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The Neurocognitive Process of Digital Radicalization: A Theoretical Model and Analytical Framework

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Abstract

Recent studies suggest that empathy induced by narrative messages can effectively facilitate persuasion and reduce psychological reactance. Although limited, emerging research on the etiology of radical political behavior has begun to explore the role of narratives in shaping an individual's beliefs, attitudes, and intentions that culminate in radicalization. The existing studies focus exclusively on the influence of narrative persuasion on an individual, but they overlook the necessity of empathy and that in the absence of empathy, persuasion is not salient. We argue that terrorist organizations are strategic in cultivating empathetic-persuasive messages using audiovisual materials, and disseminating their message within the digital medium. Therefore, in this paper we propose a theoretical model and analytical framework capable of helping us better understand the neurocognitive process of digital radicalization.

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Introduction

Although limited, emerging research on the etiology of radical political behavior (i.e. terrorism and extremism)[2] has begun to explore the role of narratives in shaping an

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[2]In this study, radical political behavior can be defined as a deliberative act with the intent to coerce and intimidate a government or civilian population, or some segment of it, through violence, or the threat of violence to further a political or ideological aim. This definition builds upon Geoff Dean's definition of violent political extremism (2014, p. 12). Radical political behavior encompasses several conceptual terms, including, terrorism and extremism, so radical political behavior is used interchangeably with radical behavior, terrorism, and extremism.

individual's beliefs, attitudes, and intentions that culminate in radicalization (Braddock, 2012; Morris, 2012; Vergani and Bliuc, 2017; Windsor, 2018). The existing studies focus exclusively on the influence of narrative persuasion on an individual, but they overlook the necessity of empathy and that in the absence of empathy, persuasion is not salient. Campbell and Babrow argue, "empathy is a requisite for, rather than a component of persuasive messages," (2004, p. 164). Consequently, if an individual empathizes with a message then it is more likely to be considered realistic, relatable, believable, and therefore, persuasive (Shen, 2010). Yet, very little is known as to how messages should be crafted to arouse empathy in order to optimize their persuasive impact, which is especially relevant to terrorist messaging given the lethal outcome of successful persuasion.

Messaging refers to the actual words, images, and production effects used to convey the narrative. Terrorist and extremist groups strategically utilize narrative messaging as a propaganda device to radicalize prospective members. The process of adapting and contextualizing the narrative to a specific audience and content medium is what makes messaging, by design, strategic. We argue that terrorist organizations are strategic in cultivating empathetic-persuasive messages using audiovisual materials, and disseminating their message within the digital medium. Therefore, the purpose of this paper is to present a theoretical model and analytical framework capable of helping us better understand the neurocognitive process of digital radicalization, and how message content and production features have the potential to arouse empathy and generate persuasive outcomes among a target audience.

Review of the Literature

Emotions and Radical Political Behavior

What mobilizes individuals to engage in radical political behavior has been a significant question in the social sciences. And while existing studies have contributed significantly to our understanding of the processes underlying radical political action, the

early social science research fails to account for any relationship between emotional motivators and the etiology of radical political behavior, thereby overlooking an important component of the radicalization process. More recent studies attempt to address this knowledge gap by developing an integrative theoretical model that identifies two distinct pathways to radical action: an emotional pathway that posits reactive anger to injustice compels action, and an efficacy pathway that asserts individuals are solutions oriented and rational, which is the basis for the shared belief that the likelihood of solving problems increases with group identification (van Zomeren et al., 2004).

This dual pathway model proposes to explain the collective action of social movements and non-violent protest, which is distinguished as normative political behavior (i.e. actions that conform to societal norms). It stops short of explaining the motivational criterion for radical political action, which is distinguished by non-normative political behavior (i.e. actions that are counter to societal norms). Tausch et al., work to elucidate this relationship between emotion, efficacy and radical action, and find that non-normative radical action is driven by low efficacy and contempt (2011). They argue that the emotional expression of contempt is especially relevant to radical behavior because it "entails psychological distance from its object and a lack of reconciliatory intentions," which is indicative of the violence that characterizes extremist movements (2011, p.2). Consistent with the findings of Tausch et al. (2011), empirically grounded social science studies that evaluate the intersection between emotions and radical political behavior share a common theme: the emotions of anger, fear, contempt, shame and disgust have all been linked to intergroup aggression (Buckels and Trapnell, 2013; Matsumoto et al., 2015; Becker et al., 2011).

