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Psychobiology of Extremist Violence[1]: The Comeback of Individuality

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Abstract

Research on the psychological paths leading towards involvement in violent extremism and terrorism has not produced a consistent layout of traits describing recurrent dispositions or plausible vulnerabilities. Extremist/terrorizing violence can adopt many forms from lone-actor attacks to guerrilla actions and other war-like tactics, and such versatility defies unifying depictions. Advances achieved at identifying important elements of ingroup dynamics and commitment ties mediating the surge and activities of violent groups neglected individual factors. Recent research has re-established the relevance of individual temperament traits to explain the attraction, engagement and support to these combative coalitions and the different roles and involvement that people enact in them. This essay presents some of these research forefronts and proposes further integration between individuality-based measures with ingroup-related mechanisms when studying proneness to violent extremism. A merge between Personality and Forensic Psychology with Social Neuroscience appears as a particularly fruitful track to generate consistent advancement in the area.

Keywords

Violent Extremism, Terrorism, Personality, Temperament, Cognitive Style, Intergroup Conflict

1. Introduction

When lethal terrorizing violence comes under the banner of an extremist ideology (political, religious, ethno-national, racial, ecological, animalistic or whatever

[1]I deliberatedly renounced to specify boundaries between violent extremism and terrorism because decades of scholarly attempts and debates to establish distinctions between them were wholly unsuccessful (Schuurman, 2020; Atran, 2021).

sort of a shared belief system), social psychology research hastily jumps to interpersonal and group explanations. Informed guesses or elaborated conjectures are launched to search for a plausible combination of collective influences (motives, values, interests, needs, aspirations), that might have helped to engender, first, and ignite afterwards the damaging actions.

Once direct perpetrators and their collaborators have been identified, urgencies to unveil the ultimate reasons behind their actions leads to disregard merely individual motivators and to focus efforts instead towards a search for the cluster of interpersonal and communal ingredients that apparently inspired and induced the deadly attacks. Whether they arrive from the changing and unending variety of islamic fighters, the rich mosaic of extreme-left and far-right radicals, the multiple nationalist, separatist and tribal insurgencies or the narco-gang guerrillas, an immediate temptation is to try to gather an explanatory cluster of collectively operated engines that suposedly are the essential drivers of dreadful violent tactics (Atran, 2021). Regardless the ideological seeds or brands that forged attacks and claimed authorship, group-rooted mechanisms have primacy.

The departing assumption behind that approach might be formulated in the following way: individual traits, motives and goals matter, of course, when dealing with extremist/terrorizing violence, but they are the obvious targets of forensic psychology (Silke, 2008, Horgan, 2014, Lankford, 2013). Guilt and responsibility assignation require detailed imputations of agency, motivation and degree of participation at the individual level. Juries need to ponder and resolve on the basis and specifics of personal involvement data.

However, in order to understand fully the roots of a violence that erupts as an occasional or recurrent tactic during ideologically conveyed intergroup conflicts, sophisticated social psychology tools are compulsory. Only a deep understanding of the coalitional and interpersonal forces unleashed by these conflicts and the mechanisms through which communal confrontation influence individual actions might provide clues to try to prevent further attacks.

This seems reasonable enough as extremist violence and terrorizing tactics most typically emanate either from small, encapsulated agonistic cells or from large and widely scattered combative movements, harboring nonetheless a cohesive and motivating doctrine. A persuasive though not necessarily elaborated narrative that provides the script for political and moral justification (Ginges, 2019), as well as the goals and missions to inflict harm and instill apprehension on targeted enemies.

"Lone-wolves" are no exception to that since even when they act fully isolated and on their own, more often than not they adscribe themselves and their deadly missions to some type of doctrinal allegiance with discernible collective resonances (Corner and Gill, 2015; Baele, 2017).

Outline of the essay: This essay was conceived as an attempt to reassert the relevance of individuality-oriented research about the role of recurrent and discernible temperament dispositions on the paths leading towards violent extrem-

ism and terrorism. To fulfill this goal, I selected some of the most promising research avenues that have used this approach and discussed their findings. The essay proceeds through the following steps: the following section deals with the paucity of convincing explanatory models for proneness to extremist violence; the next one is a summary of interpersonal and ingroup mechanisms that have almost monopolized research endeavours in the area for decades; the fourth, fifth and sixth sections contain selected examples of the return of individuality-oriented research at the forefront of efforts to fill voids that socially-oriented research was unable to replenish. The seventh section enters into the different roles (leaders/followers/supporters) that individuals play on combative groups as a complementary way to study individual factors; the eighth summarize the preliminary incursions into the neuroscience of proneness of violent extremism. The last one proposes a merge between approaches and methods of Forensic Psychology with those of Social Psychology and Psychobiology/Neuroscience of Personality as a particularly promising frontier to discern individuality nuances on this combative and dreadful variety of human action.

2. Unsatisfying Explanatory Pathways for Extremist Violence

"*The predictors of terrorism are unclear*"

Krueger and Malecková (2009).

"*How can science help us to understand why certain people develop extreme opinions and beliefs that, in some cases, lead to violent extremism including acts of terrorism*? *This question captured the interest of scholars from various disciplines, particularly the social sciences… The resulting literature is replete with failures to construct terrorist profiles based on personality traits, psychopathology, religious orientation, or racial and/or economic background*"

Decety, Pape and Workman (2018).

After decades of research to try to marshall the contextual and interpersonal ingredients that contribute to establish the socio-psychological pathways leading towards participating in terrorizing attacks, there is a shared unsatisfaction among prominent scholars who have reviewed the issue (Bruneau, 2016, Borum, 2014, Decety et al., 2018, Horgan, 2014, McCauley and Moskalenko, 2017, Whitehouse, 2018, Schuurman, 2020, Atran, 2021). The attempts to get useful layouts or consistent maps from studies that have analyzed the interactions between doctrinal narratives, shared dogmatic beliefs, close team-group dynamics and personal feelings and trajectories have not produced a robust and tightly integrated body of findings from which to depart for further and more incisive explorations.

