

LINGUISTIC PREDICTORS OF TAKING VIOLENT ACTION:
A COMPARATIVE CONTENT ANALYSIS OF TARGETED VIOLENCE MANIFESTOS
AND EXTREMIST CALLS TO ACTION

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Glossary of Key Terms

Violence and Extremism Terms

Extremism

Extremism is a highly contested and evolving concept with many competing definitions (Winter et al., 2020). In this thesis, extremism refers to the underlying worldview of the writers of *extremist communications*. These worldviews are generally rigid and uncompromising, emphasize strict differences between groups, valorize the believer's ingroup while demonizing a target outgroup, and advocate for violence as a means of political change (McCauley & Moskaleiko, 2008; Rousseau et al., 2021).

Far Right

A broad, evolving network of anti-immigration, white supremacist, libertarian/anti-government, and misogynistic ideologies (ADL Centre on Extremism, 2022; Bogerts & Fielitz, 2019; Davey et al., 2020).

Fascism

A broad and contested category of political ideology. Although academics and media fiercely debate the specifics of its definition (Eco, 1995; Harari, 2018; May & Feldman, 2019; Stanley, 2018), it is widely agreed that ultranationalism, anti-intellectualism, cults of tradition, masculinity, and heroism, cults of personality revolving around a 'strongman' political leader, and glorification of a national or ethnic ingroup (Eco, 1995; Harari, 2018; Meiering et al., 2020; Stanley, 2018) are hallmarks of fascism. This self-glorification always requires the demonization of a target outgroup, which are viewed as an imminent threat to the ingroup's values, way of life, or very existence (Eco, 1995; Stanley, 2018). For this reason, the invention of and rigid adherence to arbitrary social hierarchies are often considered to be the intellectual 'core' of fascism (J. Stanley, personal communication, October 25, 2021).

Mass Violence

The attempted or completed murder of four or more people in a single event (Knoll, 2012). In the context of this thesis, mass violence refers to attacks committed by a single person against an identifiable target group.

Militant Accelerationism

The idea that modern liberal society will inevitably collapse and that this collapse is the best opportunity for one's group to seize power coupled with the use of strategies, often violent, designed to hasten this collapse (Kriner, 2022). Although militant accelerationism is not theoretically aligned with either left or right wing politics, it is common on the *far right* (Kriner et al., 2022a; Kriner et al., 2022b)

Sample Terms

Extremist Communication

This thesis' sample of online extremist writings, including both *targeted violence manifestos* and *non-attacker writings*. The criteria for extremist writings to be included in the sample are outlined in depth in the methods section of this thesis.

Lone Attacker

An individual who plans, attempts, or commits *mass violence* without the direction of formal command and control structures (Gruenewald et al., 2013a). The 'lone' descriptor only necessarily applies to the planning and execution of the attack itself, as these attackers are often radicalized in highly connected social environments (Dewey, 2022; Kupper et al., 2022).

Non-Attacker Writer

An individual who promotes extremist ideology in online writings but is not yet known to have attempted or committed *mass violence*.

Non-Attacker Writing

An *extremist communication* authored by a *non-attacker writer*.

Targeted Violence Manifesto

An *extremist communication* authored by a *lone attacker*.

Language Terms

Agentic Function of Language

The function of language to intentionally exert one's will on physical and social realities. Agentic uses of language include both direct speech acts, in which saying something makes it so, like a friend making a promise or a referee calling a penalty, and more indirect uses, such as the intentional application or withholding of the label 'marriage' for same-sex couples (Gee, 2011). Since language users often use language agentially to construct, maintain, or challenge social realities there is a lot of overlap between language's agentic and *constructive* functions. However, they are distinct in that the agentic function of language is intentional.

Automatic Linguistic Patterns

Patterns in language which are produced automatically rather than consciously by language users. These patterns are affected in predictable and quantifiable ways by psychological states and traits of language users (Kaati et al., 2016; Pennebaker & Chung, 2008; Tausczik & Pennebaker, 2010). They can thus reveal psychological attributes of language users even when these attributes are not directly stated (Assilaméhou & Testé, 2013; Baele, 2017; Dragojevic et al., 2017; Pennebaker & Chung, 2008). Automatic linguistic patterns can take the form of either *explicit meaning* or *implicit meaning* but are produced without a language users' knowledge or intent and are thus mutually exclusive with *intentional linguistic patterns*.

Communicative Function of Language

The function of language to intentionally convey information from a speaker to an audience in the broadest sense. Language, defined as a system of symbols “chosen and produced by individual organisms flexibly and strategically” (Tomasello, 2010, p. 14), serves a communicative function when it is used intentionally in a directed fashion (i.e. with an awareness of and accounting for a target audience's attention) to affect the behaviour of a message's recipient (Tomasello, 2010).

Constructive Function of Language

The function of language to create, maintain, change, or transmit shared understandings of reality, otherwise known as social realities. Social constructionism asserts that the way that we perceive and respond to our environment is determined more by these shared understandings than by physical characteristics of the environment itself (Grace, 1987).

Explicit Meaning

Elements of language which are directly observable within a text and can thus be quantified and counted (Kleinheksel et al., 2020). Although interpretation of writer intent and deeper meanings can be applied *to* explicit meaning, such analysis is not necessary to identify or extract it (Kleinheksel et al., 2020). Explicit meaning can be a form of either *intentional* or *automatic linguistic pattern*. It is mutually exclusive with *implicit meaning*.

Implicit Meaning

Ideas which are communicated in a text through implication rather than direct statements (Kleinheksel et al., 2020). Like *explicit meaning*, implicit meaning can either be a form of *intentional linguistic content* or an *unconscious linguistic pattern*. However, unlike *explicit meaning*, because implicit meaning is not explicitly communicated, it cannot be easily quantified and requires interpretation to extract. Sarcasm, humor, and coded language are all examples of implicit meaning and all are used extensively by extremist writers (Askanius, 2021; Derkson, 2022). *Implicit* and *explicit meaning* are mutually exclusive categories.

Intentional Linguistic Patterns

Patterns of language which are produced intentionally rather than automatically. Like *automatic linguistic patterns*, intentional patterns can manifest as either *explicit meaning* or *implicit meaning*. The key difference between the two is that the language user is aware of the intentional linguistic patterns they are producing (Askanius, 2021; Bogerts & Fielitz, 2019; Fielitz & Thurston, 2019; Ware, 2020). Intentional linguistic patterns are thus mutually exclusive with automatic patterns, though it is impossible to determine via linguistic analysis alone whether the pattern was produced intentionally or automatically.

LIWC Dictionaries

Groups of words, word stems¹, and phrases used as proxies of latent psychosocial constructs in Linguistic Inquiry and Word Count (LIWC) software (Boyd et al., 2022). I used the latest version of Linguistic Inquiry and Word Count software (LIWC-22) to assess the prevalence of these constructs within my samples. These dictionaries are developed through a multi-stage process involving human judges and analytical software. They have been used and validated in thousands of studies since LIWC's creation in 1992 (Boyd et al., 2022). See Boyd et al. (2022) for a complete explanation of LIWC-22's dictionaries, including how they are generated and a discussion of their reliability and validity.

Representational Function of Language

The function of language to convey literal, direct information from speaker to audience. This is enabled by the representational relationship – in which something stands for something else – between language and physical reality (Buhler, 2011). This is narrower than the *communicative function of language* (Buhler, 2011; Tomasello, 2010) because the literal meaning of a statement is only part of what can be communicated with language. Speaker tone, volume,

¹ For example, “angr*” is a word stem including the words “angry” “angrier”, and “angriest”.

inflection, and the context within which the statement is made can all be used intentionally to modify audience behaviour in some way, thus serving the communicative function without changing the representational content of the language (Buhler, 2011).

A Note on Researcher Positionality

Institutions of Western science often purport to produce objective, unbiased, impartial knowledge (England, 1994; Kovach, 2021; Scharnick-Udemans, 2021; Wigginton & Lafrance, 2019). The scientific method, peer-review process, and rigorous thinking taught within academic institutions are of course valuable, but the pure objectivity they advertise is not realistic (England, 1994; Gough & Madill, 2012; Grace, 1987; Wigginton & Lafrance, 2019). Many scholars call on researchers to build critical awareness of their own experiences, motives, and intersectional identities rather than solely trying to erase their own subjectivity through methodological ritual (Braun & Clarke, 2019; Gough & Madill, 2012; Kovach, 2021; Scharnick-Udemans, 2021; Wigginton & Lafrance, 2019). Reflexivity is the practice of building this critical awareness through “self-conscious analytical scrutiny of the self as researcher” (England, 1994, p. 3). In reflexive practice, researcher subjectivity is not a weakness but a resource, helping us to better understand both the research process and its object. Like anyone else, I am entering the research process wearing “blindness, composed of assumptions, experiences, and immersion in the literature” (Mauthner & Doucet, 2003, p. 418). The research I did while wearing these metaphorical blinders can be more fully understood by examining how they work and where they come from.

Like many, the white, middle-class privileges of my early upbringing taught me that racism and violent extremism were mostly problems of the past, occurring now only as exceptions to a post-racial and peaceful status quo. Inherent in this worldview is a latent resentment of social change, a feeling that history, fortunately for everyone, has ended with the triumph of Western neoliberal capitalism (Fukuyama, 1989; Klein, 2008). By my early 20s this worldview was already evolving and being challenged, and when Donald Trump was elected with the support of 80% of white American evangelicals (Martinez & Smith, 2016) these privileged illusions were fully shattered. Most of my extended and immediate family are conservative evangelical Christians, and the resulting tension between my spiritual beliefs and political values spurred a long journey of introspection and research into the worldview I had taken for granted, including researching and publishing a paper analyzing the rhetoric of a white nationalist group called ID Canada (Derkson, 2022). During this journey I came to more fully understand that many of the racist, anti-feminist, and homophobic resentments fuelling violent

extremists have been organizing principles of North American evangelicalism throughout its history (Du Mez, 2020). This realization inspired a deep fixation on the question, “why not me?”

Contrary to psychology’s framing of white, middle-class, able-bodied, heterosexual men as ‘normal’ (England, 1994; Gough & Madill, 2012), these identities are specific, and deliberately targeted by far-right extremist recruitment tactics (Askanius, 2021; Evans & Davis, 2021). White men in my age range with conservative leanings are presented with slogans like “it’s okay to be white” (Brooks, 2022) or innocuous rebranding of extremist ideology, for example when white nationalists label themselves ‘Identitarians’ (Creizis, 2021; Derkson, 2022; Fielitz & Thurston, 2019). Many of these recruits must have grown up like me: watching Veggie Tales, voting for anti-gay political candidates, and believing that a woman’s place was in the home. At the same time, my experience of this religious upbringing constantly encouraged me to pursue social justice, to “care for orphans and widows in their distress” (James 1:27), and to “plead the cause of the afflicted and the needy” (Jeremiah 22:16). Why do some turn towards the extreme and oppressive elements of this culture, while others find positive and life-giving ways of engaging with it, while still others fail to reconcile these tensions and leave it entirely?

These questions and experiences have profoundly shaped the assumptions about extremism that I brought into this research. Namely, I began with the understanding that most extremist violence is right-wing and related materials are disseminated online. These pre-existing views may limit the generalizability of my findings, as they have caused me to focus rightward and online. My understanding of a ‘manifesto’ was especially shaped by this assumption of online distribution, which presented some challenges when screening sources.

My experiences have also caused me to approach this research as an explicitly political project. Ultimately, I hope that my findings can play a part, however small, in the dismantling of right-wing extremism. I have worked hard to understand and account for these biases, for example by searching for extremist communications across the ideological spectrum, but I am not approaching manifestos or right-wing ideology with any degree of neutrality. For one, my past research on extremist writing (Derkson, 2022) left me with the strong belief that online propagandists use language almost solely as a tool to manipulate readers. I believe that truth is far less important than power for extremists, and that they will use language however they must to gain it. Given this, I read the sources in this thesis with suspicion, expecting to find the strategic use of humor, detachment, coded language, and straight-up lies more than the statement of any

genuinely held beliefs. My approach reflects this, as I try to focus on automatic and unconscious linguistic patterns rather than taking extremist writing at face value.

This thesis is, first and foremost, an earnest attempt to produce knowledge that can be of use. It is also the product of these questions; of my efforts to understand my own experiences and how those experiences could have been different. I hope that understanding these motives and beliefs will enhance reader's understanding of the work itself.

“Although most barking (antilocution) does not lead to biting, yet there is never a bite without previous barking. Fully seventy years of political anti-Semitism of the verbal order preceded the discriminatory Nuremberg Laws passed by the Hitler regime. Soon after these laws were passed the violent program of extermination began. Here we see the not infrequent progression: antilocution > discrimination > . . . violence”

(Allport, 1954, p. 57)

1. Introduction

Terrorism and mass violence have long been of interest to governments and researchers alike (Neumann, 2013). However, both researcher attention (Laqueur, 2004; Victoroff, 2005) and commonly accepted definitions of terrorism (Evans, 2019c; Ware, 2020) tend to shift with the times. Increasing media and scholarly attention is currently on the rising threat of “lone wolf violence”, mass violence planned and executed by a single person without the direction of an external command structure (Gruenewald et al., 2013a). More and more often, these lone attackers are publishing their intentions, autobiographies, and ideologies online in the form of manifestos (J. Kupper, personal communication, November 10, 2022; Ware, 2020) intended to radicalize readers and inspire further violence (Evans, 2019b). However, they are not the only ones calling for violence; an inconceivable volume of hate speech and violent rhetoric is posted online every day (Askanius & Keller, 2021; Hietanen & Eddebo, 2022; Paasch-Colberg et al., 2021), all but a tiny fraction of it by people who do not go on to commit deadly violence (McCauley & Moskalenko, 2014; Meloy et al., 2012). Previous research has described the characteristics of lone attacker manifestos, but not by comparing them to non-attacker hate speech specifically (e.g. Kaati et al., 2016). In this research, I aim to improve threat detection by comparing the hate speech and violent writings of these specific groups: attacker and non-attacker extremist writers. Understanding the differences in language used by these two groups has potential benefits for threat detection and mitigation.

1.1 Statement of the Research Problem

This research began with the dialectical method of forming a research problem, in which an established fact is chosen as a starting *thesis* and an equally established but contradictory fact is used as an *antithesis* (Chirkov, 2016). This contradiction is stated as the *research problem*,

which is resolved by the final step, *synthesis* (Chirkov, 2016). These components of the research problem are summarized in brief as follows.

Thesis

Many people who commit targeted mass violence directly publish hate speech and calls to violence online before doing so (Kaati et al., 2016; J. Kupper, personal communication, November 10, 2022; Kupper et al., 2022; Kupper & Meloy, 2021; Macklin & Bjørge, 2021).

Antithesis

Many people publish similar hate speech and calls to violence online who do not commit or attempt mass violence (Cohen et al., 2014; Meloy et al., 2012; Paasch-Colberg et al., 2021; Shrestha et al., 2020a).

Research Problem

Researchers, police, and the public have a vested interest in stopping targeted mass violence with better prediction methods. Because these two groups (those who do and those who do not commit or attempt mass violence) are producing writings with similar goals and calls to violence, it is difficult to predict their behaviour based on the presence of these threats alone (Meloy et al., 2012).