Although, these studies are methodologically varied, they approach the relationship between emotions and radical political behavior using analogous theoretical frames, which are focused on explaining the motivations of existing members to act. The motivations of existing members and affiliates[3] are important as they explain the ability of organizations to mobilize

[3]The term 'affiliates' refers to loosely affiliated members who are aligned with a group's ideology. This term may include supporters and sympathizers, but also lone actors.

their current membership to action. When examining this process, radical organizations routinely incite emotions of anger, fear, contempt etc. among its base to mobilize them. This mobilization process is essential to the continued existence of radical organizations, and is what allows group members to commit acts of violence in the name of the organization. However, this study is also interested in understanding an equally important process related to the continued existence of a radical organization, that being the motivations of non-affiliated individuals (i.e. interested individuals who have yet to be radicalized, affiliate with a group, or perpetrate a terrorist act) to affiliate with a terrorist group or it's ideology (i.e. lone actors), which is the basis for how individuals are radicalized and/or recruited into terrorist organizations.

Empathetic Messaging and Radicalization

Emotions represent a conscious, psychological state of being that is accompanied by somatic indicators. Some researchers contend that emotions can be linked to feelings (Oosterwijk, et al., 2012; Damasio, 2004), while others argue that emotions are constructed, contextualized and given meaning through social experiences and society (Johnson-Laird and Oatley, 2000; Turner, 2009). Most scholars agree on two concepts that are relevant to emotions, the first being that emotions can primarily[4] be characterized as either affective or reactive; and second that emotions and cognition are linked; therefore, "emotions involve beliefs and assumptions open to cognitive influence" (Jasper, 1998, p. 401).

Studies have demonstrated that both affective and reactive emotions play an integral role in radical political action at every stage of an organization's existence (Davis, 1983, Jasper and Poulsen, 1995; Jasper, 1998; Buckels and Trapnell, 2013; Matsumoto et al., 2015). However, Jasper (1998) was among the first scholars to theorize that group leaders "appeal to, arouse, manipulate, and sustain [affective] emotions to recruit and retain members" (p. 405). This is a logical supposition given that affective emotions are affirming emotions, cultivated

[4]There are also intermediary emotions and moods (See Table 1)

through an internal belief system, and considered to be enduring emotions (i.e. love, hatred, loyalty). In contrast, reactive emotions are in response to an event or experience, and are considered transient (i.e. anger, grief, outrage). The primarily affective emotions, primarily reactive emotions, and intervening moods, which Jasper (1998) identifies as the emotions that influence radical political behavior, are presented in Table 1.