There are, however, a few general points that permit a consensual departing depiction:

- Extremist and terrorizing violence erupts and wanes with highly irregular ryhtmicity within societies that suffer it.
- Ideologically motivated lethal violence heralds a rich variety of brands and

flags. Such violence is typically targeted upon attaining limited or ambitious goals. Scope can be regional, national or transnational.

- At early stages, violent attacks are typically practiced by a self-selected and tiny minority of ordinary, mostly young and highly commited males operating within a small agonistic coalition.
- These agents decide to indulge themselves in demanding and risky operations that may require killing people (the targeted "enemies"), while assuming variable risks for themselves that might cost losing their lives.
- Another very restricted minority of actors accept sacrifizing their lives operating as human weapons (*suicide attackers*), when such lethal tactic seems convenient to erode adversarial capacities and morale.
- Sometimes, deadly attacks are planned and executed by "*lone actors*" behaving on their own. Extremist and terrorizing violence is, nevertheless, mostly a teamwork: a combative, war-like, intensive or occasional effort that may take many forms.
- The basic coalitional unit can also be quite diverse: from autonomous and isolated cells to loosely organized and disseminated guerrillas, or commandos enrolled into territorial and tightly organized insurgent proto-armies (Logan et al., 2017).

Hence, agents of extremist violence are ordinary young people who voluntarily enter and indulge themselves into risky confrontational deeds attacking people and damaging spots, infrastructures or institutions, from the outskirts of an organized society[2]. They are common people that practice deadly actions claiming to defend and expand a particular belief or ideology. These actions may advertise and promote a radical collective aspiration, though individual agents do not need to be ideologically radicalized themselves: what is exceptional and extreme is the behavior pattern they adopt (Atran, 2021; Choi and Bowles, 2007; Gómez et al., 2021; Pape, 2005, Sageman, 2004, Tobeña, 2012).

The fact that extremist violence springs almost always from a tiny minority of young people—mostly males but with a nontrivial segment of highly combative females (Silke, 2008; Horgan, 2014; Shortland, 2021; Van Vugt, 2009)—, is relevant because it permits focusing on the singularities of a complex though restricted universe (Atran, 2021; Baele et al., 2020). A range of ideologically driven agonistic teams that pretend to harm, subvert or replace an "oppressive", "unjust" or "corrupt" order through violent methods.

3. Interpersonal-Coalitional Vectors

A rich body of findings has been accrued describing the role of interpersonal and

[2]Some guerrilla tactics typically used by violent extremists are used by the institutional forces of stable societies (police, armies, intelligence), while counteracting or crashing revolts, or as defensive/offensive actions against contrarian institutional forces if a trans-national conflict arises. Moreover, it is not rare for civil wars to start with operations from small rebellious groups, though they typically escalate to confrontations between opposing armies. Combatant's recruitment then goes from mainly voluntary to a variety of coertion or abduction procedures (Humphreys and Weinstein, 2008; Gómez et al., 2021).

identity processes in shaping the individual engagement in challenging and costly pro-ingroup violent actions. The cohesive ties promoted by "*fusion identity*" mechanisms (Swann Jr. et al., 2012, 2014); the degree of ingroup commitment triggered by dysphoric and dramatic "*rites of sacrifice*" (Whitehouse et al., 2017; Whitehouse, 2018); the inspiring attempts to assert or restore self-worth or "*quest for significance*", particularly after deep losses or grievances (Kruglanski and Fishman, 2009, Kruglanski et al., 2017); the invigorating force released by anger at perceived injustices to the ingroup (Obaidi et al., 2018, 2020); and the beacon role for firm and non-negotiable involvement played by "*sacred values*", during entrenched confrontations (Atran et al., 2007; Atran & Ginges, 2012), are all of them ingredients that play an important part on group dynamics. They help to give birth and maintain the strong interpersonal links within "fictive kinship" units. These tightly cohesive and combative cells ready to act as offensive/defensive coalitions (Wrangham, 1999, Glowacki et al., 2020).

Interpersonal and value-driven ingroup attachments presumably work as intertwinned vectors strengthening ideological extremism defined as "*the justification of intergroup violence and demand for sacrifice in defense of the ingroup*" (McCauley and Moskalenko, 2008, 2017). They lead individuals to endorse first and actively participate afterwards on enacting hostile actions against those that appear to threaten the ingroup and its unifying ideological causes.

Such mechanisms behind ingroup ties and commitments have been investigated as well in general populations for nationalistic attachments (Zmigrod et al., 2018; Golec de Zavala et al., 2019), religious doctrine (Fredman et al., 2017), political attitudes (Jost, 2017) and deep loyalty to sports teams (Xiao and Van Bavel, 2012). Their roles mediating ethno-national communion, religious fundamentalism, supremacist-xenophobic movements or soccer hooliganism have been disclosed in detail.

The operation, however, of similar ingroup commitment pathways both on highly secluded cells and within the much more unstable and variable loyalties on large societies, leaves unanswered questions about the crucial individual attractors and maintenance bonds that may fulfill the challenging demands of violent extremism.

A favorite way of analyzing the mediating force of cohesive vectors within violent cells has been assessment individuals' *willingness to fight and die* for the ingroup, either through self-reports or during behavioral/cognitive tasks at the laboratory under imagined situations (Gómez et al., 2017; Pretus et al., 2018, 2019). Even obviating the noise coming by mixing the obviously different costs required by "fight" and "die" (Hansen, 2018), the fact that those assessments provide estimations of declared "intentions" only, devoid of any token of a real compromise, opens up the huge gap between statements and actual behavior.

These shortcomings in addition to the highly flexible human ability to modify general narratives and specific beliefs during protracted political confrontations, opens all kind of possibilities for adjusting or changing the "sacredness" of re-

vered values, the "fusioned" entitlements towards some targets and even the strict and highly "ritualized" links with comrades. Peer's influence has shown in fact swift capacity to modify apparently strong commitments (Hamid et al., 2019), and charismatic persuassion often succeeds at reverting the more cherished and revered goals. Given these limitations, it is not strange that plausible individual ingredients behind violent extremism have attracted a renovated interest.

