Cognitive mechanisms in violent extremism

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Cognitive mechanisms in violent extremism☆

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ARTICLE INFO

ABSTRACT

This paper considers the cognitive underpinnings of violent extremism. We conceptualize extremism as stemming from a motivational imbalance in which a given need "crowds out" other needs and liberates behavior from their constraints. In the case of violent extremism, the dominant need in question is the quest for personal significance and the liberated behavior is aggression employed as means to the attainment of significance. The cognitive mechanisms that enable this process are ones of learning and inference, knowledge activation, selective attention, and inhibition. These are discussed via examples from relevant research.

1. Introduction

The topic of violent extremism is a top concern of societies around the globe as we witness these days the most widespread wave of terrorism in history (United Nations Educational, Scientific and Cultural Organization (2017), 2017). Social scientists of diverse disciplinary backgrounds are called upon to explain the phenomenon; they approach it from different vantage points and at different levels of analysis. Economists may examine the utility of terrorism as a tool of political struggle (Llussá & Tavares, 2011), political scientists may address the grievances of populations that fuel rebellion (Gurr, 1993), and sociologists may describe the dynamics of social movements that alter history (Della Porta & Diani, 2015). Though useful and informative, these approaches are incomplete without considering the psychology of the individual. Social movements, rebellions and utility calculations, after all, are carried out by willing participants. It is they who resolve to take up arms, travel to foreign lands, give up comfort and security and risk life and limb in fighting for a cause.

In this paper, we address the individual psychology underlying violent extremism and examine the cognitive principles that enable extremist behavior. Our approach is based on the assumption that extremism is purposive and represents behavior that serves as means to individuals' goals. We thus assume that extremists' behavior is in that sense rational, contrary to the popular notions that terrorists are either psychopaths or have been brainwashed by charismatic zealots (see also Ginges, Atran, Sachdeva, & Medin, 2011; Reicher & Haslam, 2016, March 25).

But what, exactly, are the features that render behavior 'extreme'? And what psychological mechanisms mediate the transfer from moderation to extremism and vice versa? These issues are addressed on the pages that follow. Though our ultimate objective is to address *violent* extremism, we first offer a more general conceptualization of extremism as a psychological construct. We assume that extreme behavior can be diverse and encompass widely different activities (Section 2). For example, violence and mayhem may be described as 'extreme' to be sure, but so may certain diets, sports, ("fatal") attractions, cravings, etc. Is calling all these 'extreme' just a manner of speaking, or do these 'strange bedfellows' share a common psychological core? We believe the latter to be the case, and that this common core is a state of motivational imbalance in which a given need dominates and crowds out other concerns.

Following our description of extremism as a general phenomenon, we proceed to describe the specific case of violent extremism (Section 3). Here, individuals' quests for personal significance lead to a distinct motivational imbalance, yielding diverse effects documented in a growing body of empirical findings. Finally, we address the role of cognitive mechanisms without which extremism in general and violent extremism in particular would not be possible (Section 4).

2. Extremism writ large

2.1. Defining extremism

How should extremism be defined and what specific attributes

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characterize it? There are two ways of conceptualizing extremism, namely in *statistical* and *psychological* terms. These differ in their point of reference. The statistical sense of extremism views it in terms of the frequency of a behavioral occurrence within some aggregate. From that perspective, 'extreme' behavior is that which occurs infrequently within a collectivity; it occupies a tail of a distribution as it were. For instance, practicing 'extreme' sports, following 'extreme' diets, and perpetrating 'extreme' violence are rare and unusual in most societies, not something most people do; this qualifies them as extreme statistically speaking.

But extremism can be defined from a psychological perspective as well, namely in reference to a state of moderation. Specifically, moderation assumes a condition of homeostasis, and more specifically a *motivational equilibrium* characterized by a balanced satisfaction of the individual's basic biological and psychogenic needs. Extremism marks a departure from that state, introducing a motivational imbalance in which one need rises in saliency and magnitude to the point of dominating and 'crowding out' other basic needs. Because most persons desire to have all their basic needs fulfilled, only a minority may exhibit a prolonged state of extremism. Thus, the statistical and the psychological conceptions of extremism converge in that extremists typically constitute a small segment the general population.

Two further qualifications are in order. (1) Whether statistically or psychologically defined, extremism lies on a continuum and is a matter of degree; it reflects the extent of deviation from the relevant reference point (i.e., the central tendency in a distribution or the state of motivational balance respectively). (2) Whereas psychological extremism typically characterizes a minority of individuals (thus, converging with statistical extremism), in special circumstances it may apply also to a *majority* of persons within a given population.

