sense: Power, fortune, and survival in the age of networks*. New York: Little, Brown and Company.

Reed, G. F. (1985). *Obsessional Experience and Compulsive Behaviour: A Cognitive-Structural Approach*. Orlando, Florida: Academic Press.

Szechtman, H., & Woody, E. (2004). Obsessive-compulsive disorder as a disturbance of security motivation. *Psychological Review*, *111*, 111–127.

Szechtman, H., & Woody, E.Z. (2006). Obsessive-compulsive disorder as a disturbance of security motivation: Constraints on comorbidity. *Neurotoxicity Research, 10*(2), 103-112.

Szechtman, H., Shivji, S,, & Woody, E.Z. (2014). Pathophysiology of obsessive-compulsive disorder: Insights from normal function and neurotoxic effects of drugs, infection, and brain injury. In R.M. Kostrzewa (Ed.), *Handbook of Neurotoxicity* (pp. 2231-2253). New York: Springer.

Tooby, J., & Cosmides, L. (1990). The past explains the present: Emotional adaptations and the structure of ancestral environments. *Ethology and Sociobiology, 11*, 375-424.

Tooby, J., & Cosmides, L. (1992). Psychological foundations of culture. In J. H. Barkow, L. Cosmides & J. Tooby (Eds.), *The Adapted mind: Evolutionary psychology and the generation of culture* (pp. 19-136). New York: Oxford University Press.

Tooby, J., & Cosmides, L. (2006). The evolved architecture of hazard management: Risk detection reasoning and the motivational computation of threat magnitudes. *Behavioral and Brain Sciences, 29*(6), 631-633.

Trower, P., Gilbert, P., & Sherling, G. (1990). Social anxiety, evolution, and self-presentation: An interdisciplinary perspective. In H. Leitenberg (Ed.), *Handbook of social and evaluation anxiety* (pp. 11-45). New York, NY: Plenum Press.

Turner, T., & McVeigh, R. M. (1977). *Fogswamp: Living with swans in the wilderness*. Surrey, BC: Hancock House.

Wingfield, J. C., Manehy, D. L., Breuner, C. W., Jacobs, J. D., Lynn, S., Ramenofsky, M., & Richardson. R. D. (1998). Ecological bases of ormone-behavior interactions: The "Emergency Life History Stage". *American Zoologist*, *38*, 191-206.

Wilson, E. O. (1975). *Sociobiology: The new synthesis*. Cambridge, MA: Harvard University Press.

Wise, S., & Rapoport, J. L. (1989). Obsessive compulsive disorder - Is it a basal ganglia dysfunction? In J. Rapoport (Ed.), *Obsessive Compulsive Disorder in Children and Adolescence* (pp. 327-344). Washington, DC: American Psychiatric Press.

Woody, E.Z., & Szechtman, H. (2000). Hypnotic hallucinations and yedasentience *Contemporary Hypnosis, 17*, 26-31

Woody, E., & Szechtman, H. (2005). Motivation, time course, and heterogeneity in obsessive-compulsive disorder: Response to Taylor, McKay, & Abramowitz (2005). *Psychological Review*, *112*, 658-661.

Woody, E., & Szechtman, H. (2007). To see feelingly: Emotion, motivation, and hypnosis. In G. A. Jamieson (Ed.), *Hypnosis and conscious states: The cognitive-neuroscience perspective* (pp. 241-255). Oxford: Oxford University Press.

Woody, E. Z., & Szechtman, H. (2011). Adaptation to potential threat: The evolution, neurobiology, and psychopathology of the security motivation system. *Neuroscience and Biobehavioral Reviews*, *35*, 1019-1033. doi:10.1016/j.neubiorev.2010.08.003.

Woody, E. Z., & Szechtman, H. (2013). A biological security motivation system for potential threats: are there implications for policy-making? *Frontiers in Human Neuroscience, 7*, 556. doi: 10.3389/fnhum.2013.00556

FIGURE CAPTIONS

Figure 1 A conceptual model of the security motivation system. Solid arrows indicate excitatory and dashed arrows inhibitory stimulation, respectively. Yedasentience output does not act on environmental input but rather on the Appraisal of Potential Danger and the Security Motivation processors to inhibit their activity. Exposure through motor output to "safety" stimuli provides inhibitory stimulation to Appraisal of Potential Danger. Modified from Szechtman & Woody, 2004.

Figure 2 A neural circuit model of the security motivation system. Each of the 4 distinct subcircuits (loops) subserves one of the functional components in Figure 1 and identified by corresponding colors. The dashed line indicates possible sites of yedasentience feedback inhibition. *Abbreviations*: AM, amygdala; BNST, bed nucleus of the stria terminalis; GPe = external segment of the globus pallidus; GPi, internal segment of the globus pallidus; HPC, hippocampus; MC, motor cortex; MD Thalamus, mediodorsal thalamic nucleus; MOPFC, medial prefrontal cortex and orbital prefrontal cortex; PMC, premotor cortex; SMA, supplementary motor area; SNpc, substantia nigra pars compacta; SNr, substantia nigra pars reticulata; STN, subthalamic nucleus; VA, ventroanterior thalamic nucleus; VL, ventrolateral thalamic nucleus; VTA, ventral tegmental area. Reprinted by permission from Szechtman & Woody, 2004

Figure 3 The physiological network associated with security motivation. The Appraisal of Potential Danger Loop of Figure 2 connects with the HPA Axis, which has both input from and output to the Appraisal Loop. Within the Appraisal Loop there are receptors for CRH and GC, denoted by the respective circles in white rectangles, by which HPA can modulate it; CHR also acts as a neurotransmitter within the Appraisal Loop. Finally, the Appraisal Loop affects Autonomic Regulation, by which the myelinated vagus modulates the bronchi and heart. *Abbreviations*: AM, amygdala; BNST, bed nucleus of the stria terminalis;CRH, corticotropin-releasing hormone; GC, glucocorticoids; HPC, hippocampus; LC, locus coeruleus; MOPFC, medial prefrontal cortex and orbital prefrontal cortex; PVN, paraventricular nucleus. Reprinted by permission from Woody & Szechtman, 2011.