4. The Return of Temperament Traits[3]

The reappearence of research interest on normative personality traits that could be behind propensities to violent extremism it's good news. By definition, temperamental traits (recurrent personality dispositions) are behind all human attitudes, preferences and choices, and this entails the full range of them including political, religious or other ideological attachments. When dealing, however, with dreadful violent actions required by terrorist campaigns or insurgent fights, scholars have typically resorted to search for "clinical or subclinical personality traits"—with rather meager results except for lone-actors and well-studied but isolated cases (Lankford, 2013, 2014; Corner and Gill, 2015; Gill and Corner, 2017)—, or putting the wheight on interpersonal and contextual factors which are important but only part of the story.

Obaidi et al. (2021) study with ordinary Muslim supporters of Jihad extremism in three European countries and Afghanistan is a valuable addition of fresh data to a field that had neglected an important engine of human action. They departed from the idea that Muslims who endorse political violence on behalf of *Islam* may be "normal" in a clinical sense, while nonetheless bearing certain recognizable personality signatures. Normative personality description displays the full spectrum of the ways that individuals consistently differ from each other in everyday life. Under this perspective the focus is not on whether violent extremists (either actors or supporters) suffer mental ailments or deviations, but whether they have consistent personal characteristics that might be predictive of their extreme beliefs, attitudes and actions. Hence, focusing on the "normal" personality traits that might predict violent support was fully justified: propensities to violent extremism might be linked to the already rich tradition of research connecting temperamental vectors with ordinary political or religious values and preferences (Jost, 2017; Federico, 2021; Van Prooijen and Krouwel, 2019).

They explored this issue across five studies in four different countries. Firstly, they analyzed the relation between personality traits and the degree of endorsing violence among a Muslim sample from Denmark, and subsequently on a population sample from common Afghan Muslims and in a small number of previous Afghani mujahideen. They gathered then additional data among Muslims samples in Belgium and Sweden using the same battery of measures. All were conve-

[3]In this essay, I use "temperament" and "personality" as equivalent terms despite their unavoidable nuances and the unsuccessful attempts to fix boundaries between them, that individuality-oriented research tried to establish without arriving to a clear consensus. I give "temperament" some precedence as it evokes a wider range of distinctive traits and behavioral styles.

nient samples obtained by contacting Facebook groups discussing *Islam* topics (Denmark, Afghanistan, Belgium) or during a Muslim convention (Sweden). Previous mujahidin were approached through a local non-government agency in Kabul. For assessing normal personalilty traits they relied on HEXACO questionnaire and self-report scales were used to measure behavioral intentions ("readiness" or "preparedness") to support violent or non-violent tactics defending Muslim extremism.

Across the different samples their results showed: 1) a consistent but moderate pattern of correlations indicating that the more emotional individuals (fearful/worriers and empathizers) preferred non-violent forms of giving support to Muslim extremism; 2) another consistent but moderate pattern of correlations showing that the more simple-minded and less curious individuals ("low Openess") preferred violent tactics to support extremism; 3) another modest pattern of correlations showing that altruists (helpful individuals) preferred non-violent forms of supporting extremism. Swedish Muslims who gave part of their salary to the Red Crescent also preferred non-violent forms of extremism support. However, the mujhaidin were much more altruists than common Afghan citizens on the same scale, being this the highest difference in Altruism; 4) they got no correlation between "honesty-humility trait" (an HEXACO vector) with support for extremism and they excluded for this reason the involvement of "psychopatic" traits on propensity to violent extremism. They got also no associations between Extraversion, Conscientiousness or Agreableness with support for extremism; 5) they used sound psychometric contrasts to warrant the consistency and robustness of the results, excluding age as a confound but not entirely gender (women were almost half in their samples, but not a single mujhaidin female); 6) finally, the figures for support for violent extremism hardly attained more than 3.5 points scores, in a scale that went from 1 to 7 points, thus suggesting that they captured a limited degree of extremism only.

Despite these shortcomings, their findings showed that normative personality variables were indeed relevant. Across different samples the use of violent tactics was more appealing to people who were less intellectually open, less empathetic and less emotional. Support for non-violent procedures was predicted by high empathy or emotionality traits. Overall, their personality model explained between 11% and 27% of individual differences in violent and non-violent intentions, a figure which may provide insights into why some individuals, but not others in the same situations, become involved in extremist violence. By finding concording association patterns between personaity traits and support for violent *Jihad* across different contexts, they contributed to fill the lack of transnational studies on extremism using standard personality measures (Merari, 2010; Atran, 2021). Their claim for broader attention to non-clinical personality variables to improve insights into violent extremism was well deserved.

Searches directed to identify what kinds of personality traits, if any, predispose people to endorse extremist violence are rather scarce. The links unveiled

by Obaidi et al. (2021) between normative personality and support for extremist violence might have parallels on studies about the psychological features which characterize political extremism in democracies (Jost, 2017; Federico, 2021; Federico and Golec de Zavala, 2021). However, only intellectual simplicity ("low openess") cohered with traits describing political extremism on ordinary populations (van Prooijen and Kreuwel, 2019). Simplicity in interests and beliefs can be close to dogmatism, rigidity and intolerance either at the left-wing or right-wing poles of political spectrum (van Prooijen and Kreuwel, 2017), although robust relationships have not been established still.

The combination of low emotionality, low empathy and shallow intellectual curiosity as relevant predictors of support for violent tactics, in the aforementioned Muslims, conforms a profile that looks quite similar to typical antisocial clusters of young people attracted to the adventurous ingredients of violent cliques (Chabrol et al., 2009; Moshagen et al., 2018; Pavlović and Wertag, 2021). This path deserves to be explored in depth, despite the hurried dismissal of a plausible role for psychopathic tendencies by Obaidi et al. (2021). The antisocial cluster was the better predictor to gang's embededness in UK prisoners (Egan and Beadman, 2001), and the data gathered using measures of Appetitive Aggression in several samples of young African excombatants could be particularly informative on this regard (Elbert et al., 2018; Kobach et al., 2015). Joy, excitement and rewarding recollections were clearly predominant on youth soldiers who volunteered or were recruted for fierce fighting at early ages.