Synthesis

These two groups are psychologically distinct from one another (Challacombe & Lucas, 2019; Gruenewald et al., 2013a; Kaati et al., 2016; McCauley & Moskalenko, 2014). Since language is a mostly automatic process, psychological states and traits of its users can be revealed by differences in automatic linguistic patterns – elements of language produced automatically without conscious awareness – even when distinct groups are making similar threats (Assilaméhou & Testé, 2013; Dragojevic et al., 2017; Kaati et al., 2016; Smith, 2004).

In this thesis I explore this synthesis by comparing automatic linguistic patterns of extremist communications by those who do and those who do not go on to commit mass violence. My central research question is therefore “Are there consistent differences in the automatic linguistic patterns of extremist communications by people who commit mass violence and those who do not?” This question will be explored via the two sub-questions below:

- 1a. How do lone attackers and non-attackers differ in the frequency of use of various types of language?
- 1b. How do lone attackers and non-attackers differ in how frequently these types of language co-occur?

1.2 Background

Mass violence is not a new phenomenon, nor are manifestos or other writings accompanying mass attacks (Laqueur, 2004). However, mass killings by a lone attacker accompanied by manifestos, livestreams, or both have sharply increased in frequency over the past decade (Ashwal, 2021; Kupper et al., 2022; Shrestha et al., 2020b; Ware, 2020), especially those associated with the far right (ADL Centre on Extremism, 2022; Ashwal, 2021; Contreras, 2024; Saric, 2023; Ware, 2020) and in the United States (Peterson & Densley, 2021). The manifestos produced in such events are generally intended by their authors to inspire copycats and accelerate this cycle of violence (Evans, 2019b; Kupper et al., 2022). Understanding how lone attackers use language to do this, especially how they use it differently than extremists who do not commit direct violence, is a useful strategy for predicting and mitigating the threat of mass violence in an age when attackers increasingly pre-empt their attacks with online writing.

1.2.1 Terminology

1.2.1.1 Lone Attackers and Non-Attacker Writers

To understand lone attacker violence, it is necessary to understand commonly used and misused terms. The term “lone wolf” is frequently applied to these attackers, especially by media and public figures (Baele, 2017), but classifying attackers as “lone” is more complex than many people assume. For example, 14.3% of the 119 lone attackers profiled by Gill et al. (2014) had previously fundraised or donated to either licit or illicit social movements, and a third had joined fringe or extreme political groups before carrying out their attacks. Forty-eight percent of this same sample had interacted with members of political activist groups face-to-face and just over a third had done so virtually. Even without evidence of organizational membership or interactions, defining an attacker as a “lone wolf” is complex. Although they act alone, attackers often strongly identify with both violent groups and prior violent role models (Cohen et al., 2014; Kupper & Meloy, 2021) or have some degree of online contact with other extremists or extremist communities (Pantucci, 2011). “Lone wolves” are often described as “self-radicalized” (Gruenewald et al., 2013a; Kupper et al., 2022), but this ostensibly individual process occurs

within highly connected online ecosystems of platforms and ideas (Kupper et al., 2022). Framing lone attackers as “self-radicalized” has thus been criticized as dangerously misleading and ignorant of the role of online communities and groups in radicalizing lone attackers (Evans, 2019b).

It is because of this definitional fuzziness and the complications of radicalization that researchers often clarify that the “lone” descriptor only refers to the attacks and makes no claims about an attacker's ideology or radicalization process (Baele, 2017; Gill et al., 2014; Pantucci, 2011). These complications are also why these actors are referred to as “lone attackers” in this thesis, defined as individuals who commit mass violence without the input of formal command and control structures (Gruenewald et al., 2013a, p. 66). This terminology is intended to communicate that the attack and planning were executed alone without making claims about the process of radicalization or possible connections to extremist groups or movements. For similar reasons, the comparison group of extremist authors who do not commit mass violence will be referred to as “non-attackers”.

1.2.1.2 Manifestos

Unfortunately, like “lone wolf”, the term “manifesto” is used in many ways and is difficult to define because of this. Dictionary definitions include the impossibly broad statement that a “manifesto” is a written public record of its issuers “intentions, motives, and views” (*Manifesto Definition & Meaning*, 2022). This definition can be, and is, applied to every imaginable topic, from “claiming your personal power” (Burchard, 2015) to managing complex tasks with checklists (Gawande, 2009). Academic definitions can be just as ambiguous, which is why some researchers specify “targeted violence manifestos” (Kupper & Meloy, 2021). However, even research using this terminology rarely includes specific definitions or inclusion criteria, relying instead on common knowledge or a description of the examples cited to speak for themselves (e.g. Abbott, 2016; Kaati et al., 2016; Percich, 2021; Peters, 2008; Shahbaz, 2020; Szenes, 2021). In the rare cases that “manifesto” is defined, the definition always includes the requirement that the author went on to commit mass violence (Ashwal, 2021; Broscoe, 2021; Drouaud, 2020; Duong, 2020; Hamlett, 2017; Kupper & Meloy, 2021). For example, one of the most complete definitions of a targeted violence manifesto comes from Kupper and Meloy (2021) who define it as:

A written or spoken communication intended to justify an act of violence against a specific target by articulating self-identified grievances, homicidal intentions, and/or extreme ideologies for committing an attack. Generally composed by a single author before the incident occurs, it sometimes expresses beliefs and ideas to violently promote political, religious, or social changes (p. 6).

Accompanying this definition are six inclusion criteria (See Table 1). Although they are useful, these criteria require that the author commit mass violence (Kupper & Meloy, 2021) and thus exclude similar documents by non-attacker authors. In other words, defining a targeted violence manifesto as something necessarily followed by mass violence makes some forms of comparison impossible.

Julia Kupper, one of the authors of the guidelines above, noted that lone attackers and non-attacker writers also differ in their situations and motivations enough that calling non-attacker writings “manifestos” is misleading and inappropriate (J. Kupper, personal communication, November 10, 2022). For instance, lone attackers can be assumed to understand their planned violence as their last public act, since they will almost definitely die or be imprisoned for life. They can also expect at least parts of their writing to be widely shared through both mainstream media and fringe online networks (J. Kupper, personal communication, November 10, 2022; Ware, 2020). Increasingly, mass killers intentionally leverage these networks to achieve a perverse celebrity status as extremist communities online canonize them as martyrs, “saints”, or “holy warriors” (Am & Weimann, 2020; Percich, 2021; Ware, 2020). None of these outcomes are likely for someone without plans to commit mass violence, which is why a lone attacker and non-attacker writer can both author long, public facing documents intended to radicalize others and justify violence, and these “manifestos” can serve different psychological functions for their authors.

For this reason, any sources included in the analysis are generically referred to as ‘extremist communications’, defined broadly as public facing communications justifying violence against specific groups. Specifically, ‘targeted violence manifestos’ refers to extremist communications authored by lone attackers, and ‘non-attacker writings’ refers to extremist communications by non-attacker authors. Qualifying criteria for a source to be considered an ‘extremist communication’ are found in the methods section.

1.2.2 Psychological Distinctiveness

Considerable research has attempted to discover an unchanging, unambiguous profile of lone attackers (Baele, 2017). There is strong research identifying common psychological traits, even clusters of traits, in the writings of lone attackers (Ashwal, 2021; Kaati et al., 2016; Shrestha et al., 2020b), but these traits vary enough that many researchers have concluded that there is no universal psychological profile of lone attackers (Baele, 2017; Gruenewald et al., 2013b; Pantucci, 2011).

Although the reality is too complex to create a single profile, it is known that lone attackers differ psychologically from other terrorists. Lone attackers are more likely to suffer from mental illness and psychological problems (Gruenewald et al., 2013a, 2013b; Hoffman et al., 2020; Rousseau et al., 2021) and have fewer social ties (Gruenewald et al., 2013a) than group-affiliated terrorists. Lone attackers, especially those who author manifestos, are also disproportionately aligned with the far right (Gruenewald et al., 2013a, 2013b; J. Kupper, personal communication, November 10, 2022; Ware, 2020); a broad, evolving network (Bogerts & Fielitz, 2019) of anti-immigration, white supremacist, libertarian/anti-government, and misogynistic ideologies (ADL Centre on Extremism, 2022; Davey et al., 2020). Right-wing extremism often has a militant accelerationist agenda (Kriner, 2022; Kriner et al., 2022b), although accelerationism itself is ideologically agnostic (Kriner et al., 2022a). The Accelerationism Research Consortium (ARC) defines militant accelerationism as “a set of tactics and strategies designed to put pressure on and exacerbate latent social divisions, often through violence, thus hastening societal collapse” (Kriner, 2022, para. 3). In basic terms, militant accelerationists believe that modern democratic society will inevitably collapse, that this collapse is their best opportunity to seize power, and that they should work to hasten it in any way possible (Kriner, 2022).

These characteristics imply a level of psychological distinction between lone attackers and group-affiliated terrorists. Researchers must therefore examine lone attackers as a distinct group and think critically about their use of constructs and theories developed with other populations. Even though there is a great deal of high quality research focused on threat detection and mitigation (e.g. Akrami et al., 2018; Askanius, 2021; Askanius & Keller, 2021; Berglind et al., 2019; Figea et al., 2016; Kupper & Meloy, 2021), almost none of it compares lone attackers with non-attacker extremists using constructs specifically developed to study extremist language.

Past research has compared the language of violent and non-violent extremist group propaganda (Smith, 2004), the language of lone attacker manifestos and everyday online language (Kaati et al., 2016), and the prior behaviours of lone attackers and non-attacker extremist writers (Challacombe & Lucas, 2019).

There are only two direct comparisons of the writings of lone attackers and non-attacker extremists (Akrami et al., 2018; Shrestha et al., 2020b). These compare the two groups using a mix of linguistic constructs, some pulled from the broader field of personality psychology (Akrami et al., 2018) and some informed by prior research on lone attackers specifically (Akrami et al., 2018; Shrestha et al., 2020b). However, even these more specific constructs come from comparisons between lone attackers and the general population. Akrami et al. (2018) take their specific constructs from comparisons of lone attacker writings and everyday language (e.g. Kaati et al., 2016), and Shrestha et al. (2020) draw on their experience studying lone attackers. Both used established differences between lone attackers and non-extremists to distinguish between lone attackers and non-attacker extremists. This is problematic given the differences not only between lone attackers and other terrorists, but also between non-attacker extremists and the wider public. For instance, the bloggers used as a comparison group by Kaati et al. (2016) are less likely to share lone attacker's accelerationist aims than are non-attacker extremists (Kriner, 2022; Kriner et al., 2022b). To understand extremist communications and test these constructs, it is therefore necessary to understand how extremist writers use language differently than other populations and to be as specific as possible when making these comparisons.

1.2.3 Functions of Extremist Language

The functions of language are sometimes organized into four overlapping categories: *communicative*, *representational*², *constructive*, and *agentic* (Chirkov, 2025). The constructive and agentic functions are most relevant to this thesis.

² Language serves its communicative function whenever it is used intentionally to convey information to an audience (Tomasello, 2010). When information is conveyed through the literal meaning of words, rather than through tone, volume, inflection, or context, language is fulfilling its slightly more specific representational function (Buhler, 2011).

The constructive function of language is rooted in social constructionist theory, which asserts that the way that we perceive and respond to our environment is determined more by culture than by characteristics of the environment itself (Chirkov, 2025; Grace, 1987). Culture exerts this influence through the use of language in a process called reality construction, or ‘the creation of our views of things’ (Grace, 1987, p. 4). Language is being used to fulfill its constructive function when it creates, maintains, changes, or transmits these shared cultural views, or social realities. This constructive process is so fundamental to language that it is impossible to use language without using it constructively (Grace, 1987). Even the representational meanings of words are based on social, rather than objective, realities (Buhler, 2011). To examine any language is therefore, to some degree, to examine the social reality of the language user.

Lone attackers and group-affiliated terrorists (Gruenewald et al., 2013a, 2013b; Hoffman et al., 2020; J. Kupper, personal communication, November 10, 2022; Rousseau et al., 2021), lone attackers and non-attacker extremists (Am & Weimann, 2020; Percich, 2021; Ware, 2020), and extremists and the general public all occupy distinct social realities and use language differently to interact with those realities. Examining the language of these different groups can reveal associations between given linguistic properties and specific social realities. These can be used to help identify which social reality an individual is living in, and thus what level of threat they may represent.

However, the relationship between language and a given social reality can be difficult to discern, as language is also often used agentially. Theory on language’s agentic function comes from critical discourse analysis (Chirkov, 2025; Gee, 2011), which argues that since language is always deployed within social contexts with specific aims (Tomasello, 2010), its meaning is more dependent on what it is used *to do* than on formal or literal definitions (Gee, 2011). People can be said to use language agentially when they use it deliberately to exert their will on physical and social realities. Agentic uses of language include both direct speech acts in which saying something makes it so, like a referee calling a penalty, and much more common indirect uses, like giving or withholding the label ‘marriage’ from same-sex couples (Gee, 2011).

The agentic and constructive uses of language can be difficult to distinguish. This is a challenge when researching the writings of extremists, who are constantly using language strategically to serve their own ends (Askanius, 2021; Askanius & Keller, 2021; Bogerts &

Fielitz, 2019; Derkson, 2022; Fielitz & Thurston, 2019; Gee, 2011; Hawkins, 2021; Macklin & Bjørge, 2021). To understand and identify the specific social reality which extremist language is constructing, research must acknowledge and engage critically with the ways it is used strategically. At worst, uncritical analyses serve extremist agendas by reproducing accelerationist narratives which were intentionally crafted to control discourse and inspire violence (Evans, 2019a; J. Kupper, personal communication, November 10, 2022).

1.2.4 Automatic Language Use and Past Research

Fortunately, even when the explicit meaning of language – the *what* – is used strategically, the way in which it is communicated, or the *how*, is largely automatic and uncontrolled (Assilaméhou-Kunz et al., 2020; Dragojevic et al., 2017). Characteristics of language like the level of abstraction used (Coenen et al., 2006; Semin & Fiedler, 1988; Snefjella & Kuperman, 2015; Trope & Liberman, 2010), the frequency of use of different pronouns (Kaati et al., 2016; Pennebaker & Chung, 2008; Shrestha et al., 2020a), the tense of verbs (Tausczik & Pennebaker, 2010), and more are all affected in predictable and quantifiable ways by psychological states and traits of language users. Examining such automatic linguistic patterns can therefore ‘bypass’ some of the complications of extremist strategic language and offer more reliable insights into the social realities occupied by their authors (e.g. Baele, 2017; Pennebaker & Chung, 2008; Shrestha et al., 2020) even when such differences are not explicitly mentioned (Assilaméhou & Testé, 2013; Dragojevic et al., 2017; Kaati et al., 2016; Smith, 2004). Research analysing these patterns in lone attacker extremist communications is listed in the table in Appendix A. Given the insights of this and other research I expect to find differences in the following variables between lone attacker and non-attacker extremist communications.