Table 1: Emotions that Influence Radical Political Behavior

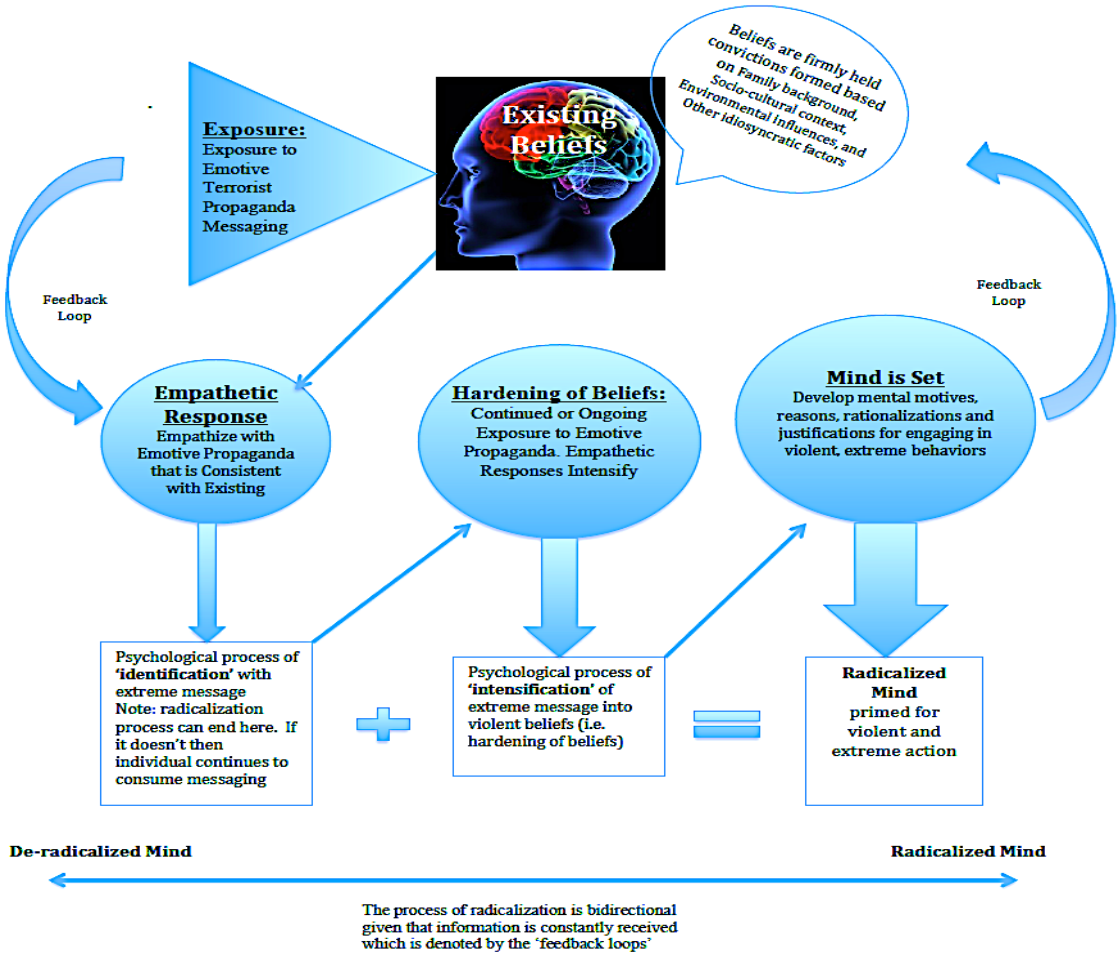
EMOTIONS
Primarily Affective
Hatred, Hostility, Loathing, Suspicion, Paranoia
Solidarity, Loyalty, Trust, Respect, Love
Primarily Reactive
Anger, Grief, Loss, Sorrow, Outrage, Indignation, Shame
Moods and Intermediary Emotions
Compassion, Sympathy, Pity, Cynicism, Depression
Defiance, Enthusiasm, Pride, Envy, Resentment
Fear, Dread, Joy, Hope, Resignation

Source: Jasper, James. (1998). "The emotions of protest: Affective and reactive emotions in and around social movements."

Emotions permeate every facet of social interaction. Despite this, every individual who experiences anger, loyalty, fear or hatred is not motivated to join a terrorist organization or carry out an attack. This logic can also be extended to every individual who consumes terrorist propaganda; not every viewer will be radicalized, not even if the propaganda messages evoke an empathetic response. That is because the pathway from message exposure to radicalization is directly influenced by an individual's existing belief system and the capacity to reconcile one's belief system with the propaganda message through the process of empathy. Figure 1 illustrates this process, which we define as the *Cognitive-Emotive Model of Radicalization*.

