Evidence to Explain Violent Extremist Communication: A Systematic Review of Individual-Level Empirical Studies

by Phillip Conrad De Bruyn

Abstract

Advances in computational approaches to detect violent extremists have made it possible to reliably identify these individuals through their communication, with accuracy ranging from 87 to 92% (95% CI), depending on the model used. Of interest is whether various facets of their communication can be explained through existing empirical research, whose findings may point to opportunities for intervention. To explore the possibility of explanatory evidence, this study conducted a systematic review of studies that presented original data and findings at the individual level of extremism. Samples of the qualifying studies (n = 272) over the last 20 years were disaggregated by individual type (e.g., lone-actor terrorist, online extremist), which included affiliations with a range of extremist groups, organizations, and ideological classifications. Using a series of linguistic dimensions observed in extremist communication as an organizing framework, the findings of these studies were grouped together as possible factors behind the various fine-grained manifestations of extremist ideology observed by high-performing models capable of extremist detection (n = 28). The work serves practitioners interested in an organizing framework for extremist communication studied as big data or those who merely seek a state-of-the-art systematic review of Islamic-based extremism. Comparatively, this study is the largest of such reviews to date, as an exploratory effort to offer possible explanations for ideological communication by extremists, and draws on samples from multiple populations of empirical studies on fundamentalism, Islamism, jihadism, and radicalization into terrorism.

Keywords: Communication, Extremism, Radicalization, Systematic Review, Terrorism

Introduction

The state of empirical evidence on the link between the Internet and radicalization into enacting or supporting violence remains limited and inconclusive.[1] However, this limited pool of empirical studies does provide tentative evidence that exposure to violent extremist communication is associated with extremist attitudes both on- and offline and that active seekers of such communication are at higher risk of engaging in violence. The role of the Internet in radicalization can therefore be seen as that of decision-shaping with respect to extremist stimuli,[2] which, in association with offline factors, can motivate the decision-making of an individual into action.[3]

Recent work on individual differences among left-wing, right-wing, and Islamic-based violent extremists[4] found that online radicalization features much more prominently in the latter group.[5] Thus, while it is known from the evidence that the Internet can act as a facilitator in the processes of radicalization, the mechanisms underlying this remain less clear.[6] An area that may provide some insight is a small but growing collection of computational approaches which accurately identify individuals with violent extremist views in online contexts to empirically detect signs of their radicalization.[7] Though work in this field is primarily concerned with the efficiency of the detection methods,[8] an understanding of why extremists communicate their beliefs online is helpful as advancements in their detection open the possibility of interventions in their trajectories.[9]

What remains unexplored is whether evidence exists that potentially explains the reliance these individuals place on the various linguistic manifestations of their beliefs online, which classification studies use to predict their degrees of association with extremist ideology. This is equally important, as it may offer explanations for their behavior that are rooted in factors not easily observed in their communication. To shed light on this area, this study will delineate the fine-grained expressions of ideology observed in classification studies into a series of dimensions that may be used to organize extremist communication. This is useful as it may reveal patterns of constructs that are used to influence would-be extremists and maintain the ideology of established extremists.
An understanding of why different populations of extremists share their ideology in this way needs to be explored, as those who become radicalized or commit terrorism have generally been exposed to the content of extremist communication.[10] Furthermore, earlier work found that changes in the linguistic expressions of ideology among those who adopt violent extremism could predict the future occurrence of their violent acts.[11] Therefore, using the dimensions as an organizing framework, this study will conduct a systematic review of literature to understand the factors that may explain the communication observed among extremists within the boundaries of the framework. Beyond the review, such a framework is also of benefit to researchers who wish to undertake wider analyses of extremist communication, which necessarily require clear organizing principles for working with vast amounts of data.[12]

**Systematic Reviews of Extremism, Radicalization, and Terrorism**

Previous systematic reviews conducted within the last five years included reviews of the most prevalent constructs, factors, and hypotheses in radicalization (n = 57),[13] as well as radicalization into violent extremism (n = 148),[14] and suicide terrorism (n = 45).[15] Another group of reviews focused on the disengagement from violent extremism (n = 114),[16] risk and protective factors against radicalization and extremism (n = 57),[17] and methodological quality of the instruments developed to identify risk factors (n = 37).[18] Other relevant reviews considered the role of the Internet in radicalization processes (n = 88)[19] and the state of primary research on extremist organizational propaganda online (n = 23).[20] Only a single systematic review focused specifically on the pathways and processes associated with radicalization and extremism among Muslims in Western societies (n = 17),[21] while the other reviews all included studies from predominantly Western left- or right-wing political extremism in their work.

It is clear what remains lacking in the study of violent extremist communication is a connection between two growing areas built on empirical evidence: high-performance computational classification approaches to identify and detect communication marked by the content of violent extremism, radicalization, and terrorism and the more traditional research approaches in these areas that may provide possible explanatory factors for the communication being observed. To the end of building such a bridge, the present study is the first interdisciplinary attempt to bring together these two empirical areas of research to shed light on individual-level extremist communication in this way.

**Toward a Practical Framework for Extremists Constructs**

Recent work on extremist communication found that all the classification studies reviewed had models which relied on variations of words and phrases used by extremists in their discussions and could be placed into a schema of four linguistic dimensions: conflict, emotion, religion, and role. Through an analysis of the terms with strong predictive potential which were identified across these studies, it was possible for the study to group individuals’ communication together thematically. These dimensions encompassed information exchanges about various conflict behaviors, emotive experiences, religious knowledge, and the functions assumed by individuals in various social roles.[22]