Moreover, the direction of the links to extremist violence found for the triad of temperamental traits in Muslim supporters contradicts the role of vectors like psychological distress, personal annoyances or high uncertainity that had been associated to extreme political positions in Western samples (van Prooijen and Kreuwel, 2019). This may serve, perhaps, as a reminding of the gap between extreme beliefs and opinions on one side versus extreme intentions or actions on the other (McCauley and Moskalenko, 2017).

Sensation Seeking was another obvious temperamental trait to focus on because the need of excitement and adventure had been targeted often as a main driver of personal itineraries leading to approach and engagement into violent cells. Schumpe et al. (2018) undertook an investigation destined to test the mediating role of hunger for novelty and risky experiences as measured by Sensation Seeking on the expressed willingness to support political violence by self-reports. In a series of interviews with hundreds of university students from Spain and several convenient online samples of USA citizens and animal activists, using transversal, longitudinal and quasi-experimental studies, they showed that Sensation Seeking was a relevant mediator for support of violent tactics and for approval of combative actions. Although they departed from an individual "quest for significance" framework, the highest predicting vector for approval of violent extremism was the hunger for novelty, adventure and excitement as measured by Sensation Seeking trait.

5. Rigid-Dogmatic Cognitive Styles

People's willingness to harm outgroup targets in the name of their ingroup may be also rooted in "cold" cognition and information processing tendencies typical of rigid categorical thinking. The notion that ideological rigidity might derive from mental rigidity was behind the first efforts to identify mechanisms for social prejudice, xenophobia and outgroup intolerance (Allport, 1954; Rokeach, 1960; Tajfel, 1982). Such line of thinking informed a fruitful tradition of research on the social psychology of intergroup conflicts, but there has been a scarcity of empirical work on individual differences in information processing styles that may amplify an individual's susceptibility to endorse violence for an ideological cause. Consequently, there has been little integration of the cognitive inflexibility hypothesis into the understanding of violent extremism.

Zmigrod et al. (2019) filled this void accruing solid evidence that cognitive inflexibility predicted extremist attitudes, including willingness to harm others and sacrificing one's life for the ingroup. In studies across two samples from the UK and USA (N = 1047) and using several laboratory measures of mental rigidity they were able to show that cognitive inflexibility predicted endorsement of violence to defend the national ingroups, which in turn predicted a self-report willingness to fight and die for their nation. The statistical models accounted for an average of 31.4% of the variance in willingness to die for the ingroup after accounting for demographic variables. Furthermore, cognitive inflexibility was related to much greater confidence in the decision to sacrifice one's life to save other connational lives, within an imagined moral dilemma test.

Subsequent analysis of responses on various cognitive tasks revealed that cognitive rigidity—in contrast to other aspects of cognition such as fluency, originality or degree of elaboration—was specifically implicated in the mediation, as an antecedent, of extremist attitudes.

In another study (Zmigrod et al., 2018) they tested whether narrow categorization of stimuli or rigid rules or routines in cognitive tasks would predict nationalistic attitudes. Using voting behavior and attitudes from the United Kingdom's 2016 EU Brexit referendum, within a sample of 332 UK citizens, they found that a flexible representation of national identity was linked to cognitive flexibility on WCST test and Remote Associate cognitive tasks, and to self-reported flexibility under uncertainty. These tasks are ideologically and emotionally neutral. Path analysis revealed that subjective and objective cognitive inflexibility predicted heightened authoritarianism, nationalism, conservatism and system justification, and these in turn were predictive of support for Brexit and opposition to immigration, to free movement of labor and to stay within the European Union. The model accounted for 47.6% of the variance in support for Brexit. Path analysis models were also predictive of participants' sense of personal attachment to the UK, thus signifying that individual differences in cognitive flexibility mediate thinking styles that may shape both nationalistic attitudes and self-identity feelings.

These findings strengthen the notion that a recurrent disposition for strict and stubborn rules of thought and behavior—cognitive rigidity or inflexibility—are linked to extremist and hostile attitudes against outgroups. They indicate that "cold" and emotionally neutral information processing dispositions—and not just "hot" emotional drivers of cognition—may play a key role in politically motivated behavior and feelings of identity.

Those were, in fact, the first studies suggesting that strong ingroup loyalty and eagerness to sacrifice for insiders were not purely underpinned by "hot" emotional processing, attitude biases or moral prescriptions and values. Hence, linking individual differences at the level of perception and cognition with differences on national self-identity and political behavior may help to further inform the understanding of cognitive underpinnings of extreme ideological options[4].

6. Meta-Cognition Roots for Dogmatism

Metacognitive skills refer to the abbility to monitorize and review the accuracy of previous decisions and choices. This ability relies on reflection on one's cognitive performance and a realization that mistakes have been made, even in the absence of explicit feedback. People endorsing radical ideologies typically show an unjustified certainty in their beliefs and such overconfidence have been observed for both political and non-political issues implying a general cognitive bias (Brandt et al., 2015; Ortoleva and Snowberg, 2015; Toner et al., 2013).

It has generally been assumed that resistance of radicals to change their beliefs was due to social and motivational factors, whereas the role of cognitive or metacognitive capacities received less attention. However, changes of mind depend not only on a motivation to change but also on the (metacognitive) capacity to realize that one's beliefs are wrong. Rollwage et al. (2018) examined whether radical political beliefs were linked to alterations in metacognition in a perceptual task requiring repeated visual comparisons and effective discriminations. Radical participants on both ends, left and right, of political spectrum showed reduced insight into the correctness of their choices and a diminished updating of their certainty confidence when presented with post-decision irrefutable evidence, indicating a generic resistance to revise mistakes.

Studying two different US population samples (n = 381; n = 417), recruited and tested online, they showed that individuals holding radical beliefs (as measured by questionnaires about political attitudes) displayed an impairment in

[4]In an extension of these studies, Zmigrod et al. (2021) uncovered individual psychological signatures of nationalistic, religious and dogmatic beliefs using a wide number of cognitive tasks and personality scales. Cognitive and personality assessments consistently outperformed demographic predictors in accounting for individual differences in ideological preferences. Extreme pro-group attitudes, including violence endorsement against outgroups, were linked to poorer working memory, slower perceptual strategies, and propensities for impulsivity and sensation-seeking. Such findings confirmed that ideological worldviews may be reflective of low-level perceptual and cognitive functions. The relevance of all these studies has been highlighted by the announcement of an ambitious and independent replication attempt that is currently underway (Schumann et al., 2020).

metacognitive sensitivity during an iterated perceptual discrimination task. Specifically, radical participants displayed less insight into the correctness of their choices and updated much less the confidence on their choices when presented with post-decision evidence.