Building upon the Neurocognitive Model of Radicalization (Dean, 2014), and refining it to account for the relationship between beliefs and the cognitive process of empathy, the *Cognitive-Emotive Model of Radicalization* is developed based upon our assertion that radical information received by the individual must generate an empathetic response that is consistent with existing beliefs for the process of radical identification to occur. The reason why empathy plays such a central role in the recruitment and radicalization of terrorists has much to do with how this process evolves within the conscious mind.

Figure 1: The Cognitive-Emotive Model of Radicalization



Empathy can be categorized along two dimensions: trait empathy and state empathy. When empathy is characterized as a trait, it refers to the "reaction of one individual to the observed experiences of another," (Davis, 1983, p. 114). In this sense, empathy is an emotional trait or feeling that is transitory (Williams, 1990; Zillmann, 2006). Whereas when empathy is characterized as a state of being, it refers to the process by which an individual understands or relates to other individuals or situations (Lazarus, 1991; Shen, 2010). In this sense, empathy is a cognitive process that "occurs when the attended perception of the object's state (automatically) activates the subject's representations of the state, situation and object, and that activation of these representations automatically primes or generates the associated automatic and somatic responses" (Preston and de Waal, 2002, p. 4). Although, state empathy is conditioned upon the existence or occurrence of trait empathy, researchers have come to agree that empathy is not a monolithic cognitive or affective response that can be reduced to a reactive emotional trait, but rather a dynamic physiological, psychological, and neural process.[5] Consequently, the study of trait empathy is not applicable to this paper.

There has been consensus that state empathy involves the interaction between affective and cognitive functions, as well as the associative process of identification (Bagozzi and Moore, 1994; Preston and de Waal, 2002; Campbell and Babrow, 2004; Decety and Lamm, 2006; Lazarus, 1991; Campbell and Babrow, 2004; Chory-Assad and Cicchirillo, 2005; Decety and Jackson, 2004, 2006). Affective empathy is characterized by an individual's activation and experience of affective reactions to another's expressions of emotions and/or experiences, regardless of whether they are positive or negative emotions, or even multiple contending emotions (Jabbi et al., 2007; Preston and de Waal, 2002). Thus, affective empathy involves the understanding and sharing of another's feelings (Decety and Jackson, 2006; Lazarus, 1991; Smith, 2010; Zillmann, 2006).

Cognitive empathy refers to the capacity to recognize, comprehend, and adopt another's viewpoint. Thus, cognitive empathy involves perspective taking by psychologically

[5]See Decety and Lamm, 2006; de Waal, 2008; Preston and de Waal, 2002 for reviews

placing oneself in another person's condition or circumstance. Although, cognitive and affective empathy are discrete processes, one cannot exist without the other and still be considered empathy. "Shared affect without shared cognition would mean little more than mimicry. Similarly, shared cognition without shared affect would be sympathy, instead of empathy" (Shen, 2010, p. 399; Eisenberg and Miller, 1987; Goldie, 1999).

In the study of empathy, the associative element is often overlooked (Decety and Jackson, 2004, 2006; Preston and de Waal, 2002), but it is a vital component in the empathetic process, especially as it relates to how individuals interpret and relate to emotionally based messages. The associative element in state empathy is defined by its primary function, which is to facilitate relationship development; and is often characterized as 'identification' (Campbell and Babrow, 2004; Chory-Assad and Cicchirillo, 2005). Identification with a message, such as extremist propaganda, is the internal process through which the audience experiences reception and interpretation of the message (Cohen, 2006; Bruneau, 2016; Canetti, 2017; Pretus et al., 2018). From the functional perspective, it is this feature of state empathy that enables relationship development which facilities the transition from perception (of the message) to action (i.e. acting on the message).