1.2.4.1 Cosmic War Orientation

Violent groups across different, even opposing, ideologies generally construct and occupy a social reality in which they and their group are a virtuous minority unjustly victimized (McCauley & Moskalenko, 2008; Meiering et al., 2020; Rousseau et al., 2021) by powerful and nefarious groups (McCauley & Moskalenko, 2014; Peters, 2008). Given this, they often frame violence as a desperate last resort (McCauley & Moskalenko, 2014; Meloy et al., 2012; Ware, 2020) in a global struggle with impossibly high stakes (Berger, 2016; Ehsan & Stott, 2020). These stakes are often conceptualized as past “ideal” or “natural” societies that may yet be again, but only if true believers are absolutely committed (Peters, 2008). These perspectives are labelled

and discussed idiosyncratically by different researchers, but, in general, are captured well by Berger's (2016) label of "cosmic war".

This social reality and its components can be detected by their effect on automatic linguistic patterns. It has been consistently found that third-person plural pronouns (i.e. "They"/"Them") (Baele, 2017; Kaati et al., 2016; Pennebaker & Chung, 2008; Shrestha et al., 2020b; Shrestha et al., 2020a), and language related to negative emotions (Kaati et al., 2016), especially anger and grievance (Baele, 2017; Pennebaker & Chung, 2008; Shrestha et al., 2020b) are used more by violent actors than the general population. Smith (2004) found that terrorist groups were more likely than non-terrorist groups to frame their opponents as valuing dominance and view themselves as valuing dominance, culture, and morality, and Kaati et al. (2016) found a higher concentration of language associated with 'power' in lone attacker manifestos than other blogs. These findings are consistent with a worldview with sharp boundaries between ingroup ("us") and outgroup ("them"), and an ever-present feeling of persecution. I anticipate that lone attackers will use a greater frequency of third-person and first-person plural pronouns, language associated with anger and grievance, and general negative emotion language than non-attackers, just as they do compared to compared to non-extremist populations.

1.2.4.2 Cognitive Inflexibility

Radicalism is often defined as the adoption of "extreme, rigid, and uncompromising" (Rousseau et al., 2021, p. 604) views. This can be seen in aspects of cosmic war worldviews, for example how frequently extremist perspectives include strict, inflexible conceptions of ideal or natural ways of ordering society (Kaati et al., 2016; Meiering et al., 2020). Some theories suggest that this inflexibility provides a sense of certainty and safety, which increases the appeal of extremism, especially for people whose sense of personal significance has been threatened (Webber et al., 2018). Victoroff (2005) associated terrorism with high certainty and low cognitive flexibility, and Kaati et al. (2016) confirmed this with quantitative linguistic analysis of extremist manifestos, all of which contained more words associated with certainty than non-extremist blogs. However, Baele (2017) found a lower percentage of certainty words in lone attacker communications than non-violent activist speeches, as well as more language associated with cognitive complexity more broadly. Baele (2017) suggests that this is because the rigid worldviews characteristic of violent extremism require complex justifications in order to be broadly applied, and these justifications require cognitive sophistication.

Since the publishing of these findings, Linguistic Inquiry and Word Count (LIWC), the analytical software used in both of these analyses, has updated how certainty is measured, breaking it into two overlapping constructs – “all-or-none thinking and a form of grandiose talking, which we now call ‘certitude’” (Boyd et al., 2022, p. 24). Given the complexity and ambiguous evidence for cognitive complexity, I approached the associated variables with an exploratory posture.

1.2.4.3 Perceptions of Agency

There is also evidence that radicalization, especially into violence, is a response to personal disempowerment (Jasko et al., 2017; Knight et al., 2017). The “quest for significance” theory of radicalization proposes that challenges to a person’s self-concept as a moral and competent agent cause anxiety, and that terrorist violence is a way to reduce this anxiety by symbolically re-asserting one’s agency (Hoffman et al., 2020; Webber et al., 2018).

These theories can be tested quantitatively, for example with word cooccurrence analyses, in which the relationships between concepts are measured by examining how often these concepts co-occur within the explicit meaning of a text (Evert, 2005; Ryan & Bernard, 2003). If agency and violence are psychologically connected for lone attackers, it is expected that lone attackers will mention violence more *in the context of agency* than non-attackers. Agency can also be examined more directly by counting the frequency of certain classes of verbs (Formanowicz et al., 2017), or words associated with agency in past research (Boyd et al., 2022) in a given text. If extremists do consider their violence a way to regain control of their lives (Hoffman et al., 2020), lone attackers and non-attacker writers are likely to view their own agency differently and use ‘agency’ language at different rates.

1.2.4.4 Psychological Distance

Automatic linguistic patterns, including level of abstraction, reflect (Snefjella & Kuperman, 2015; Trope & Liberman, 2010) and reinforce (Assilaméhou & Testé, 2013; Dragojevic et al., 2017) unconscious prejudices and expectations. The seminal model to assess abstraction level is Semin and Fiedler’s (1988) Linguistic Category Model, although there are many more inspired by this framework (Kleinberg et al., 2019). Trope and Liberman (2010) found that people tend to describe those dissimilar to themselves in more abstract language than similar others. Because the narratives involved in extremism rely so heavily on dehumanizing and distancing oneself from the other (Rousseau et al., 2021), it is likely that the targets of mass

violence – the proverbial “they” – will be described more abstractly by lone attackers than by non-attacker writers as they justify planned violence by distancing themselves from their targets. This psychological distancing may also function to ease attacker’s violence by reducing empathy with targets. Language likewise becomes more concrete as a speaker’s perception of the likelihood of future events increases, and more abstract as perceived likelihood decreases (Trope & Liberman, 2010).

This can be assessed in several ways. For example, true intentions are described more in concrete terms of “how” things will happen, whereas false intentions tend to focus on abstract reasons “why” (Granhag & Mac Giolla, 2014). It may be that the concreteness that writers describe planned violence with signals their intention of following through, and that lone attackers use more concrete language for their planned actions than non-attacker writers.

Overall, these constructs are extremely useful for distinguishing between extreme and everyday language and provide a strong theoretical starting point. However, none of the constructs listed above were developed by comparing lone attackers and non-attacker extremists. They are therefore reflective of the differences between the social realities of extremists and those of the population at large. Further examination based on more specific comparison groups is needed to understand how appropriate they are for discerning between violent language used by different kinds of extremist authors. Making this distinction has high stakes, and refining or bolstering the validity of the linguistic constructs we use to do this is of vital importance.

1.3 Current Study

In this study, I compare the language of lone attacker and non-attacker extremist communications, with the aim of identifying linguistic predictors of violence that can assist with threat detection. To do so, I analysed extremist communications both by lone attackers and non-attacker writers with a two-stage content analysis. In the first stage, I used Linguistic Inquiry and Word Count 2022 (LIWC-22) software to identify differences in word frequency use. This was intended to answer RQ 1a “How do lone attackers and non-attackers differ in the frequency of use of various types of language?” In the second analysis, I used both LIWC-22 and R open-source statistical analysis software (R Core Team, 2021) to understand how linguistic constructs which stage 1 identified as significant overlap in these writings. This was intended to both complement the findings of the first analysis and answer RQ1b “How do lone attackers and non-attackers differ in how frequently these types of language co-occur?”

2. Methods

2.1 Source Search

I conducted two distinct source searches; one to find writings by lone attackers and one for writings by non-attacker writers. To define my sample and include a comparison group, I adapted Kupper and Meloy's (2021) criteria defining a targeted violence manifesto to produce the four guidelines shown below, in Table 1. The adapted criteria were used to screen the results of both searches.

Table 1

Adapted Inclusion Criteria for "Extremist Communications"

Kupper and Meloy's (2021) Criteria for Targeted Violence Manifestos	Adapted Criteria for Extremist Communications
Text types could include online postings (e.g., on social media platforms, websites, forums), essays, declarations, statements, flyers, checklists and action plans, or audio/video/tape recordings.	The document must be self-published by a single author as a stand-alone online video or text
The writing or recording was composed in the English language and originated from a single author—not dual authorship, plagiarism, or imitation.	posting without evidence of financial compensation.
The communication was directed toward the general public, not personal addressees, and there was no direct relationship between the author and the audience.	The document must be intended for consumption by the general public, with the recognizable aim of presenting the author's worldview.
The content justified an act of violence against others by stating at least one of the following parameters: <ol style="list-style-type: none"> a. Self-identified grievances, triggers, and/or motivations for the attack; b. Beliefs and ideologies to promote and/ or implement a desired political, religious, or social change; c. Violent intentions and/or strategies for the attack. 	The document must justify or frame as appropriate or necessary violence against an identifiable outgroup or its members.

The language of the manifesto was cohesive and coherent.

The document must be non-fiction.

The message was compiled before the perpetrator conducted the attack and was composed days/weeks/months leading up to the incident.

The adapted criteria acknowledge the differences between lone attackers and non-attacker writers while controlling for as many other factors as possible. I removed the requirement that a document's author go on to commit mass violence in order to include a comparison group. I kept Kupper and Meloy's (2021) single-author and online posting requirements in the adapted criteria and added the rule that sources must be "stand-alone postings" without evidence of financial compensation. By excluding conversational internet comments and the work of professional writers this research aims to find a sample of intrinsically motivated individual writers of extremist communications who write with some degree of intention.

I also removed the rule that a document be "coherent and cohesive" (Kupper & Meloy, 2021) because the concepts of cohesion and coherence are too subjective to be useful in defining these documents. The requirement that documents be sensible or readable (as in Broscoe, 2021) is clearer, but this was left out for the sake of simplicity as, if the four criteria above can be discerned, then it follows that the communication meets a minimum standard of readability. The statement that any communication must be recognizably non-fiction excludes the surprisingly large corpus of novels written by violent extremists.

2.1.1 Targeted Violence Manifestos

Research analyzing targeted violence manifestos gathers sources in various ways. Some note only their criteria for inclusion and that they used an "open-source search" (e.g. Ashwal, 2021, p. 28) or collected "purposeful samples" (e.g. Hamlett, 2017, p. 69), some identify only the manifestos and their distinguishing traits without commenting on their search process at all (e.g. Abbott, 2016; Shahbaz, 2020), and many use multiple methods in tandem (e.g. Drouaud, 2020; Duong, 2020; Percich, 2021). Of these projects, some searched multiple social media sites where extremists are known to post (Percich, 2021), some identified them through websites intended to document their activities (Duong, 2020), and some used a combination of media, scholarly, and government sources (Drouaud, 2020). Some works (e.g. Gill et al., 2014; Kupper & Meloy,

2021) also used pre-existing databases, such as Peterson and Densley’s “The Violence Project” (2020), or the National Consortium for the Study of Terrorism and Responses to Terrorism (START)’s Global Terrorism Database (GTD; 2022). Though these databases are promising, they have limitations. For example, the Violence Project is limited to mass shootings committed in the United States (Peterson & Densley, 2020). Searches of both the Violence Project and the GTD for perpetrators who leaked their intentions via manifesto were also missing several American killers known to have published manifestos. Given these limitations and the fact that manifestos connected to mass violence are extremely likely to get news coverage (Ashwal, 2021), I chose to gather targeted violence manifestos mentioned in news articles.

These news articles were collected with a search of ProQuest, an academic “database of databases” with many filters and an easily customizable search function (ProQuest LLC, 2022). Users can filter results by databases searched, source type, and subject tag. I first limited my search to databases that included news sources in the description. I then limited the source type to include only Newspapers, Historical Newspapers, Magazines, and “Blogs, Podcasts, and Websites” (a category including the websites of news organizations; ProQuest LLC, 2022). All other source types, including Wire Feeds, Dissertations & Theses, Scholarly Journals, Trade Journals, Books, Reports, Other Sources, Encyclopedias & Reference Works, Working Papers, Conference Papers & Proceedings, Audio & Video Works, and Pamphlets & Ephemeral Works, were excluded. Results were also filtered by subject. All subjects directly related to violence were included³. The ProQuest databases and subject tags used in this search are listed in Appendix B.

Within these parameters, I searched for the terms “Manifesto” AND “Violence” in news articles published since 2004, the year of the first Web 2.0 conference (Taylor, 2012). Web 2.0 refers to the internet as it is today, a platform on which content is generated and modified primarily by users (Insua, 2014). This user-generated internet has enabled the current pattern of terrorist communications by drastically eroding barriers both to disseminating and discovering violent propaganda (Feldman, 2012; Kaati et al., 2016; Macklin & Bjørge, 2021). This search

³ Subject filters referencing specific violent ideologies (eg. White Supremacy, Nazi Groups) or groups which are frequently discussed as victims in the context of lone attacker mass violence (eg. Noncitizens, Women) are also available. These were not included in order to avoid a focus on one of many violent ideologies, although neither these nor any other subject headings were specifically excluded.

yielded 1058 results on October 28, 2022. I screened these articles for mentions of any manifesto written by a lone attacker. Forty-nine different violent extremists were mentioned.

2.1.2 Non-Attacker Extremist Communications

I began the second search with an exploratory reading of the content of various online extremist communities, listed in Table 2 below. The websites hosting these communities were compiled both through discussion with a prolific researcher in the field (J. Kupper, personal communication, November 10, 2022), and by examining past linguistic analyses of non-attacker extremist language (Shrestha et al., 2020b). They were chosen both because they promote a wide range of ideologies often considered extreme or deviant, and because lone attackers have been active participants in many of them (J. Kupper, personal communication, November 10, 2022; Shrestha et al., 2020b). Past studies using comparative word count analysis have compared samples as small as 4 000 words each (Livingston et al., 2022). I scanned the websites identified, planning to expand my search if I could not match or exceed this sample size⁴.

Table 2

Preliminary Sources

Ideology	Website	
White Supremacist	Daily Stormer	VNN Forum
	Stormfront	Niggermania
Extreme Right Wing	Terrorgram	Gab
Islamic Extremist/Jihadist	Turn to Islam	Islamic Awakening
Counter-Jihad/Anti-Islamic	Gates of Vienna	
	Incel	Lookmax

⁴ If I was unable to find sufficient non-attacker writings by scanning these websites, I had planned to expand this search in three ways. First, by screening any other online community, blog, or message board explicitly referenced in the above websites; second, by identifying repeating or significant phrases in the content of the above websites and using them as Boolean search terms; third, by gathering content that calls for violence but does not meet the other inclusion criteria and identifying the most frequently used words. As with the prior search expansion, the most common words would have been used as Boolean search terms to find more non-attacker writings. These methods were not necessary, as I was able to gather a sufficient sample from the websites identified.

Note: Terrorgram is an affiliated network of channels on the anonymous social media site Telegram which is known for distributing extremist content.