The terms themselves were used by extremists to express many common themes found in their communication and broader collective consciousness, which were summarized by Droogan and Peattie[23] from their review of the literature and their grounded theory approach to coding ideological communication. Further analysis found that 98.8% of these themes included at least one dimension of conflict, emotion, religion, or role, or one of the following additional dimensions: an extremist’s geopolitical perspectives, their involvement with collectives, or how they spread information. As shown in Figure 1, each identified theme contained 2.7 of these dimensions on average. Table 1 defines each of the seven dimensions and further estimates their prevalence in extremist classification studies, based on the actual terms included in the models (n = 28) they developed. As can be seen from these analyses, the dimensions are well-represented in both the fine-grained terms and broader themes that extremists use to communicate.
### Table 1: Linguistic dimension definitions and prevalence in extremist classification studies.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Definition</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geopolitic</td>
<td>Views of geographic or political factors that characterize or influence a country or region. Includes constructs that refer to nations, territories, cities, towns, or villages in a general or specific sense.</td>
<td>78.6</td>
</tr>
<tr>
<td>Religion</td>
<td>Exemplifies awareness of religious faith, practice, or experience. Included are references to religious concepts, customs, laws, texts, as well as events, or places of religious significance.</td>
<td>75</td>
</tr>
<tr>
<td>Collective</td>
<td>Signified by references to various groups or organizations of people. The range of constructs include collectives characterized by their ideological, military, or political properties, as well as on ethnic or religious grounds.</td>
<td>71.4</td>
</tr>
<tr>
<td>Role</td>
<td>Designated by social relations that involve two or more persons who occupy similar or different social roles. Roles can be denoted by social positions of closeness, religion, named or unnamed authority, or conflict relative to others.</td>
<td>71.4</td>
</tr>
<tr>
<td>Conflict</td>
<td>Actions in or reactions to a battle, fight, or struggle. Indicates behavior which involves physical force intended to damage, hurt, or kill someone or something, as well as support for conflict among or within different individuals or groups.</td>
<td>67.9</td>
</tr>
<tr>
<td>Emotion</td>
<td>Instances of observing, encountering, or undergoing emotions or feelings. Includes a wide range of basic or more complex social emotions that involve moral, personal, or sympathetic factors.</td>
<td>46.4</td>
</tr>
<tr>
<td>Diffusion</td>
<td>Attempts to create, validate, or spread information designed to influence belief or behavior. These attempts can include references to various sources or purported knowledge that deems an issue as correct or incorrect.</td>
<td>46.4</td>
</tr>
</tbody>
</table>

Prevalence = percentage of classification studies (n = 28) that included terms with predictive properties from a respective dimension.
Figure 1: Linguistic dimensions found in extremist communication themes (n = 83).
To illustrate how the dimensions can be used to organize extremist communication with a practical example, the following is a statement from a classification data set that was translated from Arabic and made by a sympathizer of the Islamic State of Iraq and Syria (ISIS) on June 6, 2015, via Twitter.

“We announce (with pleasure) the news of brother Abu Anas Warqa’s (the migrant) martyrdom, a soldier among the soldiers of the Islamic State, and his martyrdom occurred in the battles of east Al-Raqqah Province.”[24]

The terms in the statement include the role played by an individual: “Abu Anas Warqa” who held enough positive authority to make him worthy of being named. He was presented in a sense of closeness as a fraternal “brother,” occupied a positive fighting role as a “soldier,” and a positive faithful role as “the migrant.” These positive notions of social role were presented with the emotional sentiment of “pleasure.” The concept of “martyrdom” was also mentioned, which holds significance from a religious perspective. The state of conflict that resulted in his death, “the battles,” was given as well. Furthermore, the statement contains an event of political significance which took place in “east Al-Raqqah Province,” the presentation of an extremist organization, ISIS, as a positive in-group, and the words the author used to “announce” the “news” which adds a sense of journalistic credibility to their propaganda efforts designed to influence others.

When these terms are placed next to similar analyses of communication across tens of thousands of extremists and non-extremists, their occurrences become instrumental to the prediction of whether an individual communicated information indicative of a radicalized state. By using the dimensions in the way demonstrated, it is clear they are potentially useful as thematic categories to identify and group the expressions of various constructs used by extremists in their communication of ideology. The sections that follow will operationalize these dimensions as an organizing framework for the systematic review of empirical evidence, which may explain the observation of various forms of ideological communication among extremists.

**Methods**

A systematic review of literature was conducted to identify individual-level factors associated with susceptibility to, and participation in, Islamic-based violent extremism. It is proposed that these factors can offer explanations for the communication observed among extremists, specifically in online contexts. Accordingly, the literature review was limited to empirical studies of individuals who (1) were attracted to, or showed support for, violent extremist ideologies, (2) were at risk of radicalization or had been radicalized into violent extremism, or (3) engaged, or had engaged, in terrorism. The factors were reviewed for their potential to explain the manifestation of ideology observed in extremist communication, which has become a useful means to identify and differentiate signs of radicalization.

Data sources for the review were the ProQuest, Scopus, and Web of Science bibliographic databases. Documents were limited to (1) scholarly journal articles, (2) books, (3) technical reports, and (4) conference proceedings. The preliminary search was restricted to the following search terms (search results were upper- and lowercase-insensitive): (extremi* OR radicali* OR terrori*) AND (islam* OR jihad* OR muslim* OR salafi* OR wahhabi*). After duplicates were filtered from the search results, a total of 8,598 documents were retained for further evaluation. Initial screening included the titles and abstracts of these documents to determine whether it was likely to be an empirical study. This was done by an evaluation of whether the abstract mentioned or inferred the use of data that involved individuals, which resulted in 341 documents. The full text of each of these documents was examined and the final set of literature was restricted to studies that presented findings at the individual level based on primary research and original data of samples that included extremists. A total of 272 (3.2%) studies met the criteria and were included in the final review (see Figure 2 for the systematic search process). Twenty-eight of these included studies formed part of the extremist classification work.
Results

Most studies included in the systematic review were published between 2010-2020 (80.5%), while a smaller percentage were from 1980–2009 (19.5%) (see Figure 3). The majority of these studies either developed collections of individual cases from primary sources, including official and court documents (47.8%), or used questionnaires as their primary research instrument (27.9%). The remaining studies conducted interviews (22.1%), and a small number relied on mixed methods research based on these instruments (2.2%). Not all the studies collected unique data; 16 samples were reused across 43 studies, predominantly in research on online extremists (31.8%), which relied on a few core social media data sets.

Figure 3: Distribution of included empirical studies over time (number of studies per year).
A total of 50 unique ideological, political, and military groups and organizations were identified in the samples used by the studies. These extremist ideological classifications were determined through an investigation of designated terrorist group lists and primary source documents produced by the groups and organizations. Identified ideologies broadly ranged from Salafi and Shi'a jihadism, Deobandi fundamentalism, Islamism, and pro-Palestinian and Pakistani militancy (see Table 2).

Individual types were disaggregated based on information presented about the sample in each study. The types ranged from comparatively rich data about individuals, such as group- and lone-actor terrorists, suicide bombers, foreign fighters, and online extremists, to more general sample information, such as convicts, youth, and population-based samples upon whom theories of extremism could be tested. Others included unspecified general violent individuals (e.g., Islamists, jihadists, and homegrown terrorists) and at-risk, or radicalized, individuals.

The countries of residence reported or discerned for the majority of individuals in these samples spanned 36 states, with >70% being drawn from 10 countries: United States of America (14.4%), United Kingdom (13.4%), Indonesia (8.1%), Pakistan (6.7%), Palestine (6.7%), Netherlands (5.7%), France (4.3%), Lebanon (4.3%), Denmark (3.3%), and Germany (3.3%). Figure 4 details the distribution of the samples for all the studies included in the review, excluding online extremists since their countries of residence could not be reliably identified.

Figure 4: Countries of residence (n = 36) for >50% of a respective sample across 244 studies. Darker shades indicate more studies with samples drawn from a specific country.
Table 2: Groups and organizations in individual level studies, ideological classifications, and sample statistics (mean and standard deviation).