Consider in analogy the concept of *health*, in essence the optimal physiological functioning of an organism. Normally, most people are (more or less) healthy and their various bodily systems carry out their designated purposes as intended. Yet at times entire populations might fall sick, for instance in the case of a plague, mass starvation or poisoning. Similarly, whereas societies are relatively peaceful and non-violent much of the time (Institute for Economics & Peace, 2017)—there are circumstances (e.g., at times of war) where most of their members are required to mobilize and fight (i.e. employ violence) for a common cause. In short, whereas generally the psychological and the statistical definitions of extremism are in sync, there could be cases where they diverge. Given our present aim to elucidate the underlying *psychology* of extremism, we base our analysis specifically on the psychological conceptualization of this phenomenon addressed in detail next.

2.2. Motivational balance and imbalance

Earlier, we defined moderation in terms of a motivational balance. What might such balance consist of? Psychological theorists (e.g., Maslow, 1942; Deci & Ryan, 2000; Fiske, 2010; Higgins, 2012) agree that humans have a set of basic motives whose fulfillment is essential to their well-being. Some of those motives pertain to fundamental biological needs, including the needs for nutrition, hydration, sleep, etc. It is generally agreed that satisfaction of those needs is essential to biological health and ultimately to survival. Other basic needs are *psychogenic* in nature: needs for safety, love/belonging, esteem, and self-actualization (identified by Maslow, 1943), needs for autonomy, competence and relatedness (highlighted by Ryan & Deci, 2000), needs for value, truth and control (highlighted by Higgins, 2012), or needs to belong, understand, control enhance, and trust (identified by Fiske, 2010). Though theorists differ in their taxonomies of basic needs, they concur that such needs do exist and that their lack of fulfillment fosters suffering and distress. Humans are thus assumed to strive for fulfillment of their basic psychogenic needs, much as they do for fulfillment of their physiological needs. Furthermore, people's specific goals are assumed to be traceable, ultimately, to their basic needs. The goal of

cooking may hark back to the need for nutrition, rebelling against oppression to the need of autonomy, competing to the need for competence, forming intimate ties to the need of relatedness and so on (cf. Deci & Ryan, 2000).

2.2.1. Balance and constraint

Motivational balance is said to exist where all the basic needs constitute active concerns whose fulfillment drives individuals' behavior. Under those conditions, the needs exercise constraints on one another such that behavior that gratifies some of the needs while undermining others tends to be avoided. For instance, one's hunger may co-exist with one's concerns about health; as a consequence foods that are unhealthy are avoided. One's need for intimacy may temper one's need for achievement thus promoting behavioral choices that represent a work-family balance, etc.

This phenomenon, termed the multifinality constraints effect, was demonstrated in a series of studies conducted by Köpetz, Faber, Fishbach, and Kruglanski (2011). The authors showed that the presence of active background goals narrows the range of means to a focal goal and restricts them to those that are multifinal, that is, serve the alternative, background goals as well.

2.2.2. Imbalance and release

At times, however, a motivational imbalance may set in when a given need receives a disproportionate emphasis, thus overriding all the others. For instance, under extreme hunger one might be ready to eat anything at all, regardless of whether healthy or not, and a highly ambitious person, driven by an unstoppable drive to succeed may become a workaholic and sacrifice her or his personal relations on the altar of work. Thus, where a given need becomes particularly intense, alternative needs substantially recede in salience, liberating possible behavior from their constraints. In consequence, the set of behavioral options for gratifying the dominant need expands through inclusion of formerly prohibited behaviors detrimental to other fundamental needs.

Removal of constraints exerted by other active goals occurring under motivational imbalance was experimentally demonstrated by Köpetz et al. (2011) in the aforementioned research on multifinality constraints. In one study (Study 3) investigators looked at the kinds of foods students were considering for lunch. All participants had relatively equal concern for the goals of *food enjoyment* and *weight control*. In one condition, commitment to the goal of food enjoyment was enhanced through a mental contrasting procedure (Oetingen, Pak, & Schnetter, 2001; Oetingen, 2000). It was found that as compared to a control condition where the two goals were in balance, participants in the food enjoyment condition listed more foods (attesting to expansion of the set of means under motivational imbalance). Furthermore, the additional foods chosen in that condition were rated higher on taste but also on caloric content (at odds with the weight control objective) whereas in the control (balanced) condition fewer foods were deemed acceptable and they were equal on taste but lower on caloric content. These findings were conceptually replicated in another experiment (Study 4) where commitment to food enjoyment was manipulated via sequential priming. Study 5 conceptually replicated the effect and in addition demonstrated that the expansion of the set of means in the motivationally imbalanced condition as well as addition of highly caloric foods were mediated by *inhibition* of the dieting (weight control) goal. Other studies have shown that the activation of a goal one is committed to effects the inhibition of alternative goals (the *goal shielding* effect) such that the stronger the desire to attain the goal, the stronger the inhibition (Shah, Friedman, & Kruglanski, 2002).

As a consequence, the stronger the need, the more likely it is to permit behaviors incompatible with other needs. For instance, when one's need for an intoxicating substance (e.g., alcohol, crack heroine) is particularly high, it may prompt persons to engage in all sorts of behaviors destructive to the self and others (e.g. to forego healthy nutrition, neglect one's work obligations, engage in criminal behavior)

whose purpose is to obtain the object of one's desire by any means necessary. Such behaviors are extreme because they deviate from the state of motivational balance. And because people in general strive to maintain balance, extreme behavior is typically infrequent.