Their findings showed that two key facets of radicalism (dogmatism and authoritarianism) were associated with specific alterations in metacognitive abbilities. The fact that decision performance was not associated with radicalism revealed that the change in information processing was manifest at a metacognitive, rather than cognitive level. Radicalism was specifically associated with reductions in metacognitive sensitivity: the reliability with which subjects distinguished between their correct and incorrect judgements.

These findings extended previous work documenting anomalies in confidence in political radicals (Brandt et al., 2015; Toner et al., 2013; Van Prooijen and Krouwel, 2017), while suggesting that these peculiarities may stem from changes in metacognitive sensitivity. The use of a simple perceptual decision task enabled to rule out effects of previous knowledge, task performance and motivational factors that might have mediated differences in metacognition. Though effects sizes were modest, their consistency across two different samples highlighted such inability to recognize and revise incorrect beliefs as another potential driver of radicalization.

In a related study using a low-level perceptual discrimination task, Schulz et al. (2020) showed that dogmatic individuals were less likely to seek out new information to refine an initial decision, thus reducing their overall accuracy despite similar initial performances. Dogmatic participants placed less reliance on internal signals of uncertainty (confidence) to guide information search, rendering them less likely to seek additional information to update weak or uncertain beliefs. These findings highlighted the operation of a cognitive style that may be behind formation of dogmatic worldviews.

Future research on the psychological roots of extremist leanings will need to address how non-emotional cognitive styles and meta-cognitive abbilities interact with other motivational risk vectors such as quest for personal significance (Kruglanski et al., 2014), identity fusion (Swann Jr. et al., 2012; Whitehouse, 2018), need to belong (Littman and Paluck, 2015; Lyons-Padilla et al., 2015, Bélanger et al., 2019), social dominance orientation and authoritarianism (Duckitt and Sibley, 2010), and sacred values (Atran et al., 2007; Atran and Ginges, 2012; Atran et al., 2014).

These renovated research fronts will help, in fact, to reconnect with the obvious but often forgotten notion that fluid or operational intelligence (cognitive abbilities and styles), is a main and unavoidable component of character. A nodal ingredient of personality that most probably plays a crucial role on group dynamics both during coalition formation and along the demanding tasks that war-like confrontations necessarily require (Wrangham, 1999, 2019; McDermott et al., 2016; Van Vugt et al., 2008; Logan et al., 2017).

7. Leadership vs. Followership in Violent Cells: Clustering Traits

"… *Higher impulsivity, higher confidence, greater attraction to risk-taking and a need for status can all work to give life as a terrorist a certain appeal for some young males…*"

Silke (2008) Holy warriors: exploring the psychological processes of Jihadi radicalization, *European Journal of Criminology*, 5, 1, 99-123.

The different roles that each individual assumes within a bellicose group depend on competence, courage, endurance, ambition, discipline, trustworthiness, discretion, resilience and other traits and abbilities. Part of these attributes come with expertise though the role of individual temperament and cognitive style that characerize each personal way of behaving and interacting is no less important (Borum, 2014; Gill et al., 2013; Hoffman et al., 2011; McDermott et al., 2016; Van Vugt et al., 2008). Bold, ambitious, dominant, adventurous and callous young males form a characteristic cluster of band self-recruits in both apes and humans (Wrangham et al., 2006). Combatants in insurgencies and rebellious factions, whether male or female, share prototypical masculine biased tendencies of high risk-taking and status seeking (Van Vugt, 2009).

Commitment strength, fanatic enthusiasm and vengeful aims are presumably shared in tightly knit bellicose groups with an ideological driving agenda. These beliefs and feelings depend mainly on interpersonal interactions or systematic indoctrination, hence the distinctions on these characteristics between commanders, dispatchers and operational actors may be rather small or insignificant. Personality traits potentially offer a more stable landscape to try to define clusters of differences between combatants.

I advanced a template (Tobeña, 2004b, 2009, 2012) for the normative personality traits that might lead some extremists to be attracted first and engaged subsequently into minoritarian belligerant cells. Then I outlined (**Figure 1**) the plausible traits that might distinguish between those personal profiles that would finish by having roles of "leaders" (commanders, planners, organizers), from those that would be "followers" (soldiers, informers, couriers, helpers). In a further step I also advanced a conjectural space that might describe, in a tiny fraction of them, the proneness to get near to the threshold for volunteering for suicide attacks (**Figure 2**).

Altruistic parochialism seems an obligatory precondition for attacks that involve a sure self-destruction, although it cannot be the full story (Tobeña, 2012; Decety et al., 2018; Whitehouse, 2018). Such proneness should be analyzed in conjunction with traits fueling the agonistic and high-risk lifestyles led by volunteers entering combative bands pursuing territorial, profit-making feuds or political-religious goals (Tobeña, 2004b). By adding to such basal agonistic attributes the dimensions of Machiavellianism versus gullibility and selfishness versus altruistic groupishness the conjectural space depicted at **Figure 2** was drawn to differentiate potential clusters of traits that might distinguish between

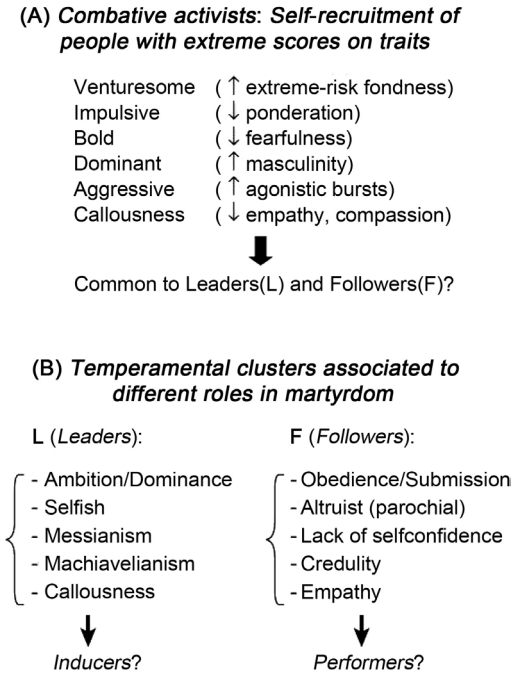

Figure 1. Common and distinctive temperamental traits for leaders and followers within combat units in intergroup conflicts. (A) Common personality traits; (B) Differential profiles for leaders (inducers) and followers (performers) of high-risk missions. From Tobeña (2004b).