<table>
<thead>
<tr>
<th>Group/organization</th>
<th>Ideology</th>
<th>Studies ($\mu$, $\sigma$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abu Nidal Organisation</td>
<td>pro-Palestinian militancy</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Al-Aqsa Martyrs Brigade</td>
<td>pro-Palestinian militancy</td>
<td>1 (39)</td>
</tr>
<tr>
<td>Al-Badr</td>
<td>pro-Pakistani militancy</td>
<td>2 (54)</td>
</tr>
<tr>
<td>Al-Jama’a al-Islamiyya</td>
<td>Salafi jihadism</td>
<td>3 (10, 5)</td>
</tr>
<tr>
<td>Al-Muajiroun</td>
<td>Salafi jihadism</td>
<td>1 (30)</td>
</tr>
<tr>
<td>Al-Nusrah Front</td>
<td>Salafi jihadism</td>
<td>2 (190)</td>
</tr>
<tr>
<td>Al-Qa’ida (unspecified)</td>
<td>Salafi jihadism</td>
<td>12 (375.3, 504.1)</td>
</tr>
<tr>
<td>Al-Qa’ida in Iraq</td>
<td>Salafi jihadism</td>
<td>1 (1,404)</td>
</tr>
<tr>
<td>Al-Qa’ida in the Arabian Peninsula</td>
<td>Salafi jihadism</td>
<td>1 (77)</td>
</tr>
<tr>
<td>Al-Qa’ida in the Islamic Maghreb</td>
<td>Salafi jihadism</td>
<td>2 (49.5, 27.5)</td>
</tr>
<tr>
<td>Al-Shabaab</td>
<td>Salafi jihadism</td>
<td>7 (47.83, 47.7)</td>
</tr>
<tr>
<td>Darul Islam</td>
<td>Islamism</td>
<td>1 (9)</td>
</tr>
<tr>
<td>Democratic Front f/t Liberation of Palestine</td>
<td>pro-Palestinian militancy</td>
<td>2 (9.33, 3.4)</td>
</tr>
<tr>
<td>Egyptian Islamic Jihad</td>
<td>Salafi jihadism</td>
<td>2 (10, 5)</td>
</tr>
<tr>
<td>Fatah</td>
<td>pro-Palestinian militancy</td>
<td>4 (21.75, 25.3)</td>
</tr>
<tr>
<td>Hamas</td>
<td>pro-Palestinian militancy</td>
<td>10 (223.7, 431.3)</td>
</tr>
<tr>
<td>Harkat-ul-Mujahideen</td>
<td>Deobandi fundamentalism</td>
<td>2 (18)</td>
</tr>
<tr>
<td>Hizb ut-Tahrir</td>
<td>Islamism</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Hizb-ul-Mujahideen</td>
<td>pro-Pakistani militancy</td>
<td>3 (367, 340)</td>
</tr>
<tr>
<td>Hizballah</td>
<td>Shi’a jihadism</td>
<td>5 (227.8, 217.4)</td>
</tr>
<tr>
<td>Hofstad Network</td>
<td>Salafi jihadism</td>
<td>2 (40)</td>
</tr>
<tr>
<td>Islami Jamiat-e-Talaba</td>
<td>Islamism</td>
<td>1 (40)</td>
</tr>
<tr>
<td>Islamic Action Front</td>
<td>Islamism</td>
<td>1 (654)</td>
</tr>
<tr>
<td>Islamic Defender Front</td>
<td>Islamism</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Islamic Jihad Movement in Palestine</td>
<td>pro-Palestinian militancy</td>
<td>6 (37.6, 61.7)</td>
</tr>
<tr>
<td>Islamic Movement of Uzbekistan</td>
<td>Islamism</td>
<td>2 (92.5, 15.5)</td>
</tr>
<tr>
<td>Islamic State of Iraq and Syria</td>
<td>Salafi jihadism</td>
<td>14 (133.8, 212.3)</td>
</tr>
<tr>
<td>Izz ad-Din al-Qassam Brigades</td>
<td>pro-Palestinian militancy</td>
<td>2 (43, 22)</td>
</tr>
<tr>
<td>Jaish-e-Mohammed</td>
<td>Deobandi fundamentalism</td>
<td>3 (12.5, 6.5)</td>
</tr>
<tr>
<td>Jam’iyyat Ul-Islam Is-Saheeh</td>
<td>Salafi jihadism</td>
<td>1 (30)</td>
</tr>
<tr>
<td>Jama’at al-Muslimin</td>
<td>Salafi jihadism</td>
<td>3 (34)</td>
</tr>
<tr>
<td>Jamaat Ansar al-Sunnah</td>
<td>Salafi jihadism</td>
<td>1 (1,404)</td>
</tr>
<tr>
<td>Jemaah Ansharut Tauhid</td>
<td>Salafi jihadism</td>
<td>1 (9)</td>
</tr>
<tr>
<td>Jemaah Islamiyah</td>
<td>Salafi jihadism</td>
<td>10 (65.2, 81)</td>
</tr>
<tr>
<td>Lashkar-e-Jhangvi</td>
<td>Deobandi fundamentalism</td>
<td>1 (181)</td>
</tr>
<tr>
<td>Lashkar-e-Taiba</td>
<td>Salafi jihadism</td>
<td>6 (196.4, 360.9)</td>
</tr>
<tr>
<td>Moroccan Islamic Combatant Group</td>
<td>Salafi jihadism</td>
<td>1 (77)</td>
</tr>
<tr>
<td>Mujahedeen Kayamanya</td>
<td>Salafi jihadism</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Mujahedeen KOMPAK</td>
<td>Salafi jihadism</td>
<td>4 (23, 16.6)</td>
</tr>
<tr>
<td>Mujahedeen Tanah Runtuah</td>
<td>Salafi jihadism</td>
<td>1 (12)</td>
</tr>
<tr>
<td>Muslim Brotherhood in Egypt</td>
<td>Islamism</td>
<td>2 (10, 5)</td>
</tr>
<tr>
<td>Mutthahida Jihad Council</td>
<td>pro-Pakistani militancy</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Palestine Liberation Organisation</td>
<td>pro-Palestinian militancy</td>
<td>2 (28.67, 26.2)</td>
</tr>
<tr>
<td>Palestinian Liberation Front</td>
<td>pro-Palestinian militancy</td>
<td>1 (65)</td>
</tr>
<tr>
<td>Popular Front f/t Liberation of Palestine</td>
<td>pro-Palestinian militancy</td>
<td>3 (28, 21.7)</td>
</tr>
<tr>
<td>Taliban</td>
<td>Deobandi fundamentalism</td>
<td>1 (304, 123)</td>
</tr>
<tr>
<td>Tanzim</td>
<td>pro-Palestinian militancy</td>
<td>1 (39)</td>
</tr>
<tr>
<td>Tehreek-e-Jihad</td>
<td>Deobandi fundamentalism</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Tehreek-e-Nafaz-e-Shariat-e-Mohammadi</td>
<td>Deobandi fundamentalism</td>
<td>2 (9)</td>
</tr>
<tr>
<td>Tehrik-ul-Mujahideen</td>
<td>Islamism</td>
<td>2 (5)</td>
</tr>
</tbody>
</table>
Most studies that built custom collections of individual cases examined online extremists (n = 54) and group-actor terrorists (n = 32). Group-actor terrorists also formed most of the samples for studies that conducted interviews (n = 24). Surprisingly, many studies tested extremist-related questions on general population-based samples (n = 54), most of which used questionnaire instruments. Table 3 provides summary statistics on the number of studies identified per individual type and the mean and standard deviation of sample sizes used in the studies.