There is one notable caveat about the latter statement on the transition from message perception to action that must be accounted for if this process is to occur, and that is the role of persuasion. Media messages, by design are emotive and can stimulate an empathetic response, but they are not necessarily persuasive. That is because the role of the media is to primarily inform the public with its messaging content. Similarly, propaganda messages, by design are persuasive, but they are not necessarily emotive or capable of triggering an empathetic response. That is because persuasive messaging is a form of human communication that is intended to influence the autonomous actions and judgments of individuals; which can be achieved using techniques such as logic and reasoning. For example, advertising commercials often appeal to one's logic and reason by convincing the audience of their need for a certain product without ever triggering an emotional response. However, when it comes to radical messaging, for it to be effective in facilitating the

transition from message perception to tangible action, the message must trigger a sustained emotional empathetic response over multiple settings that is consistent with one's beliefs; but for it to be persuasive, it must also utilize propaganda devices in the conveyance of its ideological message (Shen, 2014).

In sum, empathetic responses to emotive persuasive messaging function on a continuum. There exist intermediary stages of empathy in message processing that oscillate between empathic arousal and the complete internalization of the message and its advocacy. After initial exposure, the intensity and duration of a message's influence is then determined by an individual's existing belief system and the continued exposure to similarly themed messages. This explains how empathetic responses can be stimulated in an experimental setting, which can be observed, but then not lead to radicalization; while outside the experimental setting, message-induced empathetic responses have resulted in the radicalization of individuals.

Terrorist Narratives and Propaganda Devices in Digital Space

Terrorist groups utilize a number of cyber-technology mediums to communicate with members, affiliates and prospective affiliates, including social media, web forums, and web-based videos (Farwell, 2014; Shane and Hubbard, 2014; Gambhir, 2014; Carr, 2014; Kraidy, 2017; Robinson and Dauber, 2018; Welch, 2018; Winkler et al., 2018). Any one of these digital platforms can be used to radicalize and recruit support, but radical messaging that is conveyed through web-based videos, specifically videos that utilize propaganda devices, such as strategic narratives, have distinct advantages over other digital mediums.

Primarily, web-based videos are easy to produce; they can be disseminated quickly, and can be shared with a broad audience. Also, in contrast to the content presented through social media and web forums, web-based videos created and distributed by an organization convey the intended messaging narrative of the terrorist group (Amble, 2012).

Propaganda can be broadly defined as "any attempt to persuade to a belief or a form of action" (Antilla, 2010, p. 236), the understanding of which is that the goal of propaganda is to

influence human behavior. This makes propaganda, both an important style of communication as well as a powerful device, one that inherently relies upon a combination of textual and verbal language cues, sounds, symbols, and imagery to convey its message.

One of the most impactful forms of propaganda utilized by terrorists is that of narratives. Narratives are powerful communication tools. A narrative is "a system of stories that share_themes, forms, and archetypes," (Corman, 2011, p.37). And Casebeer and Russell contend that narratives "influence our ability to recall events, motivate people to act, modulate our emotional reactions to events, cue certain heuristics and biases, structure our problem-solving capabilities, and ultimately...constitute our very identity," (2005, p. 6). Our societal values are embedded within narratives; thus, our response to narratives is primarily emotional, making them inherently persuasive.

Narrative messages have been proposed as an effective tool for overcoming and reducing psychological resistance to persuasion. Recent communications studies suggest that empathy induced by narrative messages can effectively facilitate persuasion and reduce psychological reactance, simultaneously (Bilandzic and Busselle, 2013; Braddock and Dillard, 2016; Shen, 2018; Shen and Seung, 2018; Blair, 2018). Message induced empathy is a specific communication mechanism that aims to elicit empathy in audience members toward the content presented in the narrative, which in turn, functions as the basis for persuasion and message effects.

A Speculative Analytical Framework

To better understand how terrorist groups make use of the audiovisual medium to arouse empathy and facilitate persuasion, we assert that the messaging produced by terrorist organizations can be analyzed by deconstructing the audiovisual materials to identify the imagery, linguistic triggers, and rhetorical patterns that generate an empathetic emotional response in the message receiver. To do this, an analytical approach that integrates

multimodal content analyses, network text analysis (NTA), and fNIRS neuroimaging technology is presented.