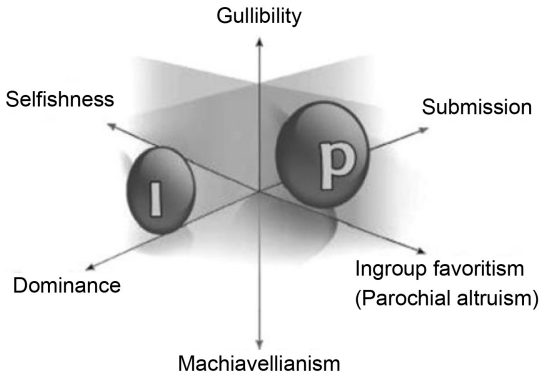

Figure 2. A temperamental workspace to distinguish individual attributes linked to proneness to engage in suicidal attacks. The hyypothetical space depicts agonistic clusters of violent activists on three temperamental traits: dominance-submission, Machiavellianism-gullibility and selfishness-altruism. It might help to distinguish between clusters typical of inducers (I) and perpetrators (P) of lethal attacks. From Tobeña (2012).

inducers and perpetrators of high risk missions or martyrdoms.

I selected these dimensions because there was a solid tradition of measuring

dominance and leadership versus submission/conformity in personality research (De Neve et al., 2013; Van Vugt et al., 2008), as well as the continuum of Machiavellianism versus gullibility/honesty (Bereczkei, 2015; Mercier, 2018). Such space was just a conjecture and other traits such as aggressiveness (proactive and reactive), callousness (vs. empathy), cruelty, narcissism (individual and collective), audacity, spirituality/religiosity, unfairness, impulsivity, messianism (glory craving) and others might be required to achieve fine-grained personality descriptions. This line of research awaits still to be pursued in depth though some of the studies described above, with supporters of Jihad at different countries are an initial and welcome approach to that.

Comparisons with data coming from other type of combative groups may be also informative (Valasik and Phillips, 2017). A research team at the National Autonomous University of Mexico (UNAM) (Ostrosky et al., 2011) measured the cognitive functioning of incarcerated criminals belonging to local drug cartels. Subjects were 82 male prisoners, all of them members of drug traffick clans. They were classified according to their role as commanders, executors, guardians, money launderers, distributors, producers and protectors rooted in their local communities. 76 males of similar ages and socio-demographic extraction were used as controls. The evaluation included psychopathic profiling and a neuropsychological battery with specific tasks for frontal lobe, executive cognition scorings. The protocol included three sessions of 2.5 hours each, carried out by trained psychologists. The inmates were affiliated to 10 Mexican cartels: Sinaloa, Golfo, Juárez, Tijuana, Beltrán, La Familia, Amezcua, Zhen Li Gon, Milenio and Guadalajara. Sentence average was 32 years, and time already served in prison ranged between 2 and 10 years. Collectively, prisoners scored 21 on the Pychopathic Check List-R (range 10 to 36), while controls scored 3 (range 0 to 8). The executors had the highest score: 24, followed by the commanders: 23. Distributors and producers scored: 21, protectors: 18 and money launderers: 17. The usual cut-off point for psychopathy in prisoners is 23. Thus, only commanders and executors were labeled as psychopaths.

Cognitive routines related to functions of the orbital-frontal cortex (lack of inhibition, marked impulsivity) were the most affected in these prisoners. The deficits were more severe in the most violent individuals. A negative relationship (−0.33) was detected, in fact, between the PCL-R scores and the Orbito-Frontal index. Money launderers obtained scores in the upper range at Anterior Prefrontal Index of cognitive function, while the rest had normal scores. All prisoners had lower scores than controls at the Dorso-Lateral Index, though still within the normal range. The executors had, however, the lowest scores. Commanders and enforcers met the criteria for psychopathy across the full range of measures, while money launderers fit the description of "successful psychopaths". Among these Mexican criminals, money launderers and protectors well rooted in their societies had the lowest psychopathy scores, although they were clearly higher than those of ordinary citizens.

Comparing gangs devoid of any type of ideological adscription with violent groups united by a deep devotion to an extremist ideology may seem inadequate, though it is worth remembering that they often merge and even fuse completely, without major obstacles. In this regard, Baez et al. (2017) assessed 66 prisoners, ex-combatants from a Colombian paramilitary right-wing terrorist group. All had participated in armed operations and gave a full, voluntary deposition and confession of crimes as a result of a legal agreement for a demobilization of armed groups. They had personal records that included many killings: convictions for murder amounted to a mean of 33 victims per subject. Most of them were also accountable for several massacres and they had also engaged in other crimes, such as theft, kidnapping and fraud. Ideological commitment was important for a tiny proportion of them (around 13%), since the majority had entered into fighting for economic reasons.

The research focus was on social-cognitive profiles and moral judgements. Moral choices measures were obtained in imagined scenarios during experimental tasks and they were clearly anomalous in these previous terrorists: outcomes were their main guiding clues rather than the integration of intentions and outcomes. Such peculiar pattern was related to their elevated proactive aggression scores but independent from cognitive domains. Moral judgement was in fact the measure that best discriminated between these terrorists, other non-terrorist prisoners and non-criminal controls. Intelligence and executive function did not distinguish between them. According to the authors the results did not suffice to determine whether moral judgement tasks could be used to detect proclivity to relapse into terrorism or to predict who will become a terrorist, but combining these tasks with sensitive instruments tapping affective, cognitive and social profiles could contribute to better characterize terrorist proneness (Gómez et al., 2021).