<table>
<thead>
<tr>
<th>Individual Type</th>
<th>Case</th>
<th>Questionnaire</th>
<th>Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremist (online)</td>
<td>54 (1.8e4, 4.6e4)</td>
<td></td>
<td>2 (16.5, 1.5)</td>
</tr>
<tr>
<td>Foreign fighter</td>
<td>10 (2.9e3, 8.1e3)</td>
<td></td>
<td>6 (34.7, 26.5)</td>
</tr>
<tr>
<td>Group-actor terrorist</td>
<td>32 (479.8, 871.4)</td>
<td>10 (192.5, 199.1)</td>
<td>24 (35.9, 29.6)</td>
</tr>
<tr>
<td>Lone-actor terrorist</td>
<td>8 (89.8, 71.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suicide bomber</td>
<td>6 (748.7, 891.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convict</td>
<td>7 (128.2, 118.2)</td>
<td>2 (126, 101)</td>
<td>11 (48.1, 39.5)</td>
</tr>
<tr>
<td>Population (general)</td>
<td>54 (3.3e3, 6.3e3)</td>
<td>8 (71, 79.1)</td>
<td></td>
</tr>
<tr>
<td>Unspecified (at-risk)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unspecified (violent)</td>
<td>17 (187.8, 214.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Youth</td>
<td>15 (163.1, 126.1)</td>
<td></td>
<td>3 (121.7, 68.8)</td>
</tr>
</tbody>
</table>

The sections that follow present the findings of these studies in the context of extremist factors identified in the individuals studied. It will use these findings to explore possible explanations for the communication observed among extremists. It is important to note that overlap exists in the findings of these studies, and as a result, findings were restricted to unique factors that contributed to the overall schema of what is known.

**Geopolitical Perspectives**

The inclusion of geopolitical terms in models that attempt to identify extremists has consistently produced accurate models (95% CI, 87.2 to 92.7%; n = 22). The presence of these terms in their communication may be explained by various perceptions in extremist and at-risk populations of relationships among countries, and subsequently their belief systems, as well as grievances held by these individuals that they directed at foreign and domestic entities.

The perceived invasion of sovereign countries by the West, as a whole, was found in the reasoning of several militants involved in group-actor terrorism.[25] The perception of a schism between Islam and the West, or that Islam was under attack, also existed in the cases of would-be and successful homegrown terrorists,[26], convicted terrorists,[27], as well as in population-based samples.[28] Furthermore, anti-Western sentiment was readily found in the reasoning of jihadist militants and their relatives,[29] and in the content written by members of extremist networks on social media.[30] Another study found that individuals who specifically used online forums for political expression were more likely to express support for group-actor terrorism than those who engaged in conventional political activity, such as attending political meetings or protests.[31]

Unsurprisingly, observations of online extremists showed grievances were actively used in attempts to motivate others to action.[32] Grievances that blamed Western nations for geopolitical events, such as human rights violations resulting from the global war on terrorism, were present in population-based samples from the Arab[33] and non-Arab world,[34] foreign fighters,[35] and group-[36] and lone-actor terrorists,[37] where grievances were identified as prime drivers for their participation in violent jihadism. Studies of group-actor militants and suicide bombers found that motivation for their activities stemmed from responses to state aggression[38] or involved nationalistic goals.[39] Geopolitical involvement by individuals was evidenced by studies on foreign fighters from both developed and developing nations, with variations in the conflict theaters...
chosen by these jihadists.[40]

As the findings of these studies suggest, geopolitical perspectives, particularly comparative perceptions of the West and Islam, form a core part of extremist ideology. Manifesting linguistic expressions of this nature will rely on the use of specific countries and demonyms in geopolitical statements, which are basic identifiable constructs that are connected to more complex ideas such as grievances. Specific terms found in the geopolitical perspectives of extremists have identified them through an inclusion of these expressions in high-performing classification models. Examples include references to the establishment of an Islamic khilafah hostile to un-Islamic nations,[41] the use of names for places preferred by extremist groups and organizations (e.g., ISIS's name for the city of Kobani, Ein Islam),[42] and communication about events in various countries (e.g., Iraq),[43] as well as at lower territorial levels such as in different wilayat or territories[44] (see Table 4).

Table 4: Terms observed in communication on geopolitical perspectives and included in predictive models (n = 22).

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>Example Terms</th>
</tr>
</thead>
</table>

Religious Knowledge

The use of specific terms that carry religious significance in classification models has proven fruitful in the accurate separation of extremists and their content from their non-extremist counterparts (95% CI, 85.5 to 91.6%; n = 21). Unsurprisingly, individuals’ understanding of cultural systems, such as practices, sacred texts, and holy places also emerged as inalienable features in studies of extremists, which may explain the predictive success of these terms.

Studies found that some jihadists adhered to rigoristic religious beliefs[60] and that both on-[61] and offline[62] environments were used to establish credibility, defend a way of practicing religion, and engage in extremist activism. Others found that extremist organizations focused on the production of a jihadist culture well-versed in their interpretations of Islamic moral principles[63] or recruited individuals on whom they could impress their own religious knowledge.[64] For example, a study of the Islamic Action Front found the organization's active members were far more educated generally than their national population-based counterparts.[65] Similarly, suicide attackers from Hamas and Palestinian Islamic Jihad were found to be better educated than their non-suicide counterparts in these organizations.[66] Indeed, an interest in Islamic studies was found in a range of extremist group-actor samples,[67] where the formal study of Islam represented a significant part of their tertiary educational background,[68] and included madrasa and religious seminary attendance.[69] Other studies, such as some focusing on group-actor extremists from Jemaah Islamiyah[70] and suicide attackers,[71] supported this finding and observed a strong association between terrorist activity and radical madrasa or religious school exposure.