3. The case of violent extremism

The psychological process just described pertains to all kinds of extremism regardless of their specific content. We now turn to examine the special case of violent extremism. The key question here concerns the motivational imbalance characterizing such extremism, and especially the nature of the dominant need that creates that imbalance. Our research in this domain (Kruglanski et al., 2009, 2013, 2014, 2017; Jasko, LaFree, & Kruglanski, 2016; Webber, Klein, Kruglanski, Brizi, & Merari, 2017; Webber & Kruglanski, 2016) suggests that the need in question is individuals' *quest for personal significance*; this is the desire to matter and have respect in one's own eyes and those of revered others. When that particular need is activated at a sufficient magnitude, it may suppress alternative needs. This liberates individuals from needs that prohibit potential means of gaining significance that they would normally constrain.

As such, release from constraints does not yet determine what particular means to the dominant need would be chosen. It merely allows an enlargement of the means set and inclusion in it of formerly prohibited activities. In many cases, other non-prohibited activities would be selected for enactment. In the context of present interest, people may pursue their overriding need for significance non-violently–even under motivational imbalance. Because the quest for significance, that underlies violent extremism, is social in nature (i.e., significance is awarded by one's respected peers) the selection mechanism of the particular means to significance resides in the shared narrative of one's reference group. In essence then, when the quest for significance looms large individuals become susceptible to *narratives* delivered by persuasive members of their social *network* that encourage acts of violence as a pathway to significance. We now examine these processes in greater detail.

3.1. The quest for significance

We believe that the human quest for personal significance represents a basic need whose fulfillment is essential to individuals' sense of well-being. It is implicit in such motivational notions as the need for competence (Deci & Ryan, 2000), enhancement (Fiske, 2010), or control (Higgins, 2012). All such constructs connote attainment of high standing on dimensions valued in one's culture (e.g., athletics, art, science, politics, or warfare as the case may be).

The quest for personal significance subsumes a variety of lower level goals identified in the social science literature on terrorism and violent extremism (e.g., Gambetta, 2005; Stern, 2003) such as devotion to the leader, vengeance, the "perks" of paradise, even financial rewards (e.g., monetary payments to families of suicide bombers, salaries to the fighters of Al Qaeda or ISIS). For instance, *vengeance* represents the case where one's disempowerment and humiliation, and hence one's loss of significance is erased by dealing a blow to the perpetrator, the source of one's dishonor thus "leveling the playing field" and restoring one's sense of mattering. Similarly, devotion to the leader of one's group implies carrying out activities that the leader approves of and for which she/he would bestow significance on the individual. Financial rewards, or the perks of paradise have prominent significance bestowing character as they are in recognition of one's worthy contributions on behalf of one's group's religious, ethnic, or national values. Even salaries dispensed to foot soldiers of terrorist organizations or payments to relatives of killed 'martyrs' are emblematic of bestowed significance: they enable individuals to care for their families, thus honorably living up to their obligations as providers. Essentially any lower level goal can be construed as significance bestowing if it is linked with it in some

compelling fashion. In the case of extremism, the operative question, then, is how these particular sub-goals—especially those that involve violence—become cognitively linked with the concept of significance.

3.2. Significance through violence

Arousal of one's need for significance (e.g., through a significance loss, and/or the opportunity for a significance gain) does not necessarily imply a resort to violence. After all, personal significance defines a universal human need which most people fulfill non-violently. In circumstances of severe intergroup conflict, however, unleashing violence against the adversary is often hailed as a particularly effective route to significance, earning one the status of hero or martyr. Typically, societies pay homage to, and glorify those who risk life and limb on their behalf. And across time and culture, military service has been regarded as a most honorable pursuit (Olsthoorn, 2005). Thus, even though violence isn't significance-gaining *necessarily*—it often is so as a symbol of physical dominance and in its pervasive role in intergroup conflict throughout human history. Groups experiencing such conflict often strengthen the association between the readiness to unleash violence against the group's enemies and social status that individuals are accorded in return. The means-ends relation between violence on behalf of one's group and the attainment of personal significance is spelled out in many cultural narratives especially those of militant organizations of various sorts (Kruglanski, Gelfand, & Gunaratna, 2012).

Extensive empirical research carried out in recent years supports the intimate relation between the quest for significance–and the support of violence on behalf of some sanctioned cause. For instance, open source materials about successful suicide attackers suggest that those animated by a loss of significance and/or a particularly strong appetite for significance gain committed more severe attacks (in terms of the numbers of people killed and/or wounded in the attacks) than individuals with a less intense quest for significance (Webber et al., 2017). Examination of ideologically motivated crimes carried out in the U.S. yielded that violent (vs. non-violent) crimes were more likely to be committed by individuals who suffered considerable loss of significance in one or more life domains (Jasko et al., 2016). And Muslim immigrants in the U.S. who felt marginalized and discriminated against were more likely to support and identify with radical Islamist groups (Lyons-Padilla, Gelfand, Mirahmadi, Farooq, & van Egmond, 2015) (for a review see Kruglanski, Belanger, & Gunaratna, in press).