2.2 Screening

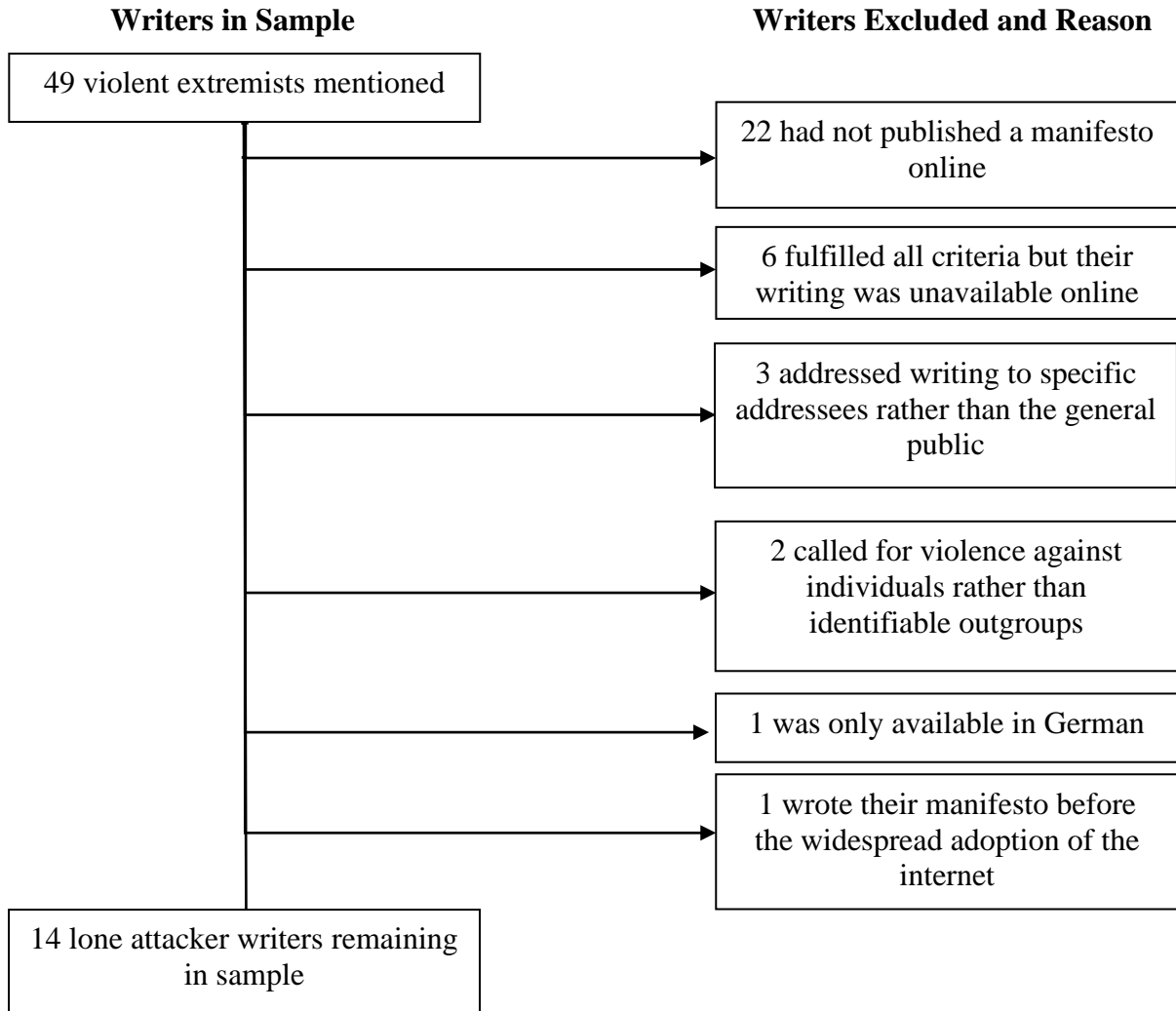
2.2.1 Targeted Violence Manifestos

I screened all sources using the already mentioned criteria adapted from Kupper and Meloy (2021). Note that some sources which qualified on all the criteria created were not fully available online, for example the manifesto mailed to MSNBC by Seung Hui-Cho before his perpetration of the Virginia Tech Shooting (Johnson, 2007). In Hui-Cho's case, MSNBC has only published fragments of it (Johnson, 2007), violating the requirement of single author self-publishing and disqualifying the manifesto for use in this analysis. The overall screening process for targeted violence manifestos is summarized below, in Figure 1.

⁵ "Incel" here refers to overwhelmingly male online communities of "involuntary celibates". This movement began in the 1990s as a way for people of all genders and orientations who were frustrated with romance and dating to support one another, but has become increasingly toxic over time. It is currently dominated by misogynistic and biologically deterministic ideologies and has been linked to multiple incidents of mass public violence. For an in-depth discussion of Incel ideology and violence, see Hoffman et al. (2020).

Figure 1

Targeted Violence Manifesto Screening



2.2.2 Non-Attacker Extremist Communications

While screening the non-attacker writings I excluded some of the websites listed in Table 2. Some were disqualified because they had evidence of a financial motive, violating the criteria that writings be “self-published by a single author ... without evidence of financial compensation”. This notably excluded “The Daily Stormer”, a neo-Nazi newsletter written by Andrew Anglin and associates, because it has a link to donate (O’Brien, 2017). I also applied this criterion to individual authors. For example, Andrew Anglin’s posts on Gab, a right-wing twitter clone, are not themselves financially motivated, but Anglin writes racist propaganda for a living

(O'Brien, 2017) and his financial motives can be assumed to affect all his writing, and thus compromise its eligibility for this analysis.

Both Gates of Vienna and Terrogram were disqualified because of their publishing process. On Gates of Vienna, extremist writers send their writing to Edward S. May, who compiles and publishes them (Bridge Initiative Team, 2020). Terrogram is a loosely connected network of Telegram channels associated with collectively published manifestos and extremist content (Kriner & Ihler, 2022; J. Kupper, personal communication, November 10, 2022). Neither forum has content which is “self-published by a single author”.

There were also two forums which I found evidence had been removed from the internet: Islamic Awakening and Lookism.net. Regarding Islamic Awakening, this evidence was a 2015 comment on a related Islamic forum by a user looking for the site (Khudayar, 2015). Responses noted that this forum had been taken down. Regarding Lookism.net, several threads on another incel forum (looksmaxxing.com) were “Archived from Lookism.net” (Neo, 2019). I found no qualifying content in the remaining Incel and Islamic forums.

2.3 Samples

2.3.1 Targeted Violence Manifestos

After screening, I had 17 targeted violence manifestos by 14 lone attackers, totalling 948 844 words and summarized in Table 3. These ranged from 28 (Bowers, 2018) to 732 836 words (Breivik, 2011), although Breivik’s manifesto is an outlier in terms of length, with a z -score of 3.83, greater than the commonly recommended outlier threshold of 3.29 (Tabachnick & Fidell, 2007). The targeted violence manifestos, not counting Breivik, have a mean length of 15 866 words and a Standard deviation of 28 570 words.

Table 3

Lone Attackers and Their Writings

Ideology (% of Sample by Lone Attacker)	Attacker (Date and Location of Attack)	Title of Manifesto(s)	Word Count
Anti-police (7.14%)	Christopher Dorner (Feb. 3 – 12, 2013, Los Angeles, USA)	A Last Resort	11 416
		Alek Minassian (Apr. 23, 2018, Toronto, Canada)	34
Incel (14.29%)	Elliot Rodger (May 23, 2014, Isla Vista, USA)	My Twisted World: The Story of Elliot Rodger	107 715
		Elliot Rodger’s Retribution (Youtube Video)	681
Islamic Extremism (7.14%)	Michael Zehaf-Bibeau (Oct. 22, 2015, Ottawa, Canada)	Untitled YouTube video	197
White Supremacist/ Racially Motivated (71.42%)	Stephan Balliet (Oct. 9, 2019, Halle, Germany)	Techno-Barbarism: A Spiritual Guide for White Men in the Current Year	68
		Read this first	109
		DoKumentation	2 077
	Robert Bowers (Oct. 27, 2018, Pittsburgh, USA)	Untitled Gab Post	28
	Anders Breivik (July 22, 2011, Oslo and Utoya, Norway)	2083: A European Declaration of Independence	732 836
	Patrick Crusius (Aug. 3, 2019, El Paso, USA)	The Inconvenient Truth	2 356
	John Earnest (Apr. 27, 2019, Poway, USA)	An Open Letter	4 199
Payton Gendron (May 14, 2022, Buffalo, USA)	What you need to know	44 808	
Christopher Harper-Mercer (Oct. 1, 2015, Roseburg, USA)	My Story	1 588	

Juraj Krajcik (Oct. 11, 2022, Bratislava, Slovakia)	A call to arms	21 771
Dylann Roof (June 17, 2015, Charleston, USA)	Untitled	2 459
Brenton Tarrant (Mar. 15, 2019, Christchurch, NZ)	The Great Replacement	16 564

Note: Because of its extreme outlier status, word count percentages were calculated using the sample word count (216 060) after removing Anders Breivik’s 732 836 words.

2.3.2 Non-Attacker Extremist Communications

Source search 2 yielded 50 qualifying writings by 46 writers totalling 74 181 words. One document titled ‘The White Resistance Manual’ (Lenz, 2011) accounts for 59 035 of these words, qualifying as an outlier with a word count z -score of 6.92 (Fidell & Tabachnick, 2003; Kortzman et al., 2020; Tabachnick & Fidell, 2007). The remaining 49 sources total 15 146 words and range from 50 to 1237 words in length ($M = 309.3$, $SD = 278.3$). These extremist communications and the forums they were gathered from are presented in Table 4 below.

Table 4

Non-Attacker Sample by Forum

Website Posted (% of Sample by Writing)	Extremist Writer	Title of Communication(s) (Date of Posting)	Word Count
VNN Forum (72.83%)	A.S.	Post in “Strategy” thread (Dec. 16, 2009)	57
	Daryl Basarab	Post in “Strategy” thread (Mar. 22, 2015)	170
	Dothead	“Aryan hate complex: Why Aryans can afford to spend an entire lifetime buried in hatred. It comes naturally to them as it’s genetic” (Mar. 7, 2017)	1 237
	FinnCS	First Post in “The problem with violence” thread (Feb. 24, 2019)	106
	Gabry Ponte	Post in “Strategy” thread (Oct. 16, 2009)	336
	Hugh	Post in “Violence” thread (Apr. 28, 2010)	403

Igor Alexander	Post in “Strategy” thread (Dec. 16, 2009)	236
J. Rourke	Post in “The problem with violence” thread (Mar. 28, 2019)	63
James Dunet	First post in “Pick your targets wisely” thread (Apr. 12, 2019)	456
James Radov	Post in “Jews are the Most Hateful, Vicious, Sadistic Murderous People on Earth” thread (Nov. 26, 2021)	51
	Post in “Jews Behind Sexualization of Kids” thread (May 21, 2022)	89
Jean West	Post in “ZOG ⁶ vs WN ⁷ ” thread (Jun 17, 2013)	493
John Evans	Post in “Strategy” thread (Apr. 26, 2015)	116
John from Canada	Post in “Strategy” thread (Nov. 2, 2012)	614
John Krump	Post in “Will violence work for the white right too?” (Oct. 18, 2018)	92
Karl Lueger	Post in “Strategy” thread (Dec. 17, 2009)	823
LongBaugh	Post in “Strategy” thread (Jun. 21, 2020)	118
Luftwaffensoldat	Post in “Violence” thread (Nov. 12, 2013)	486
	Post in “Violence” thread (Dec. 27, 2013)	672
Malhalla	Post in “Strategy” thread (Mar. 22, 2015)	170
MedVader	Post in “Strategy” thread (Aug. 29, 2010)	120
Mike Parker	Post in “Strategy” thread (Dec. 16, 2009)	139
Mike Todd	Post in “Strategy” thread (Oct. 16, 2009)	79
Neil Stewart	Post in “Violence” thread (Apr. 6, 2013)	79
Oy Ze Hate	Post in “Hitler” thread (Nov. 19, 2009)	490

⁶ “ZOG” stand for Zionist Occupied Government, a term “which reflects the common white supremacist belief that the U.S. government is controlled by Jews (*Hate on Display* / ZOG, 2024).

⁷ “WN” stand for “White Nationalist”.

	PeterKramer	Post in “Strategy” thread (Dec. 16, 2009)	317
	Polnick	Post in “Jews Control Immigration Policy, Promote Open Borders to Destroy White Nations” thread (Aug. 17, 2015)	65
	Rounder	Post in “Strategy” thread (Dec. 22, 2010)	155
	San Dimitri	Post in “Violence” thread (Dec. 12, 2013)	190
	Sean Gruber	First post in “Why not both?” thread (Mar. 28, 2018)	139
	Sean Gruber	Post in “Strategy” thread (May 24, 2018)	757
	Serbian	Post in “ Hamas and Other Palestinian forces launch major rocket attack on Israel, military bases” thread (Oct. 26, 2023)	109
	Steven L. Akins	Post in “The Jews Assassinated JFK” thread (Sept. 23, 2012)	184
	T. Garrett	Post in “The problem with violence” thread (Mar. 8, 2019)	95
	Vindicator06	Post in “Violence” thread (Aug. 8, 2014)	1 236
Stormfront Blogs (10.00%)	Anger Management Failed	“torture and justifications” (November 10, 2011)	420
	James Harting	“Inferior Men Fear Excellence” (July 3, 2023)	364
	SouthHip	“The continuing saga of Nathan B. Forrest High School” (Sep. 24, 2013)	285
		“The Purple Sea” (Oct. 27, 2009)	586
		“Where Black Rules White” (Feb. 18, 2010)	363
Niggermania (8.00%)	Damien	Post in “Niggerfluxation and TNB” thread (Jan. 20, 2023)	93

	NegrosRus	Post in “The Black-White IQ Gap is Not Shrinking” thread (Jun. 2, 2023)	473
	Proud_WHITE_chik66	“And another nigger hater joins to say hello!!” (Jan. 20, 2023)	241
	Ziolkoo	Post in “New Member Introductions” thread (Aug. 8, 2023)	176
Gab (6.00%)	@A_I_P	Untitled (Feb. 19, 2023)	189
	@Nordic1984	Untitled (Dec. 14, 2023)	554
	@SuperMario70	Untitled (Dec. 15, 2023)	166
Frontfighter (2.00%)	Unknown	“it’s the Xians fault” (October 17, 2023)	231
WhiteHonor.Org (2.00%)	Aquilifer	“The White Resistance Manual” (Date Unknown)	59 035

Note: Ideology is not specified in this table because all forums with qualifying extremist communications are extreme right-wing/white supremacist.

2.4 Analyses

The writings of lone attackers and non-attacker writers have been compared before, but all of these analyses (e.g. Baele, 2017; Shrestha et al., 2020b) define their samples differently than this study does. Baele (2017) for example, compares lone attackers with non-violent political radicals Nelson Mandela, Martin Luther King, Jr., and Mahatma Gandhi. Because this comparison group is non-violent in rhetoric as well as action, it is not comparable with my sample of non-attacker writers. Likewise, Shrestha et al. (2020b) compared lone attacker writings with multiple samples of everyday language use. These samples included, but were not exclusive to, websites known for hate speech. In this thesis I supplement and contextualize these findings by applying a two-stage quantitative content analysis approach to a more specific and targeted sample. These analyses are described in detail below.

2.4.1 Stage 1: Linguistic Inquiry and Word Count (LIWC) Analysis

The most basic forms of content analysis use word counts and frequencies to extract meaning from a text (Carley, 1990). As computer technology and software have advanced, these techniques have become increasingly reliable and efficient (Boyd et al., 2022; Carley, 1990).

Perhaps the most widely used software for such analyses today is Linguistic Inquiry and Word Count-2022 (LIWC-22). This thesis' first stage of analysis used LIWC-22 to answer research question 1a, "How do lone attackers and non-attackers differ in the frequency of use of various types of language?"