In addition to finding support among group-actor samples for the notion that violent actions were divinely ordained,[72] or that the promise of an attractive afterlife for those who die as martyrs was a motivation for would-be suicide attackers,[73] support for violent jihad was also found in population-based samples.[74] Some studies identified religiosity as a relatively strong factor in the radicalization of individuals,[75] such as religious motivations by perpetrators for their acts[76] and religious legitimacy arguments for fighting by information disseminators in jihadist networks,[77] which relied on a certain level of interpretation.[78] Such interpretation was not necessarily sophisticated and could be superficial, as was found in a group-actor sample of ISIS members,[79] or relied on ideas that were influenced by earlier forms of Islamist political ideology.[80] Another study of extremist views in a population-based sample found those at risk of depression experienced protection against depression from a strong religious identity, but that religion, although protective, also served
to legitimize and ultimately determine targets of violence after radicalization had occurred.[81]

Some studies found that individuals at risk of radicalization sought to develop an identity[82] and that an oppositional identity rooted in ideology formed in individuals who became radicalized,[83] which may provide some explanation for these individuals being absolutist.[84] Indoctrination was found to use ideas and images of a bipolar struggle between Islam and the West,[85] where the world was divided into ‘us’ and ‘them’ experiences,[86] and relied on the use of Islamic religious vocabularies.[87] Another study found the excommunication practice of takfir was used by jihadists to dichotomize their worldview and denounce other Muslims as kuffar, or unbelievers, to justify acts against them.[88] A negative view of those who offended Islam was also found to be a significant predictor for the support of violence[89] in population-based samples, including support for specific groups like ISIS among those who favored the implementation of absolutist rules under Shari’a law and clerical rule.[90] Further evidence for a dichotomous cognitive process was found at the neurocognitive level in the form of diminished activity in the dorsolateral prefrontal cortex, inferior frontal gyrus, and parietal cortex (regions implicated in calculating costs and consequences), when group-actor supporters of Lashkar-e-Taiba conveyed their willingness to fight and die for ‘sacred’ versus ‘non-sacred’ values.[91]

Given the prominence of religious and related constructs in determining support for, and engagement with, ideological extremism, these constructs will likely find expression as distinct linguistic terms in communication. The use of such terminology signals an awareness of religious faith, practice, and experience, regardless of how the knowledge was developed or how aligned it is with mainstream interpretations. Many such terms have been observed in communication among extremists of their religious knowledge and were included in high-performing extremist classification models. Examples include concepts such as Jannah or the final abode of righteous Islamic believers,[92] jihad or striving in the path of Allah,[93] important events like Ramadan,[94] different masjids or places of worship,[95] and practices such as takfir derived from interpretations of texts[96] (see Table 5).

**Table 5:** Terms observed in communication on religious knowledge and included in predictive models (n = 21).

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<th>Accuracy</th>
<th>Example Terms</th>
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**Social Role Functions**

Outside of their use in classification models (95% CI, 86.7 to 92.9%; n = 20), the many roles that were referred to in extremist communication signified that extremists recognized a complex social structure in their discussions. Indeed, the social and behavioral attributes of individuals formed part of the analysis of a range of studies and as a result, a number of recurring relations and interactions with others were identified.

Studies of group-actor terrorists and Islamist women involved in political conflict found that women played a near equivalent role in these organizations, but exhibited distinct role involvement mechanisms compared to their male counterparts,[112] such as occupying caring, support, and ideological roles. Other studies that explored these roles among extremist women in the online context found that pro-ISIS networks contained a number of discernible female roles that fostered notions of belonging,[113] including baqiya members (a newer term adopted by female ISIS supporters to mean those who persisted against efforts to suspend their accounts and were accepted into the virtual ISIS ‘family’),[114] mukhajarat (female migrants with ‘success’ stories in propaganda),[115] and so-called fangirls (enthusiastic young females).[116] Indeed, a population-based study found women were significantly more likely to support a sectarian group with a female outreach wing than one without such efforts.[117]

Relatively high levels of marriage among jihadists indicated that social relationships were important in these
populations.[118] Social bonds were a prominent driver to all major entry points to jihadist organizations,[119] and familial pressure was identified as a persistent force in the lifespan of ideological engagement for group-actor jihadists.[120] Studies that examined bombings in foreign fighters,[121] homegrown-, group-, and suicide attacker[124] samples found evidence of preexisting familial bonds and concentric circles that facilitated their recruitment processes. Other studies stressed the importance of family, friend, and peer networks due to their consistent presence in individuals who embedded themselves[125] or traveled to engage in[126] or support terrorist activity.[127] Social mechanisms within these networks such as reciprocal peer influence and immersion were identified as driving forces in the radicalization of homegrown jihadists,[128] where the role of friendship became increasingly concentrated inside the organization for those already involved.[129]

A number of studies found that potential recruits were exposed to leaders with experience,[130] knowledge,[131] and charisma.[132] Such exposure occurred both on- and offline, in a wide range of convict,[133] group-actor,[134] and youth samples,[135] and resulted in a desire by individuals to socially emulate their role models. Both foreign and domestic fighters often experienced contact with a veteran,[136] with relationships often being formed with prominent Islamist leaders.[137] Others also echoed this finding in the form of mentorship,[138] and one study concluded that foreign fighters sought spiritual authority in individuals for inspiration and guidance.[139] Searches for meaning,[140] identity,[141] and significance[142] were also present in individuals, including youth,[143] who were in the direct environment of those who became foreign fighters and suicide attackers. For example, in the cases of homegrown[144] and group-actor[145] radicalization, evidence was found of identity exploitation by those in leadership roles to influence, control, and guide individuals, which capitalized on the interplay between individuals and their environment.[146]

Those who partake in the social structure around an individual inherently occupy a type of social role relative to that person. Since roles organize behavior and give structure to positions in an individual’s local network,[147] it is expected that linguistic references to these relationships will manifest as descriptions of the roles that can be played by individuals, such as those who occupy roles involved in conflict, are close to each other, offer guidance or instruction, and so on. Roles may also be referred to by an individual without direct or indirect connection to the role itself, which signifies recognition of its status. Specific examples of social roles referred to in extremist communication that have been successfully exploited for their predictive properties include named and unnamed roles of authority (e.g., Abu Musab al-Zarqawi,[148] commander[149]), closeness (e.g., brother),[150] conflict (e.g., crusader),[151] and religion (e.g., hanif or true believer)[152] (see Table 6).

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<th>Accuracy</th>
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**Collective Dynamics**

Classification approaches have found that models performed well if they accounted for references to relationships between individual extremists and different forms of collectives, such as groups or organizations that were viewed as friendly or adversarial (95% CI, 86.5 to 92.5%; n = 20). The persistence with which these relationships were discussed in their communication may be explained by the importance of inter- and intra-group dynamics in extremist populations, as well as the various behaviors and psychological processes encouraged and elicited through these dynamics.