4. Cognitive mechanisms in violent extremism

Our present aim is to elucidate the cognitive mechanisms that enable violent extremism. Instead of discussing all cognitive processes that underpin this complex behavior, we rather focus on those of particular relevance to the process of extremism, of which violent extremism is a special case. We view these cognitive principles as describable at a different level of analysis than is (violent) extremism and see them as building blocks of extremist phenomena (in the same way as brain processes are at a different level of analysis and constitute building blocks of cognitive phenomena).

We thus discuss four cognitive mechanisms of particular relevance to extremism: 1. *knowledge acquisition (learning),* 2. *knowledge activation*, 3. *selective attention,* and 4. *inhibition*. The knowledge acquisition phase refers to the formation of the violence-significance schema whereby the former (i.e. violence) is seen to lead to the latter (i.e., significance). The knowledge activation process refers to priming the schema and rendering it accessible and ready for implementation. Finally issues of selective attention and inhibition refer to focusing on the activated schema and inhibiting possible distractors possibly arising from other needs, affording the motivational-imbalance state.

4.1. Learning and inference processes in extremism

Violent extremism refers to individuals' attempts to gratify their quest for significance via violent actions. For this to happen the individual must first forge a cognitive link between violence and significance. This amounts to forming a means-ends schema that ties the two in an "if then" fashion whereby *if* violent means are implemented (then) the end goal of personal significance is advanced. Formation of a schema occurs in a process of learning or inference in which a hypothesis (e.g. that violence is rewarded by significance) is validated by relevant evidence (Kruglanski & Gigerenzer, 2011). Importantly, such evidence can take different forms: individuals may glean it from their own experience (e.g., gaining respect for their violent actions), or from the observed actions of others and the response they elicit, and/or from messages by credible communicators whose assurances are believed (Kruglanski et al., 2005).

In the case of violent extremism, the evidence that *violence* is legitimate and rewarded by others' *veneration* is typically offered in a culturally accepted ideological narrative delivered by a credible messenger. The messenger could for instance be a group leader, a charismatic communicator, or a high ranking member whose knowledge and intentions are trusted. *Perceived consensus* within one's group that affirms the "violence equals significance" narrative may also be treated as evidence of its validity.

4.1.1. Awareness of underlying reasons

Nisbett and Wilson (1977) (see also Chun, Kruglanski, Sleeth-Keppler, & Friedman, 2011) in a seminal paper demonstrated how individuals are often unaware of the true causes of their behavior that often are implicit and inaccessible to consciousness; instead people typically attribute effects (e.g., behaviors) to readily accessible, 'explicit' causes that make good explanatory sense in a given context (see also Haidt, 2013). Such dynamics may well apply to individuals who commit violent actions against others. It is likely that those individuals are often unaware that what ultimately drives their behavior is their quest for significance (e.g. aroused by a significance loss and/or opportunity for a significance gain). Instead, they might ascribe their behavior to their devotion to a nationalist, ethnic, religious, or social cause as such without explicitly realizing that serving the cause is but a means serving their fundamental quest for significance, the ultimate driver of their behavior. Along those lines, interviews with German neo Nazis that we have recently carried out (Kruglanski, Webber, & Koehler, in press) revealed that in explaining their attraction to the movement they mentioned the significance theme in less than a 50% of the cases, as compared to nearly 80% of cases where they mentioned the movement's ideological narrative and/or the support for that narrative by their network, as the main drivers of their attraction.

Although not always present in awareness, formation of the violence-significance schema is an important and necessary phase in the production of behavior classifiable as violent extremism. Yet its mere availability in memory is insufficient. For violent extremism to be manifest in behavior this schema needs first to be activated or primed (Higgins, 1996).

4.2. Knowledge activation

Indeed, the cognitive mechanism of knowledge activation is involved throughout the radicalization process. It plays a key role in arousing one's significance motivation and in identifying possible ways of satisfying it. It can thus occur at both the goal as well as the means level, with each increasing the likelihood of violent behavior.

4.2.1. Goal activation

The process of knowledge activation assumes that a given knowledge construct is *available* in memory and that it can be triggered, and hence made *accessible* by stimuli in the individual's environment. The ease with which an available construct is activated by a cue or prime defines its degree of accessibility, or activation potential (Higgins, 1996). Accessibility, in turn, is determined by the degree to which the primed construct is currently motivationally relevant to the individual (Eitam & Higgins, 2010; Higgins & Eitam, 2014).

