

Analyzing Environmental Emotive Triggers in Terrorist Propaganda

Travis Morris

Abstract—The purpose of this study is to measure the intersection of environmental security entities in terrorist propaganda. To the best of author’s knowledge, this is the first study of its kind to examine this intersection within terrorist propaganda. Rosoka, natural language processing software and frame analysis are used to advance our understanding of how environmental frames function as emotive triggers. Violent jihadi demagogues use frames to suggest violent and non-violent solutions to their grievances. Emotive triggers are framed in a way to leverage individual and collective attitudes in psychological warfare. A comparative research design is used because of the differences and similarities that exist between two variants of violent jihadi propaganda that target western audiences. Analysis is based on salience and network text analysis, which generates violent jihadi semantic networks. Findings indicate that environmental frames are used as emotive triggers across both data sets, but also as tactical and information data points. A significant finding is that certain core environmental emotive triggers like “water,” “soil,” and “trees” are significantly salient at the aggregate level across both data sets. All environmental entities can be classified into two categories, symbolic and literal. Importantly, this research illustrates how demagogues use environmental emotive triggers in cyber space from a subcultural perspective to mobilize target audiences to their ideology and praxis. Understanding the anatomy of propaganda construction is necessary in order to generate effective counter narratives in information operations. This research advances an additional method to inform practitioners and policy makers of how environmental security and propaganda intersect.

Keywords—Emotive triggers, environmental security, natural language processing, propaganda analysis.

I. INTRODUCTION

TERRORIST ideologues use words and images as emotive triggers to weaponize ideas. Emotive triggers are symbols that are constructed to generate an emotional response. The use of emotive triggers in propaganda is not new and the analysis of emotional semantics is supported by a long scientific tradition that crosses several disciplines and sub fields [1]-[8]. Since emotive triggers can be effective, terrorist ideologues use emotive words and images to incite audiences in order to shift attitudes and gain support.

Emotive triggers frame political, religious, or historical data in such a way that a target audience experiences an array of emotions. An effective response produces either active or passive support in a target audience manifested by increased

group membership, a financial surge, increased logistics, or an ideological realignment. Ideologues use emotive triggers to target beliefs and assumptions that may be open to persuasion [9]. Effective emotive triggers also transmit specific interpretations to target populations in order to ‘infect’ its audience into action [10]. When an emotive trigger works, it produces what Barsade defines as emotional contagion [11]. Emotional contagion is the overt or subversive induction of behavioral attitudes that align with the ideologue’s interpretation [12].

Emotive triggers analyzed in violent jihadi propaganda can be classified into the following typology in Fig. 1.

Historical-Instances that validate ideology
Violence-Kinetic actions that demonstrate the ideal
Injustices-Incidents where Muslims are victimized
Immorality-Cases that demonstrate societal decay
Religion-Theological justification
Political-In-group or out-group episodes
Leadership-Positive or negative examples
Environmental-Literal or symbolic inclusion

Fig. 1 A Violent Jihadi Emotive Trigger Typology

The analysis of environmental emotive triggers in violent jihadi propaganda is a neglected subfield. Environmental emotive triggers are defined as images or words that frame the environment or environmental issues in an ideological fashion. Examples include climate change, water, soil, energy, rain, or pollution when they are ideologically framed. Environmental terms and images are used by propagandists to reinforce an ideological message to the target audience. These types of emotive triggers are overlooked in analysis for two primary reasons. First, other emotive triggers are more prominent, violence for example, thus receiving greater attention. Second, the intersection between environmental security, terrorism propaganda, and propaganda analysis is an uncommon nexus, thus the subject remains under studied.

II. PROPAGANDA ANALYSIS

Propaganda analysis can be classified as the examination of communication’s social impact or as a method to examine the qualities of emotionally laden communication [13]. Propaganda analysis can be described as a strategic method to understand intentions, strategy, and/or current events. It is also a method to uncover the overt and covert communications that propagandists intend to use to dominate the public’s attitudes and opinions [14], [15]. In this research, propaganda analysis is defined as the critical study of the communication strategies intended to dominate target audiences’ emotions.

Travis Morris PhD is an associate professor and director of the Peace and War Center at Norwich University, USA (phone: 802-485-2965; fax: 802-485-2252; e-mail: wmorris@norwich.edu).

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Terrorist propaganda can be analyzed via five methodological approaches. Morris [16] in Table I outlines the five methodological approaches to analyze terrorist propaganda. Each typology can be considered as a distinct dimension of propaganda analysis. Each dimension has a

specific objective with associated methodologies that is unique to answering questions about terrorist communications. Since there are different layers of the communicative process, each typology is considered to be a separate dimension to examine a different set of questions.