Multimodal Content Analyses of Emotions, Empathy and Terrorist Messaging

In comparison to single analytic approaches, content analyses that rely upon a hybrid coding process, which utilize machine coding of the text, and human coding of visual content is more flexible, efficient, and thereby superior to Multimedia Coding Tools (MCTs) and human coding alone (Salem et al., 2008; Cohen et al., 2016; Morris, 2012). Yet, despite the advantages of using hybrid-coding procedures in content analyses of propaganda videos, computerized text analysis still suffers from deficiencies in its ability to capture the deeper meaning of ideological messages in text, which makes it difficult to interpret the significance of emotional context, emotional words, and emotional phrases. Sentiment and affect analyses have been the primary methods used to identify and evaluate the emotional content of texts; and while these methodological approaches also suffer from the use of computerized text analysis, they have also made the greatest advances in the systematic analysis of emotions in various content mediums, which informs this study. Sentiment analysis involves what is sometimes referred to as opinion mining, which is the systematic process of identifying the predominant sentiment (i.e. positive, negative, or neutral) towards a belief, individual, organization, etc. that is expressed within a text.

For example, Pennebaker and Chung use LIWC (the Linguistic Inquiry and Word Count program) to evaluate al-Qaeda transcripts and identify the sentiment and emotional themes most salient in the group's propaganda materials (Crilley, 2001; Glaser et al., 2002; Pennebaker and Chung, 2009; Hancock et al., 2010; Baele, 2017). LIWC is a fully automated program that searches for and then extracts key sentiment intensity words given the search parameters established by the researcher. Affect analysis is procedurally similar to sentiment analysis, the main distinction is that affect analysis searches for words and phrases within the text that capture specific emotions such as love, hate, anger, etc. Studies that use affect analysis to evaluate extremist propaganda have looked at the impact of violence as it's

portrayed by extremist websites using an automated processing model that attempts to account for cultural and social contexts (Abbassi and Chen, 2008; Liu et al., 2003). In doing this, these studies examine the use and context of emotional words and markers as well as function words, such as pronouns, articles, conjunctions, prepositions and auxiliary verbs in extremist messaging.

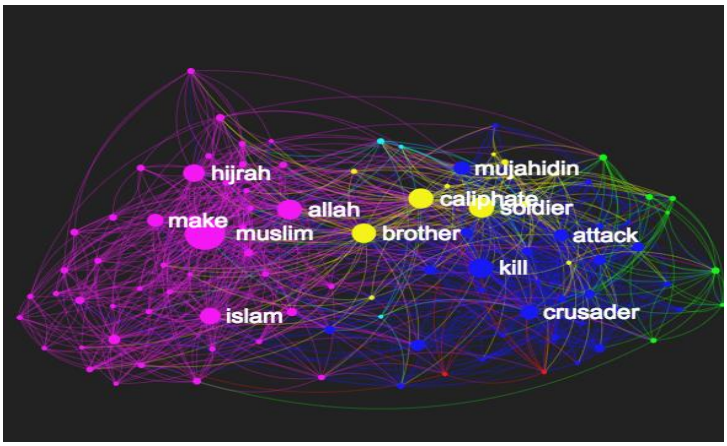
By adopting the automated coding techniques used in both sentiment and affect analyses, content analytic studies can acquire more robust emotional data from textual sources; however, regardless of the analytic approach, the existing methodologies, while they have the capacity to identify the form, use and patterns of emotional words, they are still unable to provide any insight into the social structures and concepts of the words that are used, or interpret latent meanings in the text. In other words, as it relates to this study, the multimodal content analytic approaches allow us to identify the use and frequency of affective and reactive emotive words and draw inferences from that information, but they do not allow us to evaluate how terrorist propaganda uses certain emotional words together, the intensity and density of the connectedness between specific words, or the deeper meaning and significance of the emotional network formed by these specific words. To acquire this deeper level of understanding regarding the function of emotional words and concepts in text, analysts have explored the use of network text analysis (NTA) to analyze these data (Carley, 2006; Morris, 2012).