From the present perspective, the goal of personal 'significance' is highly motivationally relevant to most people, stemming as it does from such basic needs as those of competence (Deci & Ryan, 2000) or control (Fiske, 2010; Higgins, 2012). However, it is not active invariably. At times individuals may be motivated by other basic needs, for instance, the biological needs for nutrition or hydration, or the psychogenic needs for intimacy, exploration or understanding (cf. Berlyne, 1960; Fiske, 2010). Priming the significance construct through external stimulation may bring it to the fore, occasionally to the extent of crowding out alternative concerns. In real world settings, such priming may be accomplished in various ways, for example, through sermons or exhortations delivered by charismatic communicators, through discussion in chat rooms on the internet, through Instagram posts or videos invoking concepts or depicting events related to significance, etc.

Typically, exhortations by propagandists activate the goal of collective significance related to the humiliation of a group (e.g. Muslims, Palestinians, Americans) suffered at the hands of an adversary, and these appeals hence communicate a loss of significance on the part of the group's members. In those instances, significance loss is bound with the individuals' social identity (i.e. their wounded pride as Muslims, Palestinians or Americans). Additionally, the goal of significance restoration may be activated by memories of one's personal failures, debacles, and humiliations unrelated to group values, and also by the activation of heightened *expectancies* for successful attainment of significance. As we discussed in details elsewhere (Kruglanski, Chernikova, Rosenzweig, & Kopetz, 2014), all goals have a value and an expectancy component: activation of a heightened expectancy of significance through some advocated actions (e.g. violence against one's group's detractors) should increase the activation of that goal as well.

4.2.2. Means activation

According to goal systems theory (2015; Kruglanski et al., 2002), the stronger the cognitive link between a goal and a means, the more likely it is that activation of the goal will lead to activation, and thus selection, of that particular means. The strength of the goal-means association depends on the number of means attached to the goal within one's goal network: the fewer the means, the stronger the connection and the greater the perceived instrumentality of a given means (see also Anderson, 1983; Zhang, Fishbach, & Kruglanski, 2007). This implies that a means is perceived as particularly instrumental when no other means is connected to the same goal, (referred to as a unifinal link), or when a means that serves the focal goal is negatively associated (i.e. is seen as incompatible) with other goals (referred to as a counterfinal link) (cf. Kruglanski et al., 2015). The latter, counterfinal, link additionally signals one's commitment to the focal goal. Violent extremists often believe that violence is the only way whereby they can regain significance, and this perception may be partly produced by the sense that violence is counterfinal in the sense of it requiring the sacrifice of other basic concerns (e.g. safety, survival). Consider the testimony of a Palestinian militant interviewed by Post, Sprinzak, and Denny (2003):

> You have to understand that armed attacks are an integral part of the organization's struggle against the Zionist occupier. There is no other way to redeem the land of Palestine and expel the occupier. Our goals can only be achieved through force, but force is the means, not the end. History shows that without force it will be impossible to achieve independence. Those who carry out the attacks are doing Allah's work… (p. 179)

The belief that violence is the best or the only effective means for regaining significance is constantly sustained and enhanced by the narrative (ideology) and the individual's social network that

consensually validates the narrative. These strengthen the significance-violence link, which in turn increases the likelihood of activating the means of violence whenever the end of significance is activated.

4.2.3. Downstream consequences of activation

Activation of any cognitive construct typically has downstream effects on subsequent thoughts or actions. For instance, it can affect the categorization of ambiguous stimuli that share features with that construct (Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979; for a review see DeCoster & Claypool, 2004). Thus, activation of the significance construct may increase an individual's tendency to interpret others' ambiguous remarks and behavior as significance decreasing (i.e., as slights or insults) or as significance increasing (i.e., as compliments and recognitions). It may also increase the likelihood of overattributing hostile intentions to the outgroup (an often identified cause of violence and aggression, e.g., Berkowitz, 1977; Dodge & Frame, 1982). Activation of a given goal will spread the activation to semantically related nodes in the goal's associative network (such as the means of attainment, as argued earlier) and inhibit other constructs (such as competing goals and needs). It could also prime the emotion constructs associated with attainment or failure to attain significance (e.g. shame, dejection) and it will, finally, selectively guide one's attention–an issue we discuss in what follows.

4.3. Selective attention

Once activated, goals direct one's attention and affect the way attentional resources are distributed – with most resources being devoted to goal-relevant constructs and features. Given the limited character of cognitive resources, this results in attention being diverted away from other, goal-irrelevant topics (e.g. Moray, 1959; Studdert-Kennedy, Shankweiler, & Schulman, 1970). Moreover, researchers argue that activation of a goal leads to adoption of a certain attentional set which not only facilitates perception of goal-relevant stimuli, but also creates a top-down constraint overriding the capturing power of other, irrelevant information (Most, Scholl, Clifford, & Simons, 2005; Simons & Chabris, 1999; Simons, 2000). Such inattentional blindness has been robustly demonstrated in numerous laboratory and field studies (e.g., Mack & Rock, 1998; Most et al., 2005) and can take such striking forms as inability to notice a person wearing an unusual suit (Simons & Chabris, 1999) or an airplane moving in front of one's eyes (Haines, 1991).