TABLE I
 TERRORISM PROPAGANDA ANALYSIS TYPOLOGY [16]

	Purpose	Methods	Central Question	Outcome
Dissemination	Analyze the relationship between propaganda and media	Mass Communication Methodologies	What is the relationship between terrorism and media?	Media regulation, target audience impact, and recruitment
Informative	Identify actionable intelligence	Content and Text Analysis Methodologies	What actionable intelligence is embedded?	Names, dates, locations, weapons, threats, targets, etc.
Communicative	Identify semantic meaning, syntax, structure, grammar and usage	Communication and Rhetorical Methodologies	What is the communicative structure?	Counter propaganda, disinformation, and strategic communications
Frames	Analyze how a message is constructed to change attitudes and incite action in a target audience	Multi-disciplinary Social Science Research Methods	How do actors interpret data, their frame, and competing frames for a target audience?	Counter propaganda, disinformation and radicalization
Emotion	Examine emotional messaging and codes	Sentiment Analysis, Natural Language Processing, Ethnographic Methods	What are the embedded emotional messages?	Counter propaganda, disinformation and radicalization

III. METHODOLOGY

A. Data: Inspire and Dabiq Magazine

The data used for this research came from a corpus comprised of 31 online magazine issues published from two violent jihadi organizations. The data set included 16 online *Inspire* magazine issues published by al Malahem Media Foundation, al Qaeda in the Arabian Peninsula (AQAP) between July 2010 and November 2016. 15 online *Dabiq* online issues are published by the Al Hayat Media Center, Islamic State of Iraq and the Levant (ISIL or ISIS) between July 2014 and July 2016. *Dabiq* magazine constitutes a corpus of 942 pages and 399,372 words, while *Inspire* magazine consists of 1005 pages and over 388,493 words, as summarized in Table II.

TABLE II
 DATA SET

	Publication Date	Number of Issues	Ideological Affiliation	Total Pages	Total Word Count
Inspire	7/2010-11/2016	N=16	Al Qaeda (AQAP)	1005	388,493
Dabiq	7/2014-6/2016	N=15	Islamic State (ISIS)	942	399,372

Both magazines are written in English and are designed to visually and semantically appeal to those familiar with western style fashionable magazines. *Inspire* magazine intends to both catalyze and equip individuals with ideological, technical, and tactical support to carry out attacks in western societies. Samir Khan and Anwar al-Awlaki, the magazine's leadership, promoted the idea of open source jihad as a method to circumvent security challenges and increase the likely of attacks in the west [17]. In contrast, *Dabiq* devotes its material to morally and theologically legitimize the Islamic State as a self-proclaimed caliphate with a call to all "true" Muslims to immigrate to support their cause through the use of violence. Academic studies have focused on various aspects of both magazines including: strategic messaging [18], language [19], images [20], Islamic exegesis [21], recruitment

patterns [22], themes [23], and impact [24].

B. Natural Language Processing: Rosoka

Natural language processing (NLP) has grown exponentially over the past two decades. NLP remains one of the oldest machine learning research areas. Machine translation speech recognition and text processing use some NLP logarithms, which has formed the foundation for major breakthrough computation and artificial intelligence (AI) [25]. NLP continues to evolve at a fast pace, especially with AI's increased use of NLP algorithms to both recognize and process user voice commands. Rosoka was the NLP digital platform used for this research. This software was selected because it can process large-scale multi-lingual textual data; the user can customize entity extraction, and can analyze entity salience at several levels.

Rosoka Series 6 Toolkit is a multi-lingual entity and relation extraction digital platform. The platform uses next generation NLP to understand big data and can process over 200 languages without the need to load separate dictionaries for each language. The digital platform can analyze the intensity, polarity, mood, and salience of semantic and linguistic structures. Users can create entity types, relationship definitions, lexicons, character-based regex rules, semantic vector regex rules, and maintain quality control with regression testing.

Rosoka Toolkit can be used to create domain-specific document sets (corpora) and entities. This feature is especially important for analyzing how the environment is used in propaganda. For this research an environmental dictionary was created to extract environmental entities and some examples are listed in Fig. 2. For example, if the entity in a corpus is *water*, the tool will extract water, but rain and ice can also be extracted via complementary rules to *water* in Rosoka's extraction engine. Rosoka's entity extraction systems are designed to easily locate extraction errors.