A number of questionnaire research studies investigated dynamics between and within groups of at-risk Muslim youth, and found a prevalence of shared ideology,[168] perceptions of inter-group threat,[169] and in-group superiority,[170] where collective and social identity salience were present. These group dynamics
were observed in experimental research on anti-semitism\[171\] and Sunni-Shi’a differences,\[172\] where strong adherence to the in-group predicted aggression against the out-group, such as approval of attacks and suicide bombing. Other studies found that justification for suicide bombing and political violence were more likely if respondents were highly disconnected, disordered,\[173\] or lacked a sense of belonging.\[174\]

A study found that when compared to foreign-born Muslims, Western-born Muslims were more vulnerable to the impact of perceived group-based relative deprivation and scored higher on extremism scales as a result.\[175\] Studies of foreign fighters found that the drive to help those who were perceived as mistreated by other groups was so strong in these individuals that it developed into a sense of obligation to act in defense of their in-group.\[176\] This phenomenon was noted in experimental research on the psychology of Islamism, which found a positive association between Islamist affinities and a preoccupation with group-based dominance and submission.\[177\] Others found that extremists attempted to distinguish between those who are ‘true’ or ‘false’ to Islam in their interpretations of the world.\[178\] Interestingly, a study of group-actor militants found that while this dichotomous thinking played a role in the reason they joined the group, the same separation of true and false Islam contributed toward their ultimate disillusionment with the group.\[179\]

Perceived discrimination is common among Muslim diaspora populations and was found to be positively associated with support for anti-Western political violence.\[180\] Support for this perception was also observed in at-risk Muslim youth,\[181\] jihadist converts,\[182\] and ISIS-affiliated online extremists.\[183\] Studies on religious leaders\[184\] and members of Muslim communities stopped and searched under terrorism acts\[185\] found a perception of institutional racism directed at Muslims. A study of al-Muhajiroun members, for example, showed that experiences of perceived racism intensified their attraction to the group's message and leadership.\[186\] A study that examined geo-referenced data on the behavior of online extremists found that local level measures of anti-Muslim animosity correlated significantly with indicators of online radicalization, including posting messages in support of groups like ISIS.\[187\] To this point, individuals who became radicalized and joined ISIS as foreign fighters reported that they attempted to close the gap between an ‘un-Islamic’ past and a better, redeemed future.\[188\] Indeed, the sizable undercurrent of ideological sympathy and support for specific groups, such as al-Qa’ida and ISIS, in respondents from both Muslim-majority countries and Western Muslim diasporas was found to be held together by the Internet.\[189\]

Feelings of injustice and prejudice were echoed in samples of Muslim youth,\[190\] lone-actor terrorists,\[191\] and incarcerated group-actor terrorists.\[192\] The need for justice as a response to perceived injustice was identified as part of a radicalization pathway in Muslim youth, including educated youth,\[193\] who were radicalized.\[194\] Other studies identified the presence of environments of moral and intellectual encouragement\[195\] for the actions of individuals, created and supported by established extremist organizations.\[196\] This phenomenon was also found in pro-ISIS online aggregates that grew through nuanced mechanisms of homophily,\[197\] and supported the trajectories of individual followers with information, who passed through numerous groups,\[198\] from relatively small to large networks.\[199\]

The prevalence of ideology, perceptions of prejudice, and subsequent drives toward justice found in these studies speak to the complex dynamics of extremism that lie between different collectives and within individuals' identification with particular collectives. Elements of these dynamics have been identified in extremist communication and exploited by classification models. Examples include linguistic expressions that reference specific collectives (and their adversaries) from smaller groups such as specific rebel groups like the Army of Islam,\[200\] larger organizations, such as the Islamic State of Iraq and Syria,\[201\] to entire communities of faith drawn on for ideological purposes, such as ummat al-Islam\[202\] (see Table 7).

**Table 7:** Terms observed in communication on collective dynamics and included in predictive models (n = 20).

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<th>Accuracy</th>
<th>Example Terms</th>
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Conflict Behaviors

The often-intertwined relationships extremists share with conflict are well-established in the literature, both as external friction and as internal struggle, which may offer explanations for why the inclusion of conflict terms in extremist classification models have produced accurate results (95% CI, 85.8 to 91.9%; n = 19).

Studies found that those with fundamentalist religious beliefs were more likely to be supportive of the use of violence to defend their faith across population-based samples from developed[218] and developing[219] nations, while sympathy for violence and terrorism was also found to be positively associated with psychosocial adversity, such as internal strife linked to anxiety, depression, and adverse life events.[220] For example, where followers believed jihad supported the use of violence, a strong association existed with the view that terrorists had valid grievances.[221] Training for violence was common among a number of populations of novice and experienced extremists,[222] such as overseas training,[223] firearms and bomb construction training,[224] or simply accessing technical training material online.[225] Jihadist leadership figures, in particular, tended to exhibit substantial battlefield experience,[226] while both group- and lone-actor[227] samples commonly identified with violence in their decision-making processes.[228] Interestingly, a significant minority of convicted jihadists remained welded to a militant mindset and are therefore more likely to reoffend upon release.[229]

A number of studies identified abuse[230] and traumatic events[231] suffered by individuals as contributory factors in their respective radicalization. A few studies found increased levels of popular support[232] for suicide attacks when a political reasoning or an attachment to political Islam was present.[233] Motivations to conduct martyrdom operations in group-actor samples were found to be based on the interests of their community and religion, despite the presence of suicidal tendencies in a number of potential suicide attackers.[234] Reminders of death (i.e., mortality salience) were also prevalent among online extremists[235] and have been found to increase an interest in martyrdom operations in youth samples,[236], as well as Islamic fundamentalism[237] and politically or religiously extreme views.[238]

Other studies found evidence that the environments which cultivated support for martyrdom operations relied on existing cultural schemata built into the popular imagination of how Islamic combatants engaged enemies of faith,[239] and that such environments acted to normalize[240] and socialize[241] violent jihad. Different drivers were observed and noted in a number of samples where individuals attempted to address issues that stemmed from a lack of existential meaning[242] and the perceived misrecognition of a Muslim identity in society.[243] Such actions included displays of resistance[244] and power,[245] overt rebellion,[246] and attempts to strengthen[247], maintain,[248] and defend a newfound sense of identity as ‘true’ Muslims.[249]

The presence of the many forms of ideologically driven conflict and struggle in the cognitive domains of extremists holds the potential to find expression in linguistic terms. These in turn identify not only violence and support thereof, but also the destructive actions directed at individuals outside of conflicts, such as abusive actions that result in the trauma they experience. Conflict behavior terms found in extremist communication that have contributed to accurate classification results include constructs that span the means and ends of war and weaponry (e.g., execution of suicide attacks,[250] the charge of Ansar executed by ISIS[251]) and the death and harm suffered as a result of these actions[252] (see Table 8).