LIWC-22 works by calculating the percentage of a text sample belonging to different "dictionaries", lists of words, word stems, and phrases that have been validated as reflecting different psychological constructs (Boyd et al., 2022). For example, higher use of tentative language such as "maybe" or "perhaps" is one of several indicators of cognitive flexibility (Baele, 2017; Tausczik & Pennebaker, 2010). LIWC has 107 built-in dictionaries (Boyd et al., 2022), as well as over 60 which have been created and validated by independent researchers (Boyd, personal communication, October 21, 2022). I included all basic LIWC dictionaries (Boyd et al., 2022); Pietraszewicz et al.'s (2019) 'Big Two (Agency & Communion) Dictionary'; Seih et al.'s (2017) Linguistic Category Model dictionary; Choi et al.'s (2022) 'Threat Dictionary'; and Samantha Platten's (Platten, 2020) 'Dehumanization Dictionary' in this analysis, yielding 127 outputs in total. LIWC outputs enable quantitative comparisons of explicit meaning, a form of explicit concept analysis (Carley, 1990). I analyzed each sample using LIWC and compared results between groups with hypothesis tests. These quantitative linguistic differences between groups function as basic "linguistic fingerprints" (J. W. Pennebaker et al., 2003) of lone attackers and non-attacker writers. In this study, the percentages of language in each source from each dictionary were the Dependent Variables (DVs).

Some DVs had theoretically probable or previously established relationships with extremist violence (See *Automatic Language Use and Prior Research*). For these I used 1-tailed hypothesis tests for confirmatory analysis. For the remaining DVs, I took an exploratory approach using 2-tailed independent sample *t*-tests or Mann-Whitney U tests depending on normality of the data (Fidell & Tabachnick, 2003).

I applied the appropriate hypothesis tests with a nominal alpha of .05. In experiments with multiple hypothesis tests, inflated type 1 error rates are a concern (Bender & Lange, 2001; O'Keefe, 2003; Proschan & Waclawiw, 2000; Rubin, 2017, 2021). In these scenarios, the probability of incorrectly rejecting at least one of k null hypotheses is referred to as familywise error rate (FER) and can be expressed in the formula $FER = 1 - (1 - \alpha)^k$ (Bender & Lange, 2001). In this study $k = 127$, nominal $\alpha = .05$, and this formula predicts a 99.85% likelihood of falsely

rejecting at least one null hypothesis. There are many methods to reduce the FER and associated inflation of type one error to acceptable levels, but their use is highly debated (Bender & Lange, 2001; Matsunaga, 2007; O’Keefe, 2007; Perneger, 1998; Rubin, 2017). Not only are both simple and sophisticated alpha adjustment methods unacceptably conservative in studies with many hypothesis tests (Bender & Lange, 2001; Benjamini & Hochberg, 1995; Perneger, 1998; Rubin, 2017; Yeomans, 2021), but it has also been widely argued that using the whole-study k in alpha adjustments is theoretically inappropriate (Matsunaga, 2007; Meroni & De Michele, 2022; O’Keefe, 2003; Perneger, 1998; Rubin, 2017, 2021). For one, including all of a study’s tests in the familywise k only protects against incorrectly rejecting the null hypothesis that experimental groups are identical on *all* included tests (Perneger, 1998; Sinclair et al., 2013). In other words, FER calculations cannot indicate how many type one errors exist or which tests have them, only the likelihood that at least one has occurred. This so-called ‘null hypothesis’ is rarely as relevant or even coherent as the results of individual tests (Meroni & De Michele, 2022; Sinclair et al., 2013). Not only this, but the choice to include all hypothesis tests in a single study is essentially arbitrary (Perneger, 1998). Many sources argue that if running more than one test is the only necessary condition for inflated type one error, there is essentially no reason not to expand FER *ad infinitum*, even including hypothetical future tests a researcher might run (O’Keefe, 2003, 2007; Rubin, 2017, 2021; Sinclair et al., 2013).

Although some argue against adjusting for FER altogether (O’Keefe, 2003, 2007; Perneger, 1998; Sinclair et al., 2013), more sophisticated corrections depend on how researchers define the ‘family’ of tests, a decision which has been long debated (Bender & Lange, 2001; Matsunaga, 2007; Meroni & De Michele, 2022; Proschan & Waclawiw, 2000; Rubin, 2017, 2021). Many advocate only using FER correction in confirmatory studies (Parker & Weir, 2020), and defining families based on their relation to a single construct (Matsunaga, 2007). For example, if a battery of psychological tests in applied, five of which measure anxiety, researchers would calculate FER for these tests only with $k = 5$. I have taken this approach, defining FER within confirmatory hypotheses based on the constructs discussed earlier in the thesis – cosmic war, agency, cognitive complexity, and psychological distance. These constructs and the DVs associated with them are in Table 5 below. I adjusted FER for each using the Benjamini-Hochberg method (Benjamini & Hochberg, 1995) recommended by Matsunaga (2007) as an alternative to Bonferroni adjustment.

All variables not included in these confirmatory analyses were considered exploratory. In exploratory analysis, it is often recommended to use hypothesis tests with unadjusted alpha values as a tool for *generating*, rather than *confirming* hypotheses (Bender & Lange, 2001; O’Keefe, 2003; Rubin, 2021; Sinclair et al., 2013).

Table 5

One-Tailed Hypotheses and Component DVs

Null Hypothesis	DVs in Familywise Error Calculations		
Samples will not differ in the prevalence of language associated with cosmic war.	Conflict	They	We
	Past Focus	Anger	Negative Emotion
	Animalistic Dehumanization		Power
Samples will not differ in the prevalence of language associated with agency.		Agency	
Samples will not differ in the prevalence of language associated with cognitive inflexibility.	Differentiation	Analytic	Cause
	Cognitive Processes	Certitude	All or None
	Tentative	Discrepancy	Insight
		Curiosity	
Samples will not differ in the prevalence of language associated with psychological distance.	Overall Linguistic Category Model Dictionary		
	Interpretive Action Verbs	Direct Action Verbs	
	Adjectives	State Verbs	
		Verbs	
Samples will not differ in the prevalence of language associated with lone attackers in past research.	Friend	Sadness	I
	Positive Emotion	Anxiety	Long Words

Note: The “Overall Linguistic Category Model Dictionary” which calculates the additive frequencies of Direct Action Verbs (DAVs), Interpretive Action Verbs (IAVs), and State Verbs (SVs; Seih et al., 2017).

Because the meaning of words is heavily dependent on both immediate and general context (Shrestha et al., 2020b) and word count analysis is limited in its ability to account for this context (Akrami et al., 2018; Boyd & Schwartz, 2021; Shrestha et al., 2020b), most researchers recommend that word count analysis (J. Kupper, personal communication, November 10, 2022; Shrestha et al., 2020b; Vegt et al., 2022), and explicit conceptual analysis more broadly (Carley, 1990) is used in conjunction with other techniques. To supplement these limitations, I have included a second stage of content analysis.

2.4.2 Stage 2: Word Cooccurrence Analysis

The second stage of analysis aims to supplement word count analysis by examining the relationships between LIWC dictionaries which differed significantly between groups in stage one. There are several distinct methods of this type of analysis, including contingency analysis (Mayring, 2014), word collocation analysis (Ryan & Bernard, 2003), and analysis of positional cooccurrence (Armborst, 2017; Evert, 2005). In contrast to methods such as relational cooccurrence analysis, positional cooccurrence analysis examines the relationship between words based solely on the observable frequency of their cooccurrence (Evert, 2005). This approach is appropriate here given both the volume of extremist materials collected and the exploratory nature of this stage of analysis. I used positional cooccurrence methods to answer research question 1b, “How do lone attackers and non-attackers differ in how frequently these types of language co-occur?”

Many validated association measures have been developed to examine the relationships between words (Evert, 2005)⁸. One of these, the log-likelihood ratio G^2 (Dunning, 1993; Evert, 2005) can indicate a relationship between words, but does not specify the direction of this

⁸ Originally, I planned to examine cooccurrence using a combination of LIWC’s ‘contextualizer’ tool, which allows users to extract a given number of words surrounding instances of words within a given dictionary (Boyd et al., 2022), *t*-tests, and the *c*-coefficient, a rough equivalent of a correlation coefficient (Armborst, 2017; Friese, 2013). However, many sources were already near my minimum word count for LIWC analysis, and extracting snippets of them using the Contextualizer would reduce our sample size further. The *t*-test is also vulnerable to false positives (Evert, 2005). Despite common use, *t*-tests are considered inappropriate for cooccurrence analysis (Evert, 2005).

relationship (Dunning, 1993; Evert, 2005). In other words, a significant G^2 shows that the probability of word A and word B occurring together is *different* than the probability of one occurring without the other (Evert, 2005), which could indicate a negative relationship – where two words have a tendency not to occur together – or a positive relationship in which they are more likely to cooccur (Evert, 2005). G^2 also follows a chi-squared distribution ($df = 1$; [Dunning, 1993](#); [Evert, 2005](#)), making interpretation relatively simple.

I supplemented G^2 with three degree of association tests: the Mutual Information statistic (MI; [Church & Hanks, 1990](#)), Dice Similarity Coefficient (DSC; [Dunning, 1993](#)), and logarithmic Odds Ratio (Szumilas, 2010; Tenny & Hoffman, 2024). Each test captures a slightly different aspect of these relationships (Öksüz et al., 2021). The MI test compares the observed and expected probabilities of observing two words together (Church & Hanks, 1990b; Gablasova et al., 2017) and is often used as a standardized measure – comparable across language corpora – of the direction and strength of the relationship between words (Church & Hanks, 1990a; Evert, 2005). However, MI is prone to overestimating the relational strength between infrequently occurring words, as MI scores increase both as word pairs become more exclusively associated and as they cooccur less frequently in the text as a whole (Gablasova et al., 2017; Öksüz et al., 2021). This means that MI scores for two word pairs (e.g. “*vice versa*” and “*okey dokey*”) can differ significantly if one pair occurs fewer times than the other, even if words in both pairs only occur with one another (Gablasova et al., 2017). Because of this, MI sometimes “rewards lower frequency combinations, for which less evidence exists in the corpus” (Gablasova et al., 2017, p. 164) The DSC is robust to these distortions (Gablasova et al., 2017; McKeown et al., 1996; Öksüz et al., 2021). While MI values have no theoretical minimum or maximum, DSC values range from zero to one, and measure the relative probability of two words occurring together rather than on their own (Gablasova et al., 2017; Janson & Vegelius, 1981). Finally, the logarithmic Odds Ratio (OR) measures how much more likely a given word is to occur in the presence vs. in the absence of another within a segment of text – in this case a sentence (Evert, 2005; Szumilas, 2010; Tenny & Hoffman, 2024). ORs greater than one indicate a positive relationship between words, those at or near one indicate no relationship, and those below one indicate a negative relationship (Bland, 2000; Szumilas, 2010). The logarithmic form of the OR is used because of its approximately normal distribution and the fact that it has no theoretical maximum or minimum (Bland, 2000). The formulae of all association measures used are

detailed in Appendix C. To minimize noise in the data, I calculated degree of association statistics only for the six variables which significantly differed between samples in stage one's confirmatory analyses.

These association measures are usually used to calculate relationships between individual words. In order to apply them to linguistic constructs extracted by LIWC, I created dummy variables that correspond to significant dictionaries by changing all words contained within a LIWC dictionary into that dictionary's title. For example, LIWC extracted the words 'I', 'idk', 'me', 'i've', 'i'll', 'mine', 'my', 'ill', 'id', 'myself', 'i'm', 'ive', 'i'd', 'ima', 'ilyas', 'ill', 'omfg', and 'im' from the first-person singular pronouns dictionary, all of which I replaced with the word 'I'. Association measures for this word in the adjusted sample, as well as for the "words" 'agency', 'emo_sad', 'emo_pos', 'friend', and 'emo_anx', are therefore measuring relationships between LIWC dictionaries and the constructs they represent. For example, the following sentence, "The next time I see a WN blasting militias I *think* I *will* puke" (Hugh, 2010) became "The next time I see a WN blasting militias I *agency* I *agency* puke".

3. Results

3.1 Preparatory Analysis

LIWC outputs become less stable as texts become shorter because each word represents a higher percentage of the total text (Aghazadeh et al., 2022; R. Boyd, 2017). To control for this literature often recommends a minimum of 50 words per text (Aghazadeh et al., 2022; R. Boyd, 2017). I used a minimum word count of 110 for two reasons. First, the 110 word minimum disqualified more non-attacker than lone attacker writings, bringing the two sample sizes closer to equal and reducing the threats to validity associated with comparing unequally sized samples (Fidell & Tabachnick, 2003). Second, texts with 110 words or less had a significantly higher number of DVs with no occurrences ($M = 53.64$, $SD = 15.96$) than the rest of the sample ($M = 28.19$, $SD = 5.05$, $t(62) = -5.84$, $p < .001$) and removing them reduced positive skew and number of outliers significantly.

Before hypothesis testing, I split the data by sample and screened each for non-normally distributed DVs and univariate outliers. To determine non-normality, I calculated skewness, standard error of skewness, and skewness z -score of all 127 DVs. Z -scores with an absolute value exceeding 3.29 indicated significant skewness, in line with $\alpha = .001$ and as recommended for small to medium samples by Tabachnick and Fidell (2007). To find univariate outliers, I

calculated each DVs standardized scores and flagged those exceeding the same threshold of |3.29| as outliers. The purpose of identifying outliers is to find cases which are incorrectly included in a study population, and once they are identified careful consideration is needed to decide whether they are truly from a separate population or are merely exceptional cases within the population (Tabachnick & Fidell, 2007). This study’s inclusion criteria rule out the first case, as if a writing has been included it has already qualified as part of the sample. Outliers are therefore exceptional cases within this population, but the population is by its very nature extreme. Rather than removing cases, it is widely recommended to use logarithmic transformations to normalize data and reduce unequal variance and the influence of outliers (Al-Mosaiwi & Johnstone, 2018; Bland & Altman, 1996; Lee, 2020; Manikandan, 2010; Sedgwick, 2012). I used a $\log_{10}(x + 1)$ transformation, adding 1 to remove 0 values (as in Al-Mosaiwi & Johnstone, 2018). As shown in Table 6, this reduced the number of outliers, skewed outputs, and unequally variant DVs.

Table 6

Changes in Data Following log10 Transformation

		Untransformed	Log- transformed
		Data	Data
Outliers	Attacker	8	2
	Non-attacker	54	28
	Total	62	30
Skewed DVs	Attacker	26	13
	Non-attacker	65	35
	Either sample	70	42
Unequal Variance			
DVs	Total	11	10
Unequal Variance			
and Skewed DVs	Total	6	3

After transformation three DVs – Word Count, Illness, and Mechanistic Dehumanization – were still both significantly skewed and unequally variant. My planned tests are unusable on these DVs; the *t*-tests because they assume normal distribution (Fidell & Tabachnick, 2003), and the Mann-Whitney tests because they are vulnerable to unequal variance (Wilcox, 2023). I

removed them from the analysis. A summary of the data, including skewness, kurtosis, and outlier status of cases, is in Appendix D.