Typically, in cognitive experiments selective attention was studied in reference to externally presented stimuli (e.g. text presented in a dichotic listening task or differently colored words in the Stroop task [Stroop, 1935]). But selective attention can also apply to internal constructs such as ideals or goals. For instance, the phenomenon of *rumination* refers to focusing attention on the symptoms of one's distress, and on its possible causes and consequences (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). And in the context of multiple goal activation it was found that increased activation (through priming) of some goals led to the withdrawal of attention from other goals, labeled the 'goal pull' effect (Shah & Kruglanski, 2002).

These attentional mechanisms likely play an important role in radicalization. For instance, focusing one's attention on personal significance (e.g. occasioned by instances of humiliation and significance loss) may take attention away from issues of comfort and safety and enable individuals to enact risky behaviors at odds with those concerns (e.g. volunteer for suicidal attacks). Similarly, focusing attention on issues of security and safety (as likely did much of the U.S. population in the aftermath of the 9/11 attacks) may divert attention from issues of human rights, allowing torture to be practiced (e.g. in the Guantanamo, or Abu Graib facilities, as well as in other 'black sites') and disregarding concerns with humanity, compassion, or empathy.

4.4. Suppression

Selective attention refers to focusing attention on some (internal or external) stimuli and consequently the withdrawal of attention from others. Often, however, mere diversion of attention might be insufficient and active suppression is also required. Consider the well-known Stroop test (Stroop, 1935) in which participants are instructed to name the color in which a color-denoting word is printed. When the word is printed in a color different from that denoted by the name (e.g., the word "green" printed in blue), naming the word's color typically takes longer and is more prone to errors than when the printed color matches the name of the color as it appears in the text. On the incongruent (vs. congruent) trials where the text does not match (versus matching) the color—emitting the correct response requires inhibiting the incorrect response elicited by the word (see also the flanker task, Eriksen & Eriksen, 1974).

A similar effect was found in reference to goals. Research with the use of the sustained inattentional blindness paradigm showed that in order to complete their task participants not only "tuned" their attention to the stimuli related to the current goal but also suppressed the stimuli related to alternative goals.

In research by Most et al. (2001, Experiment 2) participants were given the goal of counting the number of times grey objects on the screen bounced off the edges of the display. Some distractor items (either black or white, depending on a condition) were presented. During the task, an unexpected object (also either black or white) appeared in the display. The results showed that when the unexpected item was the same color as the distractor items, very few participants noticed it. But when it matched the color of the goal-relevant black/white objects, most of the participants noticed it. This provides support for the active suppression, or inhibition, of information that might interfere with the current goal.

These findings are in line with work on goal shielding carried out by social cognition researchers. Thus, in a series of experiments, Shah et al. (2002) showed that the activation of focal goals to which the individual is committed inhibits the accessibility of alternative goals. Importantly, the more important the focal goal was to the person and the more committed she was to it, the stronger was the shielding, or inhibition of the alternatives. This is in line with other studies (inattentional blindness was found to be greater when participants found their goal to be important vs. not important [Neisser, 1979]) and helps explain how the motivational imbalance assumed to underlie extremism is enabled by the persons' cognitive mechanisms. And since increased goal shielding reduces the flexibility of shifting between goals (Fischer & Hommel, 2012), it also sheds some light on how the motivational imbalance is sustained.

4.5. Attentional processes in violent extremism

The process that underlies split-second reaction time differences in experimental tasks like the Stroop test helps explain large-scale goal driven behavior as well - an essential step towards understanding how extremism is afforded. Specifically, when the individual's need for significance becomes dominant, it directs or "tunes" her or his attention to goal-relevant constructs. And it concomitantly draws attention away from other concerns such as one's family, safety, or physical health. Consider the testimony of a former Black Tamil Tiger, a member of the prestigious suicide squads operated in Sri Lanka by the Liberation Tigers of Tamil Eelam whom our team interviewed recently in that country.

> Family and relationships are forgotten in that place. There was no place for love. That means a passion and loyalty to that group, to those in charge, to those who sacrificed their lives for the group. Then I came to a stage where I had no love for myself. I had no value for my life. I was ready to give myself fully, even to destroy myself,

in order to destroy another person. (cited in Kruglanski et al., 2013, p. 564)

We have argued that such full commitment is possible due to the enhanced shielding and inhibition of alternative goals. This inhibition often effectively operates beyond one's awareness–to the extent that one might fail to perceive some visual, auditory, or tactile stimuli (Mack & Rock, 1998) (which might explain unawareness of certain aspects of one's surroundings, or even physical pain, when one is focused on an all absorbing mission). According to testimonial accounts, it is also well illustrated in the way Black Tigers recruit their new members, as related to one of us (AK) in personal communication by a Sri Lankan officer in charge of investigating the Black Tiger suicide units. Specifically, volunteers for the unit are invited for an interview, but before it takes place they are asked to wait in a foyer. During the interview they are asked to describe what they saw while waiting and name all the details they remembered. Only those who remember very few details, attesting to their complete engrossment with the forthcoming interview, are accepted.