8. Neurobiological Systems Mediating Violent Ideological Extremism

"*…there are undoubtedly clusters of recurrent dispositions that may predict vulnerability to different radicalization avenues and behavioral outcomes. A propensity to meet conflict with violence, for example, may reflect one such recurrent disposition.*"

Decety, Pape and Workman (2018).

Not surprisingly, Decety et al. (2018) pointed to antisociality/aggresiveness as a crucial trait among precursors of violent extremism. It is easy to concur with them that it is mandatory to investigate how long-lived individual propensities to engage in violent and antisocial behavior interact with other relevant dispositions (cognitive rigidity/flexibillity, for instance), both at behavioural and distinctive biological levels (from gene associations and neurohormonal mediators up to brain areas, circuits and functional systems). Aggresiveness, and particularly, proneness to engage in pro-active or reward-fuelled appetitive violence

(Bergstrøm et al., 2018; Chester, 2017; Chester & DeWall, 2016; Kobach and Elbert, 2015; Elbert et al., 2018; Pavlović and Wertag, 2021) most probably will emerge as an unavoidable individual component of combative extremism and there is already a rich and solid body of neurobiological findings to depart from (Carlisi et al., 2020, Glenn and Raine, 2014, Lischinsky and Lin, 2020, Rosell and Siever, 2015).

A wide base of neurobiological correlates has been established already for many of the temperament traits advanced above as potentially relevant for profiling differential clusters of individuals with proclivity to violent extremism. Research on the biological underpinnings of parochialism, status-seeking, impulsivity, dominance, narcissism, machiavellianism, dogmatism, altruism, spirituality, unfairness/dishonesty and other traits has accrued an impressive amount of connections at different levels of neural analysis, from gene markers and neurohormones to brain systems. These interdependences have already been used to narrow the provisional but increasingly detailed explanatory depictions (Bereczkei, 2015; Cikara and Van Babel, 2014; Decety et al., 2018; De Dreu et al., 2010, 2011, 2018, 2021; De Dreu & Gross, 2019; Grebe et al., 2018; Ligneul et al., 2016; Shortland, 2021; Tobeña, 2012).

Moreover, neuroimage studies of correlates for political beliefs had established that traits conveying different political attitudes and preferences (radicalism, individualism, conservatism), could be linked to particular processing areas within the brain (Zamboni et al., 2009). This was shown for small samples of normative people and the brain areas more implicated were those related to deliberation, cognitive control and subjective value processing in distinctive regions of prefrontal cortex. Cristofori et al. (2017) studying Vietnam war veterans analyzed if traumatic brain lesions could have affected these political traits. After dividing afflicted veterans into three groups according to lesion location (ventromedial prefrontal cortex-vmPFC; dorsolateral prefrontal cortex-dlPFC and parietal cortex), they found that vmPFC lesions, but not dlPFC ones, decreased radicalism scores compared with parietal lesions and the healthy controls. Patients with vmPFC lesions were more prone to judge radical opinions or behaviors as more moderate and presumably acceptable. These findings highlighted the role of the vmPFC in appropriately valuing political options and strengthened the well known notion that vmPFC is a nodal area for appropriately scaling many types of values.

Zhong et al. (2017) showed that the areas of prefrontal cortex which are in charge of deliberation and cognitive control (dlPFC, preferently) were predictive of variations on religious fundamentalism. The role of cognitive flexibility was crucial: religious dogmatism increased as executive cognitive skills decreased. Cohering findings were obtained by Nam et al. (2021) exploring the links between neuroanatomy and ideological preferences by comparing brain lesioned patients with healthy controls. People with frontal lesions held more conservative (less liberal) beliefs than those with anterior temporal lobe lesions or no lesions. Greater damage in dlPFC was associated with greater conservatism. Although executive function measures did not mediate the relationship between frontal lesions and

ideology, these findings indicated that PFC plays a role in the development of conservatism. Moreover, studying intergroup economic competitions at the laboratory, with young healthy people, Yang et al. (2020) found that within-group neural synchronization between the right dlPFC and the right temporoparietal junction (rTPJ) underlyed intergroup hostility, in concomitant neuroimaging measures. During out-group attacks particularly, in-group bonding increased within-group synchronization in both rdlPFC and rTPJ, and within-group rdlPFC synchronization positively correlated with intergroup hostility. These authors advanced that "within-group synchronized reduction in PFC activity might explain how in-group bonding leads to impulsive and collective hostility toward outsiders".

In neuroimage studies with Muslim Pakistani radicals living as migrants at Barcelona (Spain), who had expressed support for Kashmir fighting groups, differential brain activities were found when expressing willingness to costly sacrifice for sacred values in contrast to non-sacred values (Hamid et al., 2019). Processing decisions about sacred values involved less activation of pre-frontal brain regions (dlPFC) associated with cognitive control and cost-benefit calculations. In these radicals, willingness to fight and die relied specifically on brain activity within vmPFC areas dedicated to estimate subjective values and expected rewards. High compared to low willingness to fight and die was also characterized by a decreased recruitment of brain regions (dlPFC) linked to ponder costs during decision-making. The data revealed in fact a negative functional connectivity between these vmPFC and dlPFC regions when processing high versus low willingness to fight and die for a cause (Pretus et al., 2019).

The relevance of vmPFC activation on these circumstances coheres with the changes in patterns of activation at this region detected with the approval of images of politically violent protests at US (Workman et al., 2020) and also with studies of imagined aggression (Pietrini et al., 2000). Nearby prefrontal cortex regions process how situational factors shape attitudes towards killing. In studies simulating warfare conditions, individuals who underwent fMRI scanning while imagining carrying out unjustified acts of killing (shooting civilians) compared to justified killing (shooting enemy soldiers), showed increased activation in the orbitofrontal cortex (OFC) (Molenberghs et al., 2015). The same happened when unjustified shootings were imagined against individuals of a Muslim outgroup (Domínguez et al., 2018). Relatedly, greater activity was detected at OFC as well heightened coupling with the amigdala and insula, when individuals viewed harmful behaviors perpetrated by out-group members against in-group members (Molenberghs et al., 2016). Decety et al. (2018) emphasized that future studies should investigate whether activation or the functional connectivity among these regions of the prefrontal cortex will capture individual differences while processing extreme violence.