2.2 Stage 1 Results: LIWC Analysis

To answer my first research question – How do lone attackers and non-attackers differ in the frequency of use of various types of language? – I used LIWC to calculate the dependent variables (DVs) – the proportion of language belonging to each LIWC dictionary in each document. After splitting the LIWC outputs into the two samples and conducting preparatory analyses I applied the appropriate hypothesis test. In the event that either sample had a significantly skewed DV, I used the nonparametric Mann-Whitney U test (Mann & Whitney, 1947) rather than an independent samples *t*-test. In heterogeneously variant but normally distributed DVs, I used an independent samples *t*-test without the assumption of equal variance.

I applied Benjamini-Hochberg familywise error corrections (Benjamini & Hochberg, 1995) to the hypotheses in Table 5. For exploratory hypothesis tests, I used an unadjusted alpha of .05. These analyses yielded six significantly differing variables. I calculated effect size with the common Cohen’s *d* for the *t*-tests, and the rank-biserial correlation statistic for the Mann-Whitney U tests (Berry et al., 2018). The results of these hypothesis tests, as well as the unadjusted *p*-values of significant exploratory tests are below, in Table 8.

Table 8

Statistically Significant Intergroup Linguistic Differences

Hypothesis	Test	LIWC Dictionary	Sample Mean (SD)		Effect size	Test Statistic	<i>p</i>
			Non-Attacker	Lone Attacker			
Lone Attackers >	U	Agency	4.54 (2.10)	6.13 (2.33)	0.39	158	0.032*
	T	I	1.98 (2.53)	3.82 (3.10)	0.83	2.64	0.006*
Non-Attackers	U	Sadness (emo_sad)	0.10 (0.22)	0.99 (0.12)	0.48	134	0.003*
	U	Anxiety (emo_anx)	0.11 (0.19)	0.13 (0.15)	0.36	166	0.035*
Lone Attackers <	U	Friend	0.04 (0.13)	0.10 (0.12)	0.57	113	<.001*
Non-Attackers	T	Positive Emotion (emo_pos)	0.39 (0.44)	0.66 (0.58)	0.58	1.86	0.034*
	U	You	0.52 (0.88)	2.30 (2.08)	0.58	109	0.001

	U	Mental	0.03 (0.10)	0.05 (0.05)	0.47	138	0.001
	U	Food	0.10 (0.23)	0.12 (0.14)	0.47	137	0.002
	U	Memory	0.04 (0.10)	0.10 (0.14)	0.46	140	0.003
	U	Female	0.17 (0.46)	0.47 (0.68)	0.46	141	0.004
	U	Want	0.21 (0.35)	0.42 (0.45)	0.48	134	0.006
	U	Polite	0.12 (0.24)	0.33 (0.71)	0.46	140	0.007
	U	Lack	0.07 (0.13)	0.15 (0.11)	0.45	144	0.007
	U	Substances	0.02 (0.09)	0.02 (0.04)	0.32	176	0.008
	U	Assent	0.09 (0.27)	0.06 (0.06)	0.43	148	0.008
Non-	U	Nonflu	0.02 (0.06)	0.02 (0.04)	0.32	176	0.008
Attackers ≠	U	Home	0.07 (0.11)	0.15 (0.20)	0.43	149	0.011
Lone	U	Risk	0.24 (0.41)	0.41 (0.26)	0.44	145	0.011
Attackers	U	Leisure	0.25 (0.49)	0.32 (0.31)	0.44	146	0.012
	T	Conflict	0.79 (0.92)	1.24 (0.71)	0.73	2.32	0.02
	U	Family	0.13 (0.27)	0.28 (0.32)	0.37	163	0.026
	U	Sexual	0.09 (0.19)	0.19 (0.31)	0.35	169	0.026
	U	Auditory	0.15 (0.30)	0.14 (0.13)	0.37	163	0.026
	U	Fatigue	0.09 (0.27)	0.02 (0.02)	0.30	182	0.029
	U	Netspeak	0.13 (0.22)	0.18 (0.24)	0.37	164	0.031
	U	Wellness	0.04 (0.13)	0.02 (0.02)	0.28	186	0.044
	T	Male	0.85 (1.06)	1.42 (1.11)	0.64	2.03	0.05
	T	Article	8.17 (2.54)	6.66 (1.91)	-0.63	-1.99	0.05

Note: To aid interpretation, all Means and Standard Deviations are derived from untransformed data. All statistical tests were performed on log-transformed data. Statistically significant confirmatory test results are denoted with an asterisk (*) by their p -value.

As seen above, after alpha adjustment the LIWC dictionaries corresponding to the fundamental motive to establish agency (Pietraszkiewicz et al., 2019), first-person singular pronouns (Boyd et al., 2022), and sadness, anxiety, friendship, and positive emotions (Boyd et al., 2022) differed significantly between samples. Untransformed LIWC outputs for these six variables are summarized in Appendix E. Only the 24 exploratory DVs in the table above

differed significantly between groups. The remaining 97 insignificant DVs are listed along with other sample characteristics in Appendix D.

3.3 Stage 2 Results: Word Cooccurrence Analysis

In stage one of analysis, each text was a single case regardless of length. Stage two's analyses depend instead on the overall number of occurrences and cooccurrences (Boyd et al., 2022) making outsized influence from outliers much more of a problem. Because of this I removed longer outliers (Anders Breivik's "2083: A European Declaration of Independence", and Aquilifer's "White Resistance Manual"), from all calculations in stage two. I used LIWC's Contextualizer tool (R. Boyd, 2018), frequency counter, and core word count mechanic to calculate descriptive statistics, which are presented in Table 9.

Table 9

Descriptive Statistics of the Relationship Between Significant Dictionaries

Dictionary (# of occurrences for each sample)	Five most Frequent Words (n/% of Dictionary or Context)				% of other dictionaries in context						
	Dictionary		Context		Agency	I	Positive Emotion	Sadness	Anxiety	Friend	
	Lone Attacker	Non-Attacker	Lone Attacker	Non-Attacker							
Agency (9154 in Lone Attackers/ 676 in Non- Attackers)	You (1427/15.6%)	Will (80/11.83%)	People (505/1.1%)	White (55/1.5%)	Attacker/ Non- Attacker	7.40/ 6.17	5.30/ 1.70	0.65/ 0.47	0.10/ 0.10	0.14/ 0.13	0.20/ 0.06
	Will (1126/12.3%)	You (64/9.46%)	Time (361/0.8%)	People (43/1.2%)							
	Your (582/6.4%)	Do (45/6.65%)	Life (360/0.8%)	Jews (35/1.0%)							
	Do (356/3.9%)	Don't (31/4.60%)	Day (177/0.4%)	Things, Nothing, War (18/0.5%)							
	Made (233/2.5%)	Your (30/4.44%)	Nothing (177/0.4%)								
I (12 712 Lone Attackers/ 234 Non-Attackers)	I (7321/ 57.5%)	I (147/62.8%)	Life (1071/1.7%)	People (18/1.5%)	Attacker/ Non- Attacker	3.80/ 4.91	7.40/ 4.87	1.00/ 0.63	0.32/ 0.16	0.25/ 0.20	0.36/ 0.03
	My (3073/24.2%)	My (37/15.8%)	Time (776/1.2%)	White (13/1.1%)							
	Me (1796/13.6%)	I'm (14/6.0%)	Mother (583/0.9%)	Jews (11/0.9%)							
	Myself (227/1.8%)	Me (12/5.1%)	House (441/0.7%)	Find (11/0.9%)							
	I've	I've	Hate								

	(119/0.9%)	(7/3.0%)	Day (438/0.7%)	(10/0.8%)								
	Good (171/11.76%)	Good (17/32.07%)	Life (152/2.2%)	White (8/3.0%)								
	Hope (103/7.08%)	Enjoy (3/5.66%)	Time (76/1.1%)	Jews (5/1.9%)								
Positive Emotion (1454 Lone Attackers/ 53 Non-Attackers)	Love (73/5.02%)	Fun (3/5.66%)	Sex (66/1.0%)	People (4/1.5%)								
	Fun (72/4.95%)	Inspirational, Inspired,	People (60/0.9%)	State (3/1.1%)	Attacker/ Non- Attacker	4.08/ 5.53	8.76/ 2.64	1.89/ 1.08	0.22/ 0.27	0.15/ 0.24	0.33/ 0.00	
	Happy (68/4.68%)	Hope, Celebrated, Proud, Appreciation (2/3.77%)	Felt (59/0.9%)	Algiers, Solutions, Goyim, Propaganda, Paid, Ground (3/1.1%)								
	Lonely (52/14.0%));,);, Grievances,	Life (52/2.9%)	White (2/3.1%)								
	Cried (36/9.7%)	Morose, Discourage,	Felt (28/1.6%)	Context (2/3.1%)								
Sadness (372 Lone Attackers/ 12 Non- Attackers)	Loneliness (33/8.9%)	Despondency, Depression,	Day (19/1.1%)	Nationalism (2/3.1%)	Attacker/ Non- Attacker	2.42/ 6.61	10.8/ 3.08	0.85/ 1.16	1.70/ 1.04	0.25/ 0.00	0.17/ 0.00	
	Sad (25/6.7%)	Sadly, Cry, Repentance,	Room (16/0.9%)	Left (2/3.1%)								
	Despair (23/6.2%)	Saddening (1/8.33%)	Crying (15/0.8%)	Air, Factory, Time (2/3.1%)								

Anxiety (313 Lone Attackers/ 19 Non-Attackers)	Fear (51/16.29%)	Fear (7/36.9%)	Felt (28/2.0%)	Violence (4/3.6%)							
	Scared (25/7.98%)	Horror (2/10.5%)	Life (21/1.5%)	⚡ (3/2.7%)							
	Worry (19/6.07%)	Afraid (2/10.5%)	School (15/1.1%)	Men (3/2.7%)							
	Nervous (14/4.47%)	Overwhelming (2/10.5%)	Girls, Fear (15/1.1%)	Die,	Attacker/	4.01/	10.35/	0.71/	0.30/	1.30/	0.11/
	Anxiety (14/4.47%)	Scary, Worry, Horrific (1/5.3%)		Excellence, Discipline, White, Context, Opponents, Elite, Inferior, Right, People, Inflict (2/1.8%)	Non-Attacker	4.57	2.48	0.66	0.00	0.00	0.00
Friend (553 Lone Attackers/ 8 Non-Attackers)	Friends (227/40.5%)	Friends (3/37.5%)	Beautiful (33/1.3%)	Death (2/4%)							
	Friend (90/16.0%)	Squad, Squads,	Friends (32/1.3%)	Context (2/4%)							
	Girlfriend (84/15.0%)	Friendlier, Mate,	Life (31/1.3%)	War (2/4%)	Attacker/	3.24/	8.17/	0.93/	0.11/	0.06/	0.97/
	Friendship (29/5.2%)	Friendly (1/12.5%)	House (28/1.1%)	Right (2/4%)	Non-Attacker	6.87	0.96	0.00	0.00	0.78	0.00
	Girlfriends (19/3.4%)		James (27/1.1%)	All Other Terms (1/2%)							

Note: The columns “Five most frequent words – Dictionary” columns display the most common words *within* the corresponding dictionary (e.g. lone attacker’s most commonly used words from the agency dictionary are you, will, your, do, and made). The “Five most frequent words – Context” columns show the words occurring most frequently within a 16-word span of instances of a given dictionary. The contextual span is 16 words long because this is the average sentence length of all sources. The “% of other dictionaries in context” columns show how much of this extracted context consists of the other five dictionaries, briefly summarizing intergroup differences in the dictionaries’ relationships. Readers may note that non-attackers tended to use more ideologically charged and aggressive language in the context of these dictionaries, and also that, despite a few exceptions, non-attackers had weaker relationships between constructs as indicated by the “% of other dictionaries in context” column.

After calculating descriptives, I conducted in depth cooccurrence analysis on the six significant variables. Word cooccurrence can be analyzed based on segment or distance (Evert, 2005). I chose to analyze word cooccurrence based on segments, each corresponding to a sentence in the sample. I used the Quanteda package for R open-source software to divide each sample into sentences (Benoit et al., 2018; R Core Team, 2021), then created a binary sentence-term matrix in which each word (including dummy variables) was assigned a value of 1 (present) or zero (absent) in each sentence.

I first calculated the G^2 statistic to test significance of association (Evert, 2005), followed by degree of association statistics where G^2 was significant. These were Mutual Information (MI; Church & Hanks, 1990; Öksüz et al., 2021), the Dice Similarity Coefficient (DSC; Dunning, 1993; Janson & Vegelius, 1981), and the logarithmic Odds Ratio (OR; Bland, 2000; Evert, 2005; Szumilas, 2010; Tenny & Hoffman, 2024). Because this stage of analysis is exploratory, I did not adjust alpha levels or account for familywise error (O’Keefe, 2003, 2007; Rubin, 2021). These results are displayed in Table 10.

Table 10

Degree of Association Measure Scores for Significantly Related Variable Pairs

	<i>Association Measure</i>	Attacker Sample					
		Agency	Friend	Positive Emotion	Sadness	Anxiety	I
Agency	G^2	N/A	9.535**	1.656	23.105**	0.010	35.577**
	<i>MI</i>		-0.17		-0.36		0.06
	<i>DSC</i>		0.06		0.03		0.46
	<i>OR</i>		-0.29		-0.58		-0.22
Friend	G^2		N/A	13.154**	0.614	2.267	113.736**
	<i>MI</i>			0.41			0.35
	<i>DSC</i>			0.09			0.11
	<i>OR</i>			0.50			1.08
Positive Emotion	G^2			N/A	21.125**	0.017	188.511**
	<i>MI</i>				0.62		0.29
	<i>DSC</i>				0.08		0.23
	<i>OR</i>				0.74		0.89
Sadness	G^2				N/A	2.689	86.106**

	<i>MI</i>						0.38
	<i>DSC</i>						0.07
	<i>OR</i>						1.20
<hr/>							
	<i>G²</i>				N/A		86.700**
Anxiety	<i>MI</i>						0.39
	<i>DSC</i>						0.07
	<i>OR</i>						1.26
Non-Attacker Sample							
Positive							
		Agency	Friend	Emotion	Sadness	Anxiety	I
Agency	<i>G²</i>	N/A	1.022	3.190	4.131	2.646	2.302
	<i>MI</i>						
	<i>DSC</i>						
	<i>OR</i>						
<hr/>							
Friend	<i>G²</i>		N/A	0.545	N/A	1.968	0.156
	<i>MI</i>						
	<i>DSC</i>						
<hr/>							
Positive Emotion	<i>G²</i>			N/A	0.408	0.712	0.279
	<i>MI</i>						
	<i>DSC</i>						
	<i>OR</i>						
<hr/>							
Sadness	<i>G²</i>				N/A	N/A	0.293
	<i>MI</i>						
	<i>DSC</i>						
<hr/>							
Anxiety	<i>G²</i>					N/A	0.923
	<i>MI</i>						
	<i>DSC</i>						
<hr/>							
	<i>OR</i>						

Note: G^2 values above the critical χ^2 value 5.024 ($df = 1, \alpha = .05$) indicate a significant relationship. All G^2 p-values are $< .01$. Mutual Information (MI) values lower than $|3|$ can be disregarded (Church & Hanks, 1990b). Dice Similarity Coefficients (DSCs) express a straightforward probability of one code occurring given the presence of the other (Gablasova et

al., 2017). Odds Ratios (ORs) greater than one indicate a positive relationship between target words, those at or near one indicate no relationship, and those below one indicate a negative relationship (Bland, 2000; Szumilas, 2010).