Effortful inhibition, however, is also often required. Since in case of extremism it is basic needs that are neglected, they may well "vie" for attention as well. As fulfillment of those needs is essential to individuals' well-being, the focusing of attention on the dominant, extremism-promoting need may require considerable effort directed at inhibiting those competing basic concerns. Precisely because such alternative concerns are basic, they are likely to assert themselves sooner or later, and grab the individual's attention. Staying focused on the dominant need may then require an active inhibition effort.

In analogy, consider a basic need for nutrition manifesting itself through hunger. Though preoccupation with other concerns, say with an engrossing intellectual activity, may take one's mind off hunger for a while–this state is likely to be only temporary. Sooner or later, hunger will let itself be known through growing pangs induced by a prolonged fasting, and come to insinuate itself into the individual's awareness. In short, to maintain attentional focus on a given topic to the exclusion of others, mechanisms of selective attention may need to be augmented by those of active suppression: an effortful process of banning unwanted thoughts from one's mind (Anderson & Huddleston, 2012; Lee & Kang, 2002; Wegner & Erskine, 2003).

Accordingly, extremism (of whatever kind) is fraught with psychological difficulty (entailed by the required investment of inhibitory energy). As a consequence, the more extreme the behavior (i.e. the greater the upset of the psychological balance) the fewer the persons (namely those with extraordinary self-regulatory capacity) capable of keeping it up, especially for a long duration. For instance, the average length of time individuals spend as members of violent far right organizations in Europe (e.g. of the neo-Nazi variety) is about ten years (Bjorgo, 2002. Similarly, Pyrooz and Decker (2011) examined interviews with former juvenile gang members in the U.S. and found that gang desistance was strongly correlated with age suggesting a natural aging out process from membership in gangs. Gottfredson and Hirschi (1990) age-crime curve suggests that criminal activity prevalence peaks in the late teens and declines in the early 20's. Additionally, Laub and Sampson (2001) suggest that the vast majority of criminal offenders stop committing criminal activities. Key elements to this desistance include aging, marriage, securing legal, stable work and/or reassessing the costs and benefits of crime (i.e., realizing the sacrifice to other needs that engaging in crime effects). And although drug addiction, alcoholism, and eating disorders, are often long lasting, individuals typically engage in protracted battles with these afflictions aimed at a recovery of a motivational balance that affords a harmonious satisfaction of their basic needs (Carter et al., 2012; Keel, Dorer, Franko, Jackson, & Herzog, 2005; National Center on Addiction and Substance Abuse at Columbia University, 2012).

In summary, processes of learning, knowledge activation, selective attention and inhibition play an important role in all kinds of extremism, including violent extremism. Activation of a dominant need, and the focusing of attention on it, come at the expense of alternative concerns that also demand attention. Maintenance of extreme behavior may thus require continued investment of efforts and energies in inhibitory processes that deny attention to those concerns. This imposes stress on the motivational system as a consequence of which extremism tends to be time-bound, and to be exhibited by small segments of most populations.

5. Recapitulation and conclusion

Much of human behavior is purposive and intelligible. It is typically represented in consciousness as people generally are aware of *what* they are doing, and have some idea (whether accurate or not) of *why* they are doing it. Cognitive processes enable this awareness and hence are centrally involved in setting the conditions for action. Not all actions are created equal, however. And actions' unique properties are shaped in part by the way the cognitive processes are applied in a particular instance.

These notions were presently discussed in reference to actions describable as violent extremism. To address this topic we first conceptualized the general phenomenon of extremism, of which violent extremism is a special case. We posited that extreme actions originate from a motivational imbalance in which a given fundamental need takes precedence over other needs. This results in the withdrawal of attentional resources from the latter needs and a removal or relaxation of constraints that these normally impose. In turn, this liberates previously restrained means to the currently dominant goal, paving the way to their implementation.

We applied these notions to the phenomenon of violent extremism. Based on our prior empirical and theoretical work (e.g., Kruglanski et al., 2009, 2013, 2014, 2017Kruglanski, Chen, Dechesne, Fishman, & Orehek, 2016; Webber et al., 2017) we identified the *quest for personal significance* as the dominant motivation that induces individuals to risk life and limb for an ideological cause (or a "sacred value" as Atran, 2010, dubbed it) whose defense and advancement is perceived as significance bestowing. Accordingly, the pursuit of violent extremism entails the suppression of alternative concerns, those for safety, and comfort as well as empathy and compassion for other human beings. When the latter concerns are muted, violence and aggression (that were previously prohibited) become entertainable options. Their added appeal derives from their historical role in establishing physical dominance and social status, and in their legitimation via ideological narratives embraced by individuals' networks.