Table 8: Terms observed in communication on conflict behaviors and included in predictive models (n = 19).

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Emotive Experiences

The basic and social emotions that underpin ideological communication have served to improve the accuracy attained by classification models that incorporate these types of terms (95% CI, 84.2 to 92.5%; n = 13). The performance of these terms may be explained by the range of conscious experiences that was identified in the study of extremists, based on their own thoughts and feelings, or those of others with whom they interacted.

Anxiety, fear, and hesitation were common experiences in would-be[268] and successful[269] suicide attackers prior to the execution of their mission, as well as among the online supporters of terrorist organizations.[270] Experiences of humiliation were found to be common among those who eventually committed suicide attacks for these organizations.[271] Anger and stress from significant hardship were also identified as contributory to the acts of homegrown jihadists,[272] Islamists,[273] and foreign fighters.[274] A study that examined the relationship between culture and terrorism found that population-based samples who were angry, hopeless, and experienced suffering showed more tolerance of terrorism.[275]

A number of extremist[276] and population[277] samples reported a deep sense of moral dissatisfaction based on a perceived decadence of modern institutions. Other socially complex experiences such as a need for commitment[278], emotional meaningfulness,[279] and a sense of a profound duty to enact revenge were identified in individuals who supported[280] or attempted to join[281] extremist organizations and in suicide attackers,[282] respectively. Research consistently found evidence of adverse life events,[283] identity issues,[284] and crises[285] in the backgrounds of group-actor samples and in convicted jihadists.[286] Personal uncertainty was an important determinant of a radical belief system[287] and obsessive ideological passion was often found to be anchored in a strong but insecure sense of identity.[288]

Whilst negative affective experiences featured prominently from a wide spectrum of anger (e.g., frustration,[289] hatred,[290] outrage[291]), sadness (e.g., humiliation,[292] neglect,[293] shame,[294] sympathy[295]), and fear (e.g., anxiety,[296] distress[297]), positive affective experiences such as ideological passion that underlie political or religious commitment[298] and excitement[299] were also present in the findings of studies. Studies identified a complex web of positive experiences that sought status through recognition[300] and esteem from others,[301] provided outlets for endured experiences,[302] and served altruistic goals.[303] However, negative experiences were also viewed positively, such as the perception of suicide attacks as noble.[304] An analysis of several online extremist samples found evidence that these individuals were more likely to express negative affects tied to perceived discrimination within and criticism of Western society, and positive affects in support of jihad, than average users of these publicly accessible social media.[305]

The wide and contrasting range of basic emotions present in the experiences of extremists make their identification as linguistic expressions a possibility. These expressions of basic emotions are also closely linked to more complex social emotions, such as those feelings that involve moral, personal, and sympathetic expressions about issues important to extremists. Specific examples of terms used in extremist classification models to identify signs of radicalization include descriptions of basic emotional states, such as feeling angry,[306] anxious, or stressed,[307] but also expressions of social emotions in the form of condemnation of,[308] or support for,[309] a particular matter that captures the attention of extremists (see Table 9).

<table>
<thead>
<tr>
<th>Accuracy</th>
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<tbody>
<tr>
<td>84.2 to 92.5% (95% CI)</td>
<td>anger/rage,[310] anxiety/stress,[311] condemnation,[312] disgust,[313]</td>
</tr>
<tr>
<td></td>
<td>surprise,[324] …</td>
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Information Diffusion

Many classification studies have included what they consider persuasive terms used by extremists in their models, which have produced accurate results in the identification of content indicative of radicalization (95% CI, 85.4 to 92.1%; n = 13). The use of these terms may be explained by a range of studies that have observed the particular ways in which extremist information was created and transmitted to and from individuals in order to influence their beliefs and behaviors.

Studies have noted that extremist ideology influenced individuals through persuasion[325] and that extremists who possessed vast knowledge of Islam were attractive to recruits.[326] Research showed that such authority could be used to successfully manipulate normative beliefs about aggression toward others.[327] Other studies found that messages exchanged in radicalization processes attempted to disguise their true ideological intent[328] or were amplified and combined with jihadist interpretations of verses from the Qur’an.[329] Others, in turn, were found to develop a desire to be influenced by their chosen ideology[330] and spread the word given to them, known as dawah, either in-person[331] or online.[332]

Among those who sought interpretations of the Qur’an and sunnah, second and third generation immigrant Muslims were found to seek more literal interpretations of narratives.[333] Among population-based samples, support for scriptural literalism was found to coincide with support for religious violence.[334] A literalist religious outlook was also found to generate positive views of a specific violent group, such as al-Qa’ida.[335] Experimental research that investigated the relationship between persuasive narratives and costly actions, such as martyrdom operations, found that individuals who were high-perspective takers and experienced more physiological arousal from the narrative were more likely to engage in costly behavior.[336]

Narratives such as those found in the online environment often include tales of exploits by foreign fighters and individuals who joined extremist organizations as a means to enhance the persuasiveness of the narrative and project onto themselves a romanticized version of Islamic history, as was found by a study that examined individuals who joined ISIS.[337] Studies that examined the role of the Internet in the radicalization processes of extremists concluded that these individuals used the Internet as an echo chamber to find support for their ideas that were echoed by like-minded individuals in their communication with each other.[338] Studies of a youth sample deemed likely targets for radicalization by ISIS found that exposure to the group’s online propaganda elicited support for, and trust in, the messaging, as well as a desire to exchange information and seek further interaction to get answers to their questions.[339] Furthermore, recent experimental research on ISIS found that exposure to counter-narratives against violent extremism resulted in increased support for the organization among individuals at greater risk of radicalization.[340]

Given that the processes of ideological persuasion and interpretation rely on both the effective construction and communication of ideas, the identification of these processes would likely include references to the specific means and modes of information diffusion, accompanied by linguistic expressions of verses, books, media, speeches, and so on. Examples of nuanced information diffusion embedded in the communication among extremists include references to media outlets that appear credible but produce propaganda such as the ISIS-affiliated Amaq News Agency,[341] claims of truth or untruth[342] often through the citation of various sources,[343] and requests to perpetuate the so-called knowledge or information derived from these sources[344] (see Table 10).

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<th><strong>Accuracy</strong></th>
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Table 10: Terms observed in communication on information diffusion and included in predictive models (n = 13).
**Discussion**

The present study used a series of dimensions as a framework to organize the factors that may explain the communication observed among extremists. These were geopolitical perspectives, religious knowledge, social role functions, collective dynamics, conflict behaviors, emotive experiences, and information diffusion. These dimensions were chosen for their potential as thematic categories to group various constructs that these individuals used to express their ideology, which a small body of computational approaches have exploited to accurately identify extremists and signs of their radicalization (n = 28). The search for possible explanatory factors behind their communication was informed by the empirical findings of a systematic review of literature, which produced a limited number of studies with such factors at the individual level of extremism (n = 244). These studies used cases, questionnaires, and interviews as data-collection instruments. The important position of communication as a necessary precursory element in a large amount of violent action means an organizing framework to better understand and potentially explain such communication through empirical evidence is a useful contribution to the study of conflict. To the best of the author’s knowledge, the systematic review conducted in this study is the largest open-access resource of its kind to date.