In the Targeted Violence Manifestos, analysis showed significant relationships between agency and friendship language ($G^2 = 9.534, p = .002$); agency and sadness language ($G^2 = 23.105, p < .001$); friendship and positive emotion language ($G^2 = 13.154, p < .001$); sadness and positive emotion language ($G^2 = 21.125, p < .001$); and 'I' language and all other dictionaries, including agency ($G^2 = 35.578, p < .001$), friendship ($G^2 = 113.736, p < .001$), positive emotion ($G^2 = 188.512, p < .001$), sadness ($G^2 = 86.106, p < .001$), and anxiety ($G^2 = 86.700, p < .001$). In the non-attacker writings, the same analysis showed no significant cooccurrence relationships.

This sample's MI statistics range from -0.16 to 0.61 and are not therefore considered evidence of significant relationships. Considering the tendency of MI statistics to overestimate relationships between infrequently occurring words (Gablasova et al., 2017; Öksüz et al., 2021), this is better interpreted as a shortcoming of the MI statistic than a contradictory result. The DSCs of significantly associated pairs range from 0.03 to 0.458, and significant OR values were spread between -0.58 and 1.26. These two tests found that lone attackers use of 'I' language and friendship language ($OR = 1.08$), sadness ($OR = 1.20$), and anxiety language ($OR = 1.26$) were very slightly positively related, and that these dictionary pairs had around 10 ($DSC = 0.110$), seven ($DSC = 0.07$), and seven percent ($DSC = 0.07$) probabilities of cooccurring respectively. However, agency was negatively related to friendship language ($DSC = 0.06, OR = -0.29$), sadness language ($DSC = 0.03, OR = -0.58$), 'I' language ($DSC = 0.46, OR = -0.22$), and positive emotion language ($DSC = 0.09, OR = 0.50$). Sadness and positive emotion language ($DSC = 0.08, OR = 0.74$), and 'I' language and positive emotion language ($DSC = 0.23, OR = 0.89$) were also negatively related (Church & Hanks, 1990b; Szumilas, 2010).

4. Discussion

These results support the synthesis of the research problem – that language users with distinct psychological traits can be distinguished by examining automatic linguistic patterns even when the explicit meaning of these groups writings is similar (Assilaméhou & Testé, 2013; Dragojevic et al., 2017; Kaati et al., 2016; Smith, 2004). Lone attackers use significantly more first-person singular pronouns and more language related to agency, sadness, anxiety, positive emotions, and friendship than non-attacker extremist writers threatening violence online.

Exploratory analyses also revealed 24 out of 121 potentially significant constructs (Table 8), including: you, mental, food, memory, female, want, polite, lack, substances, and assent. Except for assent, all these dictionaries were more frequently used by lone attackers. The relationships between significant LIWC dictionaries also differed across samples, as indicated by the log-likelihood significance of association test (G^2). In the writings of lone attackers, both agency and positive emotion were negatively related to friendship, sadness, and 'I' language, while 'I' language was positively related to anxiety, sadness, and friendship. In contrast, there were no significant relationships between constructs in the writings of non-attacker extremists.

4.1 Intergroup Linguistic Frequency Differences

Overall, comparative word counts not only indicate that lone attackers and non-attacker extremists occupy distinct social realities, but also confirm that these different realities can be detected by analyzing automatic linguistic patterns (Assilaméhou & Testé, 2013; Dragojevic et al., 2017; Kaati et al., 2016; Smith, 2004). Although several DVs used in confirmatory hypotheses differed, the only one with a statistically significant group difference in the same direction as prior research (Shrestha et al., 2020a; C. H. Smith, 2016) was first-person singular pronouns or 'I' language. The only other supported confirmatory hypothesis was that lone attackers would view their own agency differently than non-attackers. This is the first empirical test of this hypothesis, but lone attacker's emphasis on agency supports the theory that extremist violence is a maladaptive attempt to re-establish a feeling of control in one's life (Hoffman et al., 2020; Jasko et al., 2017; Knight et al., 2017; McGregor et al., 2013; Webber et al., 2018).

First, only two dictionaries associated with cosmic war (sadness and anxiety language), differed between groups. Notably, neither negative emotion or anger language differed between samples, despite both being strongly associated with lone attackers in past research (Kaati et al., 2016; Shrestha et al., 2020b; Shrestha et al., 2020a). Overall, this is weak or absent support of cosmic war as a linguistic difference between lone attackers and non-attackers. Likewise, variables associated with psychological distance and cognitive inflexibility were not significantly different between groups. In the case of cognitive inflexibility, this may be less surprising given the ambiguity of prior research, which has associated lone attackers with both higher (Kaati et al., 2016) and lower (Baele, 2017) use of language associated with cognitive inflexibility than other populations (See 2.4.2 *Cognitive Inflexibility*).

Lone attackers also used both positive emotion and friendship language more than non-attackers, contradicting prior findings that lone attackers use both less than non-extremists (Baele, 2017; Kaati et al., 2016). Prior linguistic research suggests that LIWC dictionaries are domain-specific - that language representing the same psychological construct manifests differently depending on its user and context of use (Johnson-Grey et al., 2020). This may explain the difference between these findings and earlier work as, with one exception (Shrestha et al., 2020b), the dictionaries included in LIWC do not originate from studies of extremist language (Baele, 2017; Duong, 2020; Kaati et al., 2016; Pennebaker & Chung, 2008; Shrestha et al., 2020b; C. H. Smith, 2016). These discrepancies suggest that non-extremists are using language in a qualitatively different way than non-attacker extremists. This is an important and practical finding because it demonstrates the urgency of developing more sensitive and specialized measures of intergroup linguistic difference.

I also found many group differences during exploratory analyses. Twenty-four out of 121 exploratory variables differed significantly. The most strongly associated exploratory variables were you, mental, food, memory, female, want, polite, lack, substances, and assent. It is unclear what these and the rest of the significant exploratory variables have in common and what underlying psychological difference they are reflecting. However, it has clear implications that linguistic differences between lone attackers and non-extremists are not necessarily useful for making the more vital and difficult distinction between lone attacker and non-attacker extremists. These exploratory variables are potential starting points for the development of future LIWC dictionaries that are appropriate to this more specialized comparison.

4.2 Relationships Between Dictionaries

Exploratory positional word cooccurrence analysis helped answer research question 1B, “How do lone attackers and non-attackers differ in how frequently these types of language co-occur?”. I used multiple association measures to better understand the relationships between LIWC dictionaries and their corresponding constructs. There were no significant relationships between constructs in non-attacker communications, while there were many in lone attacker writing (See Table 10). Agency was negatively related to both friendship ($DSC = 0.063$, $OR = -0.291$) and sadness language ($DSC = 0.034$, $OR = -0.582$). The same pattern applied to positive emotion, which related negatively with friendship ($DSC = 0.087$, $OR = 0.496$) and slightly negatively with sadness language ($DSC = 0.076$, $OR = 0.742$).

The only variable with significant relationships with all others analysed was ‘I’ language within the lone attacker sample. These relationships were both positive and negative. Lone attacker’s ‘I’ language was not likely to cooccur with agency ($OR = -0.2207$) or positive emotion ($OR = 0.885$), but was likely to cooccur with anxiety ($OR = 1.2599$), sadness ($OR = 1.1950$), and friendship language ($OR = 1.0751$). These statistics suggest that lone attackers tend to talk negatively about themselves, perhaps due to internal struggles with their own self-concepts. This impression is reinforced by statements like the following:

“Matt ----- will go on to live a life of pleasure. Girls will throw themselves at him. And I will go on to be rejected and humiliated by girls. At that moment in time, we were just playing together as children, oblivious to the fact that my future will be dark and his will be bright. Life is such a cruel joke.” (Rodger, 2014a, p. 25)

“In front of those endless crosses, in front of those dead soldiers lost in forgotten wars, my despair turned to shame, my shame to guilt, my guilt to anger and my anger to rage.” (Tarrant, 2019, p. 9).

Lone attacker’s portrayal of their relationships with themselves may also be a deliberate choice. Lone attackers write more autobiographically than non-attackers, as evidenced by their higher use of agency and ‘I’ language – both hallmarks of autobiographical writing (Pietraszkiewicz et al., 2019) – and the obvious content of their manifestos. Autobiography is often understood as an attempt by authors to pre-emptively write their own mythology (Adeniyi, 2022; Kleinau, 2022) and lone attackers are radicalized in online settings that worship violent extremists as ‘saints’ (Am & Weimann, 2020; Pantucci, 2011; The Soufan Centre, 2019; Ware, 2020). Given that language always fulfills multiple functions, including its agentic function when it is deliberately used to accomplish specific social goals (V. Chirkov, personal communication, March 27, 2023; Gee, 2011), lone attackers are likely both communicating genuine shame, guilt, and self-pity while simultaneously using language agentially to build their own mythology by portraying themselves as tortured heroes.

Based on my reading of the texts during screening, the motive to self-mythologize is consistent with lone attacker’s autobiographical writing style, their public comments⁹, and their

⁹ For example, Anders Breivik famously referred to his murder of 77 children as his ‘book launch’ (Seierstad, 2016).

immersion in online ‘cultures of martyrdom’ (Am & Weimann, 2020). Lone attackers play to both on- and offline audiences by expressing a sort of ‘joy of martyrdom’, which is absent in non-attacker communications. For example, Brenton Tarrant (2019) writes that “in the end the struggle is a beauty in itself, and the victory will be all the sweeter because of it” (p. 73) and ends his manifesto with the line “Goodbye, god bless you all and I will see you in Valhalla” (p. 73). Elliot Rodger is even more overt, laughing while he tells his camera “I take great pleasure in slaughtering all of you” (2014b, 2:55).

Self-mythologizing language is used much less by non-attackers, who have no reason to expect canonization into sainthood and express relatively pessimistic expectations of their own personal futures. Statements like “The Jews had won. We have been losing ground ever since the White Flight that started over desegregation” (Steven L. Akins, 2012) or “We are being destroyed. Civilization is on the way out” (NegrosRus, 2023) are typical. These comments echo both the opinions of community members with status and established extremist talking points. This is especially true of complaints about target outgroups, which research has found function to strengthen one’s identity as part of the ingroup (van Dijk, 1992). Research has long understood that people join extremist groups in part to meet needs for social belonging (Baumeister & Leary, 1995; Doosje et al., 2016), and that their rhetoric continues to meet these needs once they join. For instance, white nationalists use social media largely to form and strengthen collective identities (Hawkins, 2021), using the threat of ‘them’ to reinforce their belonging in ‘us’ (Rousseau et al., 2021). Non-attacker’s performative conformity confirms the importance of social belonging and illuminates how non-attacker extremist language functions agentially as well as constructively; that is to create and maintain shared understandings of reality (Buhler, 2011; Grace, 1987). Non-attacker language works constructively to maintain their extremist ingroup’s social reality and agentially to assert their belonging in that community to other members.

The need for belonging may also be why non-attackers use more aggressive, ideologically charged language in the context of the dictionaries listed above (see Table 9). The descriptive statistics and frequency counts show that, for attackers, language in all significantly differing dictionaries is embedded in relatively banal language, for example most frequently using the words people, time, life, day, and nothing in the context of agency. Non-attackers embedded the same language in more ideological charged, even aggressive vocabulary, in the case of agency

including white, people, jews, things, nothing, and war. This is surprising given both the violence committed by lone attackers and the prediction that they would mention agency more in the context of violence than non-attackers.

Another interesting finding is that non-attackers showed no significant relationships between constructs. This is not due to sample size, as the input matrices for cooccurrence were broken down into sentences, and even the much shorter non-attacker sample had over 12 000 sentences. The lack of relationships between concepts instead likely indicates a less consistent topic, writing style, or even purpose for writing. In other words, LIWC dictionaries are less connected in non-attacker language because the psychological constructs they capture are less connected in their thinking. This makes sense considering that lone attackers have a specific future event which they are focused on and motivated to explain, while non-attackers do not. I also found while reading both writings that lone attackers were much more deliberate than non-attackers in using language agentically to control the aftermath of their violence, both in the way that people understand them (Evans, 2019a) and by inspiring further violence (Evans, 2019b; Kriner, 2022; Kupper et al., 2022). For instance, Patrick Crusius asserts near the start of his manifesto that “This attack is a response to the Hispanic invasion of Texas” (Crusius, 2019, p. 1) and ends the manifesto with the proclamation “I am honored to head the fight to reclaim my country from destruction” (p. 4), a clear attempt to inspire just such a fight. This focus was not reflective of the non-attacker sample, perhaps because writing primarily to cultivate social belonging rewards conformity, requiring language to shape itself to the context of given thread, forum, or online extremist community to do so.

Overall, these linguistic differences suggest that the writings of lone attackers and non-attackers serve different psychological functions, even while both groups explicitly aim to radicalize others and justify violence. They imply that lone attackers are motivated by a drive to control one’s own mythology, while non-attackers are mostly seeking belonging online. Given the overwhelming amount of hate speech online (Hietanen & Eddebo, 2022; Paasch-Colberg et al., 2021), if these possible differences in motive are to have any use as linguistic markers of violence, they must be operationalized in a way that is compatible with automated threat detection. This discussion has identified promising candidates for this operationalization, including heightened use of language associated with agency, friendship, ‘I’ language, positive emotion, sadness, and anxiety, as well as associations between ‘I’ language and these dictionaries

summarized above. As with all word count analyses, more examination of the context in which lone attackers use the above linguistic constructs is needed to understand the underlying psychological realities at play (Akrami et al., 2018; Boyd & Schwartz, 2021; Shrestha et al., 2020b).

4.3 Limitations

4.3.1 Sample Size

Although I gathered a more than adequate sample in terms of word count, each source analyzed by LIWC in stage one yields a single data point for each DV, regardless of length. To deal with this, I considered ‘chunking’ the data, a LIWC function which splits input text into segments of a researcher-determined length (Boyd et al., 2022). However, the much higher word count of the lone attacker sample, despite its smaller n , would have created an even greater inequality of sample size in the opposite direction and, given the much longer outliers in each sample, outsized influence over the results. Small samples are a common challenge of researching lone attacker manifestos (Meloy & Gill, 2016; Ware, 2020). The statistical limitations of small samples are a major reason why I segmented data into sentences in stage 2 of the analysis. As noted, even the much smaller non-attacker sample had over 12 000 sentences, significantly reducing the concerns associated with small samples.

4.3.2 Inclusion Criteria

This thesis’ strict inclusion criteria also contributed to the small sample sizes. Despite the care taken in creating these criteria, applying them in practice was considerably more time and resource-intensive than in theory. For example, Christopher Harper-Mercer gave a physical copy of his manifesto to a bystander during his shooting on a college campus (Sidner et al., 2015), violating the first criterion’s requirement that manifestos be published, “as a stand-alone *online* video or text *posting*”. Reading Harper-Mercer’s manifesto makes it clear that he wrote the manifesto with the expectation that his writing would be circulated widely online. Although this contradicted my assumption that all manifestos would be distributed online, I chose to include Harper-Mercer in the sample for these reasons. Future research could capture similar samples without this dilemma by removing the unnecessary online requirement from the above criteria, perhaps replacing it with language capturing the expectation of mass distribution.