Atmosphere, Biomass, Carbon, Deforestation, Emissions, Fire, Global Warming, Hazardous Waste, Incinerator, Landfill, Mulch, Noise Pollution, Organic, Pesticides, Recycle, Smoke, Trees, Utility, Ventilation, Waste, Water

Fig. 2 Environmental Entities Examples

Work flow begins with importing the violent jihadi corpora into Rosoka 6. The environmental entity dictionary identifies what environmental terms to extract from the data. The environmental entity extractor is then applied to the corpora and all environmental terms are extracted and analyzed. Extracted data are checked for accuracy by analyzing the in-text context and the correction of any multi-use terms in the environmental dictionary. Intensity, polarity, mood, and salience of semantic and linguistic structures of all entities can be analyzed at this stage.

C. Frame Analysis

Frame analysis is the process of understanding how information is packaged in a manner that appeals to a target population. Using multi-disciplinary methods, analysts and scholars examine how groups frame their ideology into a message to gain political momentum and seize power [26]. Scholars examine how a message is framed in order to understand how language or images are used to impart meaning [27]. Frame analysis can reveal why some messages resonate with a target audience and can be used to design effective counter messages.

Frames can be used to diagnose problems, suggest causality, define morality, and subscribe a prognosis [28]. Effectively framing data from history, grievances, religion and politics is used to catalyze a small group into a movement [29]. The Center for Strategic Communication in Arizona is an example of how frames are analyzed in propaganda [30]. They identified cultural master narratives of al-Qaeda in the Maghreb (AQIM) based on their study of 246 AQIM propaganda texts from 2007 to 2013. Their analysis revealed that AQIM uses specific terms to frame their own members and enemies in a negative light. It is logical to frame an enemy negatively; however, negative self-framing (or representation) can also be used to interest potential recruits. Understanding how AQIM uses frames via propaganda analysis assists in understanding local and strategic objectives.

In this research, each individual environmental word and image entity was analyzed to determine how it was being framed in the data. Rosoka was used to extract environmental word entities and the “context” application was used to determine how each entity was being framed by the propagandist. Frame analysis was used to determine whether the entity’s meaning was literal or symbolic. Additionally, frame analysis determined each environmental entity’s purpose and classified it as either informational, tactical, or an emotive trigger. Emotive triggers were classified in accordance with their use to incite a target audience. Frame analysis was also used to identify each environmental image entity used across 1,947 pages. Frame analysis findings for both environmental and image entities is discussed in the next section.

IV. FINDINGS

A. Environmental Entities

A significant finding is that both violent jihadi magazines regularly include environmental words and images to target audiences. Since both magazines have numerous contributors and editors over their publication years, this finding indicates that environmental entities are linked to a propagandist’s method of framing ideology. This research confirms the nexus between the inclusion of environmental issues and violent jihadi propaganda. Table III illustrates the frequency of environmental word and image entities in individual magazine issues across the data set. Out of the entire data set, 193 total environmental entities were identified in *Inspire* magazine and 108 environmental entities were identified in *Dabiq*. These findings indicate that both ideologues use environmental entities across their propaganda; however *Inspire* embeds them more frequently. NLP and frame analysis is used to determine that both violent jihadi magazines use both environmental words and images throughout their publication years. Table III also indicates which magazine issues have the most frequent environmental entities. *Inspire*, issue 9, “Winning on the Ground,” has the highest number of environmental word entities at 40, while *Dabiq*’s issue 15, “Break the Cross,” has the most frequent use of environmental word entities at 20. However, there are some issues that have fewer than 5 entities, suggesting that propagandists vary the types of emotive triggers used in different issues. Additionally, analysis reveals that environment image entities are also used by both violent jihadi publications at an almost equal rate.

TABLE III
 ENVIRONMENTAL WORD & IMAGE FREQUENCY

Issue	Inspire Word Entity	Dabiq Word Entity	Inspire Environmental Image Entity	Dabiq Environmental Image Entity
1	18	7	9	10
2	7	3	10	4
3	2	3	3	3
4	9	4	2	1
5	4	3	4	2
6	9	4	8	4
7	2	12	1	2
8	12	8	3	3
9	40	7	7	3
10	10	4	5	3
11	7	6	3	1
12	18	13	3	6
13	23	4	1	0
14	11	10	3	1
15	18	20	0	10
16	13	N/A	1	N/A
Total	193	108	60	53

Analyzing every environmental entity is beyond the scope of this research. Therefore, purposive sampling was used to isolate certain entities considered to be core environmental issues illustrated in Table IV. Although a central

environmental entity is listed in Table IV, for example *water*, all synonyms for the entities were included. More specifically, for the entity *water*, the synonyms such as rivers, lakes, streams, rain, etc. were all classified into the water entity. Rosoka identified the core environmental entities across both corpora via the environmental dictionary. Environmental entities varied on frequencies with *fire* being the most frequent in *Dabiq* at 63 and *Inspire's* use of *soil* and *water* is equal at 59.