However, the work completed here is not without limitations. The evidence provided by the review as possible explanations for the communication observed among extremists was derived from the findings of studies that analyzed various samples from different populations. While it has been established that those susceptible to Islamic-based extremism who went on to commit violent acts were generally exposed to extremist communication,[360] future work should consider whether the dimensions are present in the communication that each of these different populations engage in across on- and offline mediums. Attempts to further distinguish different populations on cultural and demographic factors that can be reasonably delineated would also be beneficial. However, such inquiry may be limited by suggestions that various parts of individual factors such as those within a person's sociodemographic characteristics, criminal history, work and education, personal experiences, attitudes and beliefs, relationships, and mental health cannot easily be identified in their communication, despite potentially influencing their attraction to specific forms of ideology.[361] The full complexity of what an individual’s psychopathological and psychological makeup deems important may be near impossible to capture in written content. As such these dimensions, whilst broad, cannot organize every factor which motivates extremist communication. However, the dimensions do appeal to a sociability bias of language,[362] which would be problematic in the search for extremist personality traits,[363] but from a communication perspective, such a bias sheds light on the language developed within and among extremists to facilitate their socialization.

A linguistic approach to extremism that can organize some of its communication, as well as the behavioral, cognitive, and emotive factors that may influence expressions of the extremist mindset, while imperfect, is a useful step toward fine-grained and practical research on dangerous ideology. Such an approach, it is hoped, will help unlock new frontiers in the use of text data in conflict research,[364] so that the harmful trajectories individuals embark on may be identified and prevented before acts of violence from their side can come to fruition. While it is clear that existing classification approaches to extremism achieve impressive performance results, emerging deep-learning artificial intelligence algorithms offer entirely new paradigms that will undoubtedly be applied to the problems of extremism. These newer approaches can achieve even higher levels of performance, scale to unprecedented amounts of big data, and learn from both the communication and the relations between individuals and their peers to make predictions.[365] Given the potential power of these approaches, it is more important than ever to look through the window opened by communication and attempt to find the point where extremist speech acts turn into acts of violence. The study of violent extremist communication in an organized way, using frameworks such as the one presented here, opens avenues to sophisticated computational approaches that can use these structures developed from more traditional subject matter expertise to better learn from, and understand, the extremist phenomena the algorithms are expected to predict. Building this bridge between old and new approaches will assist research efforts to ultimately delineate different forms of violent and nonviolent extremism.[366] This, in turn, may curtail undue surveillance and potential misuses[367] and develop more affordable, effective, and ethical ways to counter extremism.[368]
About the Author: Phillip Conrad De Bruyn is a PhD graduate from the Faculty of Arts, Business, Law and Education at The University of Western Australia. His research interests include individual behavior, online extremism, propaganda, and the application of advanced methods to the study of extremism, radicalization, and terrorism.

Notes

Notes marked with letters indicate studies included in the systematic review. The first letter signifies the sample type (c = convict, f = foreign fighter, g = group-actor terrorist, l = lone-actor terrorist, o = online extremist, p = population, s = suicide bomber, u = unspecified at-risk/violent, y = youth). If applicable, the second two letters signify the ISO 3166-1 alpha-2 code of the country of residence reported or discerned for the majority of individuals in the study sample. If the majority could not be discerned on a per country basis, m+ indicates the sample is from Muslim majority countries, m- signifies non-Muslim majority countries, and + means both country types were present.


[4] To clearly delineate from left-, right-wing, and other types of violent extremism, the scope of this study is Islamic-based violent extremism, including fundamentalism, Islamism, and jihadism, and terrorism. Extremism, in this sense, means “encouraging, condoning, justifying, or supporting the commission of a violent act [within the context of Islamic-based extremism] to achieve political, ideological, religious, social, or economic goals.” See: Gary LaFree and Joshua Freilich, “Government policies for countering violent extremism,” Annual Review of Criminology 2, no. 1 (2019): pp. 383–404; URL: https://doi.org/10.1146/annurev-criminol-011518-024542.


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[147] Eric Gleave et al., “A conceptual and operational definition of ‘social role’ in online community,” in *HICSS ’09: Proceedings of the 42nd Hawaii International Conference on System Sciences* (Waikoloa, 2009); URL: [https://doi.org/10.1109/hicss.2009.6](https://doi.org/10.1109/hicss.2009.6).


[171] Naumana Amjad and Alex Wood, “Identifying and changing the normative beliefs about aggression which lead young...


[189][w] Alex Schmid, “Public opinion survey data to measure sympathy and support for Islamist terrorism: A look at Muslim
opinions on Al Qaeda and IS” (The Hague: The International Centre for Counter-Terrorism, 2017), pp. 1–34; URL: https://doi.org/10.19165/2017.1.02.


[194*] Marieke Slootman and Jean Tillie, op. cit., pp. 1–130.


[207*] Walid Magdy et al., op. cit., pp. 1–10.

[208*] Hassan Saif et al., op. cit., pp. 571–587.

[209*] Ibid.


[211*] Shakeel Ahmad et al., op. cit., pp. 1–23; Nuha Albadi et al., op. cit., pp. 1–19.


[213*] Walid Magdy et al., op. cit., pp. 1–10.


[215*] Nuha Albadi et al., op. cit., pp. 1–19.


[242*] Lasse Lindekiilde et al., op. cit., pp. 858–877.


[250*] Shakeel Ahmad et al., op. cit., pp. 1–23.

[251*] Walid Magdy et al., op. cit., pp. 1–10.


[256] Nuha Albadi et al., op. cit., pp. 1–19.
[259] Laura Smith et al., op. cit., pp. 1–12.
[263] Nuha Albadi et al., op. cit., pp. 1–19.
[264] Laura Smith et al., op. cit., pp. 1–12.


[315] Ibid.


Ugur Kursuncu et al., op. cit., pp. 1–22.


Daniel Xie et al., op. cit., pp. 2545–2549.


Walid Magdy et al., op. cit., pp. 1–10; Daniel Xie et al., op. cit., pp. 2545–2549.


Walid Magdy et al., op. cit., pp. 1–10.

Tom De Smedt et al., op. cit., pp. 1–31.


Walid Magdy et al., op. cit., pp. 1–10.


Tom De Smedt et al., op. cit., pp. 1–31; Daniel Xie et al., op. cit., pp. 2545–2549.


Daniel Xie et al., op. cit., pp. 2545–2549.