All these findings point towards the role that discernible brain systems dedicated to both cognitive flexibility and value estimation may play in mediating ideologically driven violent extremism. The maps already outlined by these stu-

dies for preferential neural circuits and their associated molecular (neuromodulatory) cascades implicated in violent extremism, will help to ensure further advances if measures of temperament traits and distinctive roles are also included in future explorations.

9. The Individuality Front: Merge Forensic and Personality Psychology with Social Neuroscience on Violent Extremism Research

Two decades ago, in the aftermaths of Sept. 11th attacks at US and the murderous assaults that followed in several capital cities across the world, the mainstream psychological analyses of extremist/terrorizing violence almost abandoned an individually oriented perspective (Atran, 2003, 2021; Victoroff, 2005; Gambetta, 2006; Schuurman, 2020). The tortuous and ferocious Middle East wars that punctuated the first decades of the present century and their reberverations in the West only reinforced this trend. Social psychology research focused mostly at contextual, interpersonal and ingroup influences (motives, values, identities, aspirations) searching for a plausible combination of features that might help to engender, first, and ignite afterwards the terrorizing operations (Atran, 2021; Kruglanski et al., 2014; McCauley and Maskolenko, 2008, 2017).

Despite early warnings that individual temperaments must play an unavoidable role on intergroup confrontations triggered by fringe rebellious and combative coalitions (Tobeña, 2004a, 2004b), only a handful of research endeavours looked at individual personalities as a source of potentially informative knowledge on singularized pathways leading into violent extremism. Victoroff et al. (2011) studied Palestinian adolescents sympathizing with the second *Intifada* insurgency and found that those with marked androgenic activation profiles were the most belligerant, regardless of their living conditions. Merari et al. (2009) gathered data in Israeli prisons from "failed suicide bombers" as well as from organizers and dispatchers of Palestinian suicide attackers. They obtained clear hints of distinctive temperamental profiles: failed *shahids* tended to be submissive, dependent, influenceable and moderately depressed, whereas organizers were self-assured and combative individuals, though reluctant to enlist themselves as suicide bombers. Though it is relevant to emphasize again that studying supporters and sympathizers of terrorist groups is one thing, but lending oneself in attacking operations is quite another, these findings were a reminding of the relevance of individualities.

From another perspective, Lankford's (2013, 2014) launched a serious effort to reinstate the relevance of individual factors as precursors of terror killings by gathering detailed forensic analysis of a variety of mental frailties that apparently characterized what he baptized as "self-destructive killers". His portraits included different types of attackers from rampage shooters to suicide bombers mainly from a series of US cases. There is wide agreement, howewer, that the bulk of extant data across different countries indicates that most participants in

violent extremism and terror attacks do not suffer mental problems (Silke, 2008; Gill and Corner, 2017). Mental disorders only have a noticeable presence in lone-actor terrorists: detailed forensic analysis by (Corner and Gill, 2015; Corner et al., 2016) in US and European series have established that with robustness. Lankford's (2013, 2014) request for in deep clinical forensics was too restrictive to explain the phenomenon of proneneness to violent extremism and suicidal terrorism, but useful, nevertheless, because it contributed to erode the absolute primacy assigned to purely contextual and collective triggers (Atran 2003, 2021; Sageman, 2004; Gambetta, 2006).

The gamut of normative character traits was unnecessarily discarded (Tobeña, 2004a; Borum, 2014), though recent advancements reviewed in previous sections show that there are very active research fronts devoted to discern plausible individual contributors for proneness to violent extremism. The panorama for sophisticated searches that cognitive and social neuroscience has opened in this area is vast (Cikara and Van Babel, 2014; Decety et al., 2018).

10. Conclusion

Personality traits have reappeared within wide-ranging analyses of predictors of ordinary political preferences in studies at several countries (Aidt and Raub, 2018; Barceló, 2017; Hibbing, 2021; Wang, 2016; Zmigrod et al., 2021). The mediating role of temperamental traits on political polarization and sectarian partisanship has also been analyzed with illuminating findings[5] (Federico, 2021, Federico et al., 2021; Finkel et al., 2020; Gotzsche-Astrup, 2019; Hibbing, 2021; Jost, 2017). Studies with large samples of normative people using self-reports have repeatedly demonstrated strong associations between radical/extremist views and dogmatic intolerance both on political and religious issues (Van Prooijen and Krouwel, 2017, 2019). The predictive capacity of measures based on individual traits for extremist political adscription is now increasingly grounded (Finkel et al., 2020; Hibbing, 2021; Santamaria-Garcia et al., 2021; Zmigrod et al., 2021).

Thus, re-establishing the relevant role of individual factors into proneness towards violent extremism and terrorist actions adds to these evolving and already very productive research endeavours. Individual temperament traits are unavoidable ingredients of all sorts of combative coalitions and operational activities during intergroup conflicts. Their involvement in deadly violence fuelled by ideological extremism needs to be wholly ascertained. The goal of depicting typical clusters of traits that enhance odds of entering into violent extremism paths seems more feasible.

Combining the virtues of systematic biographical dissections (Silke, 2008; Gill and Horgan, 2013; Horgan, 2014; Horgan et al., 2016; Bakker and De

[5]Hibbing (2021) systematic study of Trump's radical supporters in the US went even into the proposal of a "*securitarian*" trait as their most distinctive characteristic: a personality trait rooted on a basic biological disposition mediating recurrent individual attitudes towards insiders/outsiders. This is a temperamental trait that treasures a rich body of research under other names (parochialism, ethnocentrism, xenophobia), that may be fruitfully used when exploring links to violent extremism.

Bont, 2016; Baele, 2017), with neurobiological available periscopes in addition to personality mesures and cognitive-moral laboratory tasks, promises to offer finer depictions of the role that individuality plays in the extreme choices adopted by some people during intergroup warlike confrontations. Recent research discussed in this essay has opened new ways to discern the individuality nuances arising from the interwoven and unique admixtures that beliefs, values and character dispositions form in each one of participant actors involved in violent extremism.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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