Across both data sets, environmental entities are classified into two types, literal or symbolic. Emotive triggers can be either type, depending on how the entity is framed. Each environmental entity is then classified into three framing purposes. Informational frames are used to inform the reader with no emotionally charged message assigned to the entity. An example of this would be an ideologue mentioning the River Jordan as a reference point. A tactical classification involved using an environmental entity as an instructional guide. An example of this would be describing the use of water in bomb making or how to determine the best location for inflicting the most economic damage from arson. Finally, environmental entities are used as emotive triggers when they are framed to illicit an emotion from the reader. For example, *trees* are used symbolically to represent humanity or a single human being. *Soil* is used as an emotive trigger when it is framed either positively or negatively to catalyze the reader's

emotions. For example, "the soil is polluted with crusader blood" is an example of how soil is emotionally framed negatively, while the "fertile soil," is a sign of blessing.

There are variances in how violent jihadists frame environmental entities in propaganda. *Dabiq* uses these entities primarily at the symbolic level, whereas *Inspire* fluctuates between using them either symbolically or literally. This is due to the fact that some environmental entities are used in *Inspire's* informational guides in the magazine. *Dabiq* uses environmental entities as emotive triggers at a much higher rate than *Inspire*. This can be attributed to the symbolic use of these entities to legitimize the Islamic State theologically. A significant difference between the magazines is how the entity is used tactically. There are no instances in *Dabiq* where one of the core environmental entities is framed for a tactical purpose. Again, *Inspire's* inclusion of an instructional component in each issue attributes the reason for this difference. Finally, with the exception of *water* in *Inspire*, all other entities are framed primarily as emotive triggers, followed by tactical and informational framing

Water is the most salient environmental entities in both data sets. Both fire and water in *Inspire* and *Dabiq* magazine are the most salient core entities. Framing across magazines vary. *Dabiq's* use of environmental entities is meant to be symbolic and used as emotional triggers.

TABLE IV
 CORE ENVIRONMENTAL ENTITY ANALYSIS

Entity	Issue Frequency	Entity Frequency	Aggregate Salience	Meaning	Typology	Framing Purpose
Water (Inspire)	13/81%	59	731	Literal	63%	Informational 8%
				Symbolic	37%	Emotional Trigger 41%
Water (Dabiq)	14/93%	47	479	Literal	32%	Tactical 51%
				Symbolic	68%	Informational 32%
Soil (Inspire)	11/69%	39	311	Literal	15%	Emotional Trigger 68%
				Symbolic	85%	Tactical 0%
Soil (Dabiq)	7/49%	21	79	Literal	32%	Informational 8%
				Symbolic	68%	Emotional Trigger 78%
Trees (Inspire)	5/31%	59	68	Literal	15%	Tactical 14%
				Symbolic	85%	Informational 0%
Trees (Dabiq)	8/53%	52	44	Literal	0%	Emotional Trigger 100%
				Symbolic	100%	Tactical 0%
Fire (Inspire)	13/81%	54	702	Literal	69%	Informational 5%
				Symbolic	31%	Emotional Trigger 88%
Fire (Dabiq)	15/100%	63	346	Literal	16%	Tactical 7%
				Symbolic	84%	Informational 11%
						Emotional Trigger 89%
						Tactical 0%

This analysis illustrates that environmental entities are used throughout both data sets, but how they are used varies. Findings indicate that when these five core environmental entities are used, they are used primarily as emotive triggers that draw from symbolic and literal meanings. Environmental entities reveal that the propagandist's perspective also includes environmental security as a component of their propaganda tool kit. Religious discourse or other communicative

techniques are typically the focus of propaganda analysis, however this research illustrates that environment and environmental issues are indeed part of the violent jihadi cognitive process. This is significant because they are used in attempts to leverage potential recruits and followers in similar ways that other emotive triggers identified in Fig. 1.