Network Text Analysis of Empathy and Terrorist Messaging

As noted, LIWC can only report on the emotional content in text by identifying the use of specific words that are associated with specific emotions, to reflect the emotional tone of the content. And while proxy measures can be used in statistical analyses to draw inferences, LIWC is not sophisticated enough to produce reliably valid measures in itself. That is why we assert that a deeper analysis of the content can be achieved by using Automap and ORA-Lite (Organizational Risk Analyzer) computational software to conduct NTA of the transcripts from videos produced by terrorist organizations.

A dimension of Social Network Analysis (SNA), NTA identifies the relationship between the words used in a text. NTA does this by encoding the relationships between the words and constructing a network of the words and concepts that are connected. The result of NTA is a semantic network(s), which can then be analyzed statistically and/or using visual maps. Furthermore, by visually mapping the nodes, we can identify the relationships between the emotional language used in the corpus of terrorist messaging by focusing on the connections associated with the use of affective emotional language. Figure 2 illustrates the analytical and data visualization capabilities of the software program Automap, in conjunction with ORA-Lite, to extract and visualize networks from transcribed video text (Howard et al., 2016).

Figure 2: Data Visualization of Semantic Networks in the Transcript for ISIS Video, *No Respite (2015)*[6]



-Most influential keywords in this text:
Muslim, soldier, Caliphate, Allah
-Most influential contexts in this text
#1: Muslim, Allah, Islam, hijrah
#2: soldier, caliphate, brother, carry
#3: kill. Crusader, mujahidin, attack
#4: vehicle, group, detonate, explosive
Nodes: 100, Edges (Co-Occurrences): 1159

[6]The colors in the figure represent each cluster of words that share conceptual meaning, and the nodes indicate the most significant words in each of the clusters, as well as the entire text. Figure 2 represents just one observation of analysis.

FNIRS Analysis of the Neurocognitive Persuasive Effects of Terrorist Messaging as Measured by Empathetic Responses

Studies on the relationship between visual emotional stimuli and brain activity have determined that complex naturalistic stimulus events (i.e. phenomenon depicted in movies and films) are related to complex neural events in the brain (Bartels and Zeki, 2004; Jääskeläinen et al., 2008; Lankinen et al., 2014; Kauttonen et al., 2015). This is because movies typically depict people in their natural settings and contexts; therefore, when exposed to a naturalistic visual stimulus, such as a film or film clip, subjects engage the action observation and imitation networks in the brain, a process referred to as 'mirroring' which can be observed with increased activity in the left inferior frontal cortex and inferior parietal cortex (i.e. the mirror neuron system or MNS) (Kanwisher and Yovel, 2006; Large et al., 2008).

Understanding the process of mirroring in relation to visual emotional stimuli is important, especially in the context of viewing videos that portray radical behavior and actions, mainly because the mirror-neuron system (MNS) is comprised of several networks that are activated not only when an individual performs an action but also when that individual observes the performance of this action by another (Vanderwert and Nelson, 2014).

At the most basic level, the MNS is responsible for the motor process of imitation, but at a more complex level, it is also responsible for an individual's ability to experience the cognitive processes of both empathy and persuasion, which are essential to stimulating the desire in an individual to imitate an observed behavior. However, in studies of the neurocognitive process of radicalization, although persuasive influence over the radicalized individual by the terrorist organization can be assumed, it is viewed as a subjective and fluid occurrence that cannot be sufficiently captured by empirical models (Wojcieszak and Kim, 2016; Chadee et al., 2015; Shen, 2010). Similarly, while cognitive neuro-scientific studies have identified specific neural correlates that respond to persuasion, the neurocognitive networks associated with feeling persuaded involve the activation of several regions of the brain (DMPFC, pSTS, TP and left VLPFC) which are not simultaneous, and occur in response to different types of stimuli and stimulus events, which makes it difficult to isolate

and observe the process of persuasion (Falk et al., 2010).