The present portrayal of violent extremism utilizes the workings of several major cognitive mechanisms to investigate the motivational role of personal significance in fostering violent extremism. Processes of inference and judgment formation transform the "grist" of accessible motivational constructs into firm action-relevant judgments concerning means and ends through the "mill" of an inferential process in which conclusions are drawn from (subjectively relevant) evidence. Knowledge activation is responsible for bringing to mind the goal of personal significance and rendering it accessible and attention-drawing. It also "tunes" attention to goal-relevant stimuli and causes its diversion away from other concerns. The mechanism of inhibition augments this process by suppressing alternative motivational concerns incompatible with (and hence imposing restraint on) violence and aggression.

Understanding the cognitive mechanisms that underlie violent extremism may be leveraged to gain insights into ways of countering extremism. These may require: (1) the *reactivation* of basic motivational concerns (basic needs and values) that constrain the means to significance and prohibit violence (2) *activation* of alternative, pro-social means to significance compatible with the reactivated concerns, and (3) their validation through evidence contained in compelling narratives supported by individuals' networks.

5.1. Implications for applied efforts

A recent study assessing the Sri Lankan rehabilitation program for former members of the Liberation Tigers of Tamil Eelam (LTTE, decisively defeated in 2009 by the Sri Lankan military) provides initial evidence for the utility of our theory. The program included educational, vocational, psychological, family and community training, and it was aimed at psychological empowerment of detainees and providing them with sustained mechanisms designed to enhance their sense of personal significance (Webber et al., 2018).

The program proved to be effective as it significantly reduced extremist attitudes (expression of violent intention against the Sinhalese majority) after one year. A follow-up study showed in addition that upon release beneficiaries expressed lower levels of extremism than their counterparts in the Tamil community. Mediation analyses showed that the reduced feeling of insignificance accounted for this reduction in extremism. The processes we have discussed in this paper offer some insight into cognitive mechanisms that may have enabled such a transition. Namely, by reducing beneficiaries' feeling of insignificance, and equipping them with professional education allowing them to earn significance without sacrificing their other needs (e.g. of safety, survival, or intimacy) the cognitive link between violence and significance may have been weakened and the link of significance to socially constructive activities may have been strengthened.

The ability of Tamils from the region to succeed in life without resorting to terrorism was additionally demonstrated by successful individuals from the Tamil community in Sri Lanka (business people, athletes, regional movie stars) whom the beneficiaries had the chance to meet. This could also activate a heightened *expectancy* of significance through actions accepted and desirable by the mainstream, further diffusing the violence to significance connection.

By this and other efforts aimed at facilitating transition back into mainstream society, participants were taken out from the environment which sustained their engagement in violence as a unique means for earning significance and helped to place them in a new one which rewards (with respect and significance) non-violent strivings.

5.2. Future directions for cognitive research

Although crucial, the cognitive processes we have focused on in this paper are not the only ones that might be responsible for the evolution and devolution of violent extremism. We selected mechanisms based on empirical evidence and their specific role in an individual's goal-system, yet there may be additional ones worth considering in this context. For example, memory and language processes likely play a role in an individual's development of significance needs. For instance, *memory* of their 2009 defeat may be fresh in former members of the LTTE organization, thus weakening their subscription to the "violence brings significance" schema. Such memory may be less vivid in new cohorts of young Tamils, who may be therefore more enthusiastic to revive the violent struggle for Tamil independence. Consistent with this notion Webber et al. (2018) found that erstwhile LTTE fighters who completed the deradicalization program were significantly less likely to express anti-Sinhalese attitudes that were members of the Tamil community at large who did not belong to the LTTE. And in November 2017, numerous Tamil University students attended an (outlawed) celebration of LTTE slain leader's (Prabhakaran's) birthday (Express, 2017, November 27), carrying the troublesome portent of their possible radicalization. Though suggestive, the specific role of memory in these phenomena must await further systematic investigation.

Also, understanding the impact of *language* may point to an important direction for future research. As particularly related to in-group and out-group bias (Webster, Kruglanski, & Pattison, 1997) and to use of violence (in case of delegitimizing language of targeted others, Bar-Tal, 1990) – understanding the impact of language might afford insights into radicalization and be helpful in efforts to build effective deradicalization programs. For instance, the sophisticated deradicalization program in Saudi Arabia, and similar programs that were modeled after it, such as the Sri Lankan and the American program in Iraq (see, Angell & Gunaratna, 2011; Kruglanski, Belanger, et al., in press) refrained from referring to inmates of the deradicalization facilities as 'terrorists', 'militants', 'radicals' or even 'detainees.' Instead, they called them 'beneficiaries,' based on the logic that the former designations may be insulting and occasion a significance loss, contrary to the program's intentions to build the inmates' sense of significance and their potential to enhance it further through pro-social means.

Declarations of conflict of interest

None.

Acknowledgement

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