Salience in NLP can be defined as the construction of information so that it is more visible, significant, or

memorable to target audiences [31]. For the propagandist, this is critical because the use of emotive triggers is a method used to increase salience. How information is framed also elevates its salience as this technique increases the probability that a target audience will notice the information, cognitively process it, and be impacted in some way. If the propagandist is effective, ideological alignment occurs with the intended audience. It is also important to note that a high degree of salience is a product of the interaction of texts, terms, and the presence of frames in the text. A high degree of salience does not necessarily guarantee effectiveness in a target audience, but it does indicate how the propagandist thinks about the information. Table IV also illustrates the aggregate salience of five core environmental entities. The highest degree of salience in *Inspire* magazine is *water* at 731, while *fire* maintained the upmost salience for *Dabiq* at 702. It is important to note that entity frequency does not always indicate high salience. The entity, *trees*, is just as frequent as *water* across the corpus, however it's salience is significantly lower than *water*. This is why measuring salience is an effective measure in propaganda analysis as it indicates that *fire* and *water* are significant environmental entities in *Inspire* and *Dabiq*.

B. Limitations: Environmental Entities without Context

Environmental entities should be examined beyond salience and frequency in propaganda analysis. *Climate change* as an environmental entity is used as an example. *Climate change* across the corpus is used 5 times in *Inspire Magazine* with an aggregate salience of 46 and is not mentioned at all in *Dabiq*. However, in the first *Inspire* magazine published in 2010, Usama bin Laden is listed as the author of an essay entitled, "The Way to Save the Earth." In this essay of 1844 words, he addressed climate change, global warming, corporate greed, and pollution. Therefore, it is critical to note that even though the *climate change* entity was used only 5 times, the 1844 words were used as commentary around the entity to define and argue that readers should be concerned about climate change. The following selection is taken from *Inspire Magazine's* first issue, published in 2010. The selection is included because it demonstrates how textual context can elevate the importance of an entity beyond frequency or salience.

"This is a message to the whole world about those who cause climate change and its dangers – intentionally or unintentionally – and what we must do. Talk of climate change isn't extravagant speculation: it is a tangible fact which is not diminished by its being muddled by some greedy heads of major corporations. The effect of global warming has spread to all continents of the world. Drought, desertification and sands are advancing on one front, while on another front, torrential floods and huge storms the likes of which only used to be seen once every few decades now reoccur every few years. That's in addition to the islands which are quietly and calmly sinking under the waters of the oceans; and the pattern is accelerating and reports by organizations dealing with the

affairs of displaced people estimate the displacement of as many as a billion humans during the next four decades as a result of this." [32]

V. CONCLUSION

Government sponsored cyber-attacks against military, private, or governmental targets indicate a new wave of warfare. Recent examples include the Russian integration of cyber warfare in the Ukraine and information operations during the United States 2016 Presidential election. In addition to cyber-attacks, defensive and offensive information operations illustrate emergent methods in cyber space to achieve a desired outcome. Information operations and propaganda have always had a strong correlation, but it is permanent, yet ever evolving place in cyber space is a new dimension. Therefore, it is critical to have robust analysis and scholarship that advances our understanding of the role of propaganda in information operations from governments and non-state actors.

This research advances propaganda analysis in a way to understand how environmental entities are used as emotive triggers by terrorist propagandists. Normalizing ideological resonance with an audience is arguably one of the most important functions of any political, religious, or social movement. This outcome is no different for terrorist propagandists. Therefore, a propagandist uses terms, like those associated with the environment, to emotionally catalyze his or her target audience so that the information is highlighted, cognitively processed, and remembered. Emotive triggers are the most dangerous when they become part of a process that alters and then aligns a target audiences' perceptions with that of the ideology.

The war of ideas, deception (commonly called fake news), and information warfare has exponentially increased in cyberspace over the past decade. Kinetic victories against terrorists and terrorist groups demonstrate one kind of success, however not winning at information operations can have far reaching consequences. This is the case because tactical victories can overturn to defeat in the subsequent years if the ideology behind the victory is at odds with a population. Governmental officials, who are not necessarily interested in "understanding" the emotions of terrorists or how they intersect often resort to symptom relief. This plays out exactly the same as alleviating the symptoms of a virus, rather than eradication of the virus, symptom suppression is pursued as a course of action. Ideas and emotive triggers associated with terrorist propagandists are the viruses that replicate cognitively. Combating them implies a thorough diagnostic process to understand how their propaganda functions.

This research confirms that environmental entities are used as emotive triggers by violent jihadi propagandist, which should inform information operations and operators in constructing counter messages. The advancement of propaganda analysis is critical if policy makers want to win in informational operations. The blowback of not knowing terrorist's emotive triggers is to dismiss the ideological weapons that are being used to advance their agenda and

recruit. Identifying, examining, and analyzing how propagandists communicate their message is critical should any effective counter messaging campaigns be designed.

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