In contrast, research has demonstrated that the capacity for empathy is correlated with the capacity for radical behavior in that it is associated with the neurocognitive process of 'identifying' with an organization's message, which may be the first step in the process of radicalization (Ilardi, 2001). Researchers have also determined that for messaging to have any persuasive influence it must first induce an empathetic response, which is significant given that studies (McCauley and Moskalenko, 2011; Feddes et al., 2015) have been able to isolate and measure empathetic responses, which occur with MNS activity, and can be observed with the activation of the ventrolateral prefrontal cortex (VLPFC) region of the brain (Himichi and Nomura, 2015; Singer et. al., 2006).

Existing research demonstrates that enhancement of empathetic response (i.e., up-regulation) activates the left VLPFC, whereas inhibition of this process (i.e., down-regulation) activates bilateral VLPFC, which suggests the VLPFC is related to empathetic emotive processing: i.e. up-regulation is left-specialized, while down-regulation also recruits the right VLPFC (Kim and Hamann, 2007; Ochsner et al., 2009, 2012; Wager et al., 2008; Doi et al., 2013). Therefore, independent of the emotion triggered (positive or negative), if a visual stimulus induces empathy, then activity in the left VLPFC will be observed, with no activation in the right VLPFC, whereas if a visual stimulus does not induce empathy, activity will be observed in both the left and right VLPFC.

To observe VLPFC activation, we argue for the use of fNIRS (functional near infrared spectroscopy). FNIRS is a non-invasive procedure that measures cerebral hemodynamics similar to that of fMRI (Huppert et al., 2006), but we consider fNIRS the optimal neuroimaging modality for this type of research given that a comprehensive review comparing fNIRS and fMRI, has found that for clinical and experimental neurophysiology application, fNIRS has several advantages over fMRI in terms of affordability, flexibility, portability, simplicity and insensitivity of motion artifacts (Irani et al., 2007; Cui, 2011; Doi et al., 2013). Consequently, with the use of fNIRS, one can then measure stimulus response

during direct viewing of the stimulus event, and record baseline changes and the temporal course of activation in the VLPFC.

Conclusion

In this paper we present a theoretical model and analytical framework for understanding the nuanced process of digital radicalization. The *Cognitive-Emotive Model of Radicalization* advances the discussion of the neurocognitive mechanisms that move an individual from an objective consumer of terrorist narratives and propaganda messaging to that of an individual with a radicalized mindset. The theoretical model accounts for this individualized process and the saliency of one's existing belief system, while also highlighting the importance of the message construction itself; in that terrorist organizations are strategic in cultivating empathetic-persuasive messages using audiovisual materials, and disseminating their message within the digital medium.

Beyond the development of the theoretical model, this paper provides a foundational basis for future research, given the analytical approach and research procedures highlighted. The analytical framework argues for the utilization of a content-analytic approach to first, identify the use of emotive language and imagery, and then interpret the meaning and significance of the linguistic and rhetorical patterns, images, sounds and symbols that manifest in the audiovisual materials produced by terrorist organizations. Building upon the content analyses, the use of network text analysis (NTA) is recommended in order to generate and visually map an emotional network of the emotive language used in the audiovisual materials disseminated by terrorist groups. The anticipated outcome of the content analyses and network text analysis is the development of a terrorist messaging typology that is potentially most effective at optimizing persuasive impact. Lastly, the use of fNIRS is considered because it provides a systematic procedure for validating the terrorist messaging typology. FNIRS can be used to observe and record VLPFC activation during individual exposure to the audiovisual stimulus, which functions as a means to confirm the terrorist

messaging that is most effective at generating an empathetic response and thus optimizing persuasive impact. The analytical approach presented is intended to stimulate discourse on how best to measure, analyze, and counter the online radicalization process.

Going forward, it is evident more research is crucial to both understanding the cognitive process of radicalization, as well as identifying the ever-evolving techniques terrorist groups use to recruit and radicalize individuals in digital space. The implication of this paper, and for future research, is that it provides a framework from which to develop effectual digital counter-messaging strategies, capable of promoting radicalization deterrence and disengagement.

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