Another challenging requirement was that communications must explicitly ‘justify or frame as appropriate or necessary violence against an identifiable outgroup or its members’.

Many extremists deny that they are advocating for violence even while doing so, for example by defending Hitler’s regime with claims that the holocaust is a hoax. If an extremist writer truly does not believe that this or other groups are guilty of violence, then statements like “I wish Adolf [Hitler] would have won and American leaders would have joined him” (Irishwaffen, 2022) are not *in their own minds* calls for violence. However, it is well known that extremists almost invariably frame their aggression as a defensive last resort (Breivik, 2011; Crusius, 2019; Tarrant, 2019; Ware, 2020). Because this study is a comparison of explicit calls to violence, I chose to apply this requirement relatively strictly, excluding writings which cite violent groups while denying their aggressive and violent nature.

Finally, the first criterion’s requirement that communications be “*stand-alone* online video or text postings” was also somewhat ambiguous in practice. It was intended to exclude writings that were replies in a conversation between specific people. However, many of the manifestos by lone attackers (e.g. Balliet, 2019; Crusius, 2019; Tarrant, 2019) were posted to existing threads on extremist forums. I chose to evaluate whether sources were “stand-alone” on a case-by-case basis, excluding them if they referenced another user by name or a point made in an earlier post on the same thread.

4.3.3 Ideological Concentration

Although I planned this thesis as an examination of violent rhetoric across different ideologies, white supremacist sources are the clear majority of writings. Despite spending significant time screening both Incel and Islamic online forums, I did not find any content meeting the criteria for a non-attacker extremist communication. In the case of TurnToIslam.org and linked online Muslim communities, content never “justified or framed as appropriate violence against an identifiable outgroup” and was comparatively mild. Although Incel writing is certainly extreme, I was unable to find any sources calling for violence against an *outgroup* which was 110 words or longer.

Overall, the seeming overrepresentation of far-right ideologies reflects current trends in the ‘Western World’ (ADL Centre on Extremism, 2022). With the exception of the 9/11 terrorist attacks, 75% of ideologically motivated violence in the U.S. this century has been perpetrated by the far right (ADL Centre on Extremism, 2022), including 100% of incidents in 2022 and 2023 (Contreras, 2024; Saric, 2023). Left-wing, fundamentalist Islamic, and other political movements are, of course, not immune to violence (Laqueur, 2004; Neumann, 2013; Peters, 2008), and

violence in these movements is worthy of study. These samples' rightward skew may be due to the search only being conducted in English, and thus finding sources more concentrated from English-speaking parts of the world. However, both the wider literature (ADL Centre on Extremism, 2022; Contreras, 2024; Saric, 2023) and the makeup of this sample still demonstrate that not all movements are equally violent, and our limited threat detection and prevention resources should be directed where they are most necessary.

These samples were also not ideologically homogenous. Although a large majority of lone attacker sources were also white supremacist, the inclusion of an Islamic Extremist, an Anti-Police, and two Incel writings introduces a potential difference between samples. Future research could examine this by comparing lone attacker and non-attacker extremist writings across ideology, or by re-doing a comparison like this one with only white supremacists included. I did not remove ideological outliers from this study because of the already limited sample size.

4.3.4 Lone Attacker Source Search

My method for finding lone attacker manifestos relied on the considerable news coverage these attackers generate. Although news coverage of mass violence is nearly guaranteed (Ashwal, 2021), media outlets may focus more on certain regions, ideologies, or certain types of attackers or targets depending on political leanings. Further, there is slight chance that writings may be misreported as manifestos. To minimize this possibility, I verified targeted violence manifestos with the Repository of Extremist Aligned Documents (READ; "About," 2024) a database of extremist materials curated by the International Centre for the Study of Radicalisation at King's College London ("About," 2024).

4.3.5 Word Counts

Although I gathered more specific comparison groups than prior research, this work is still largely an analysis of word frequency, and is subject to many of the same critiques as word count analysis more broadly (Carley, 1990). Meaning remains contextual (Boyd & Schwartz, 2021), and the frequently used extremist tools of irony, sarcasm, and humor (Askanius & Keller, 2021; Bogerts & Fielitz, 2019; Davey et al., 2020; Fielitz & Thurston, 2019; Hawkins, 2021; Palmer, 2019) remain difficult to quantify. I supplemented stage one's word count analysis with a range of exploratory association measures in stage two of the analysis. Future research can better address this limitation, perhaps by examining relationships between each dictionary and extremist references to in- and outgroups to better understand contextual use, extracting text surrounding

instances of each dictionary for manual qualitative analysis (Ryan & Bernard, 2003), or applying Principal Component Analysis (PCA) or other methods of dimension reduction to larger samples of extremist writing to understand how linguistic constructs cluster together and what this implies for their psychological meaning (Hair et al., 1998; Jolliffe & Cadima, 2016; MacCallum et al., 2001).

4.4 Conclusion

This thesis presents evidence that psychological differences between lone attackers and non-attacker extremists can be detected by quantitatively examining the linguistic differences between their writings. These results advance online threat detection by identifying evidence-informed starting points to develop such tools, namely the LIWC-22 dictionaries for agency, friendship, sadness, anxiety, and 'I' language. Exploratory analysis also revealed promising LIWC dictionaries to generate useful research questions and hypotheses. This includes both variables identified in the first analysis like you, mental, food, memory, and more, and relationships between variables identified in the second analysis. Importantly, the differences between the results of this study and prior research demonstrate that linguistic differences between lone attackers and the general population are not useful for distinguishing between lone attackers and non-attacker extremists. To be effective, online threat detection tools must be tailored as specifically as possible to the groups to which they are being applied. By examining and refining these dictionaries, as well as examining the relationships between them, we can improve our capacity to identify and stop lone attacker extremist violence before it happens. In the terms of this thesis' starting metaphor (Allport, 1954), these findings will help us better predict when barking will lead to biting.

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Appendices

Appendix A: Past Word Count Analyses of Violent Extremist Communications

LIWC Dictionary	Significant Findings	Sample(s)	Author (Year)
3rd Person Plural Pronouns	Used <i>more</i> in:	Lone attacker manifestos than various baseline measures of everyday language	Kaati et al., (2016)
		Statements and interviews by two Al-Qaeda speakers (Bin Laden and Al-Zawahiri) than documents from a range of terrorist groups	Pennebaker & Chung (2008)
		Writings of lone actor terrorists than speeches of nonviolent activists (Specifically Mahatma Gandhi, Martin Luther King Jr., and Nelson Mandela)	Baele (2017)
		Comments of “extreme adopters” – who use forum-specific jargon significantly more than others – than those of other users of a Swedish immigration discussion forum	Shrestha et al. (2020a)
1st person singular pronouns	Used <i>more</i> in:	Comments of “extreme adopters” (see above) than those of other users of a Swedish immigration discussion forum	Shrestha et al. (2020a)
		Suicide notes, manifestos, and audio transcripts of mass shooters than those of suicide attackers as a whole	Smith (2016)

		Suicide notes, manifestos, and audio transcripts of American suicide attackers than those from other places	Smith (2016)
1st Person	Used <i>less</i>	Comments of “extreme adopters” (see above) than those of other users of a Swedish immigration discussion forum	Shrestha et al. (2020a)
Plural	in:		
Pronouns			
Long Words (>6 letters)	Used <i>more</i> in:	Lone attacker manifestos than various baseline measures of everyday language	Kaati et al., (2016)
		Statements and interviews by two Al-Qaeda speakers (Bin Laden and Al-Zawahiri) than documents from a range of terrorist groups	Pennebaker & Chung (2008)
		Writings of both lone attackers and nonviolent activists than baseline language samples	Baele (2017)
Emotion Words (Negative)	Used <i>more</i> in:	Lone attacker manifestos than various baseline measures of everyday language	Kaati et al., (2016)
		Statements and interviews by two Al-Qaeda speakers (Bin Laden and Al-Zawahiri) than documents from a range of terrorist groups	Pennebaker & Chung (2008)
		Suicide notes, manifestos, and audio transcripts of American suicide attackers than those from other places	Smith (2016)

		Writings of lone actor terrorists than speeches of nonviolent activists	Baele (2017)
Emotion Words (Positive)	Used <i>more</i> in:	Statements and interviews by two Al-Qaeda speakers (Bin Laden and Al-Zawahiri) than documents from a range of terrorist groups	Pennebaker & Chung (2008)
	Used <i>less</i> in:	Comments of “extreme adopters” (see above) than those of other users of a Swedish immigration discussion forum	Shrestha et al. (2020a)
		Writings of lone actor terrorists than speeches of nonviolent activists	Baele (2017)
Emotion Words (Overall)	Used <i>more</i> in:	Statements and interviews by two Al-Qaeda speakers (Bin Laden and Al-Zawahiri) than documents from a range of terrorist groups	Pennebaker & Chung (2008)
Anger words	Used <i>more</i> in:	Lone attacker manifestos than various baselines of everyday language ^a	Shrestha et al. (2020b)
		Comments of “extreme adopters” (see above) than those of other users of a Swedish immigration discussion forum	Shrestha et al. (2020a)
		Writings of lone actor terrorists than speeches of nonviolent activists	Baele (2017)
Certainty Words	Used <i>more</i> in:	Lone attacker manifestos than various baseline measures of everyday language	Kaati et al., (2016)
	Used <i>less</i> in:	Writings of lone actor terrorists than speeches of nonviolent activists	Baele (2017)
Power Words	Used <i>more</i> in:	Lone attacker manifestos than various baseline measures of everyday language	Kaati et al., (2016)

		Comments of “extreme adopters” (see above) than those of other users of a Swedish immigration discussion forum	Shrestha et al. (2020a)
Friendship words	Used <i>less</i> in:	Lone attacker manifestos than various baseline measures of everyday language	Kaati et al., (2016)
Social Processes Words	Used <i>more</i> in:	Statements and interviews by two Al-Qaeda speakers (Bin Laden and Al-Zawahiri) than documents from a range of terrorist groups	Pennebaker & Chung (2008)
	Used <i>less</i> in:	Suicide notes, manifestos, and audio transcripts of American suicide attackers than those from other places	Smith (2016)
		Statements and interviews by two Al-Qaeda speakers (Bin Laden and Al-Zawahiri) than documents from a range of terrorist groups [Specifically “human words” (E.g. child, people, selves)]	Pennebaker & Chung (2008)
Past Focus Words	Used <i>more</i> in:	Mass shooter communications in which the author expresses suicidal desires than those where the author does not	Duong (2020)
	Used <i>less</i> in:	Statements and interviews by two Al-Qaeda speakers (Bin Laden and Al-Zawahiri) than documents from a range of terrorist groups [Specifically past tense verbs and language related to time overall]	Pennebaker & Chung (2008)
Causality Words	Used <i>more</i> in:	Writings of lone actor terrorists than speeches of nonviolent activists	Baele (2017)

Resentment Words	Used <i>more</i> in:	Writings of both lone attackers and nonviolent activists than baseline language samples	Baele (2017)
		Lone attacker manifestos than various baselines of everyday language (In this study this was labeled “Grievance” language) ^a	Shrestha et al. (2020b)
Cognitive Processes Words	Used <i>more</i> in:	Writings of both lone attackers and nonviolent activists than baseline language samples	Baele (2017)
Inclusion Words	Used <i>more</i> in:	Comments of “extreme adopters” (see above) than those of other users of a Swedish immigration discussion forum	Shrestha et al. (2020a)
Exclusion Words	Used <i>more</i> in:	Lone attacker manifestos than various baselines of everyday language (In this study this was labeled “Othering” language) ^a	Shrestha et al. (2020b)
	Used <i>less</i> in:	Comments of “extreme adopters” (see above) than those of other users of a Swedish immigration discussion forum	Shrestha et al. (2020a)
Statements of Violent Intent	Used <i>more</i> in:	Lone attacker manifestos than various baselines of everyday language ^a	Shrestha et al. (2020b)
Military Terminology	Used <i>more</i> in:	Lone attacker manifestos than various baselines of everyday language ^a	Shrestha et al. (2020b)
References to Prior Extremists/	Used <i>more</i> in:	Lone attacker manifestos than various baselines of everyday language ^a	Shrestha et al. (2020b)

Attackers

^a Shrestha, Akrami, et al., (2020) created these LIWC dictionaries. They may therefore not correspond perfectly with similar works using the dictionaries included in LIWC.

Appendix B: Details of Source Search 1 (ProQuest for Lone Attacker Authors)

Databases

ProQuest Databases Included in Search

ABI/INFORM Collection	ProQuest Recent Newspapers: Barron's
Canadian Business & Current Affairs Database	ProQuest Recent Newspapers: Calgary Herald
Canadian Major Dailies	ProQuest Recent Newspapers: Edmonton Journal
PAIS Index (Includes "Internet material, etc.")	ProQuest Recent Newspapers: Leader-Post
ProQuest Historical Newspapers: The Globe and Mail	ProQuest Recent Newspapers: Montreal Gazette
ProQuest Historical Newspapers: Leader-Post	ProQuest Recent Newspapers: National Post
ProQuest Historical Newspapers: The New York Times	ProQuest Recent Newspapers: Saskatoon Star-Phoenix
ProQuest Historical Newspapers: Saskatoon Star-Phoenix	ProQuest Recent Newspapers: The New York Times
ProQuest Historical Newspapers: Toronto Star	ProQuest Recent Newspapers: The Vancouver Sun
ProQuest Historical Newspapers: The Wall Street Journal	ProQuest Recent Newspapers: The Wall Street Journal
ProQuest Historical Newspapers: The Washington Post	

Subject Tags Included in Search

Violence Mass Murders

Murders & Murder

Attempts

Shootings

Terrorism

Extremism

Massacres

Domestic Violence

Rape

Hate Crimes

Suicide Bombings

Domestic Terrorism

Militancy

Sex Crimes

Gun Violence

Appendix C: Formulae of Association Measures Used

G^2 is calculated with the following formula, where O_{ij} is the observed frequency of cooccurrence, E_{ij} is the expected frequency of cooccurrence under the null hypothesis, and Σ_{ij} is the sum of each input codes occurrences (Evert, 2005):

$$\text{Log-Likelihood } (G^2) = 2 \sum_{ij} O_{ij} \log \frac{O_{ij}}{E_{ij}}$$

The formulae for all degree of association tests are as follows:

Mutual Information:

$$MI = \log \frac{O_{11}}{E_{11}}$$

Dice Similarity Coefficient:

$$DSC = \frac{2 * O_{11}}{(O_{12} + O_{21})}$$

Logarithmic Odds Ratio:

$$OR = \log \frac{(O_{11} * O_{22})}{(O_{12} * O_{21})}$$

For all formulae above, O_{11} is the observed number of segments (in our case sentences) containing instances of both target codes, O_{22} represents the observed number of sentences where neither occurs, and O_{12} and O_{21} each represent the observed occurrences of one code but not the other. E_{11} represents the expected number of segments containing instances of both target codes and is calculated with the following equation.

$$E_{11} = \frac{O_{12} * O_{21}}{(O_{11} + O_{22} + O_{12} + O_{21})}$$

Appendix D: Statistical Trends in log-Transformed Data

LIWC Dictionary	Sample Mean (SD) (All values are %)		Kurtosis Statistic		Skewness z-score		Levene's Test			Number of Outliers	
	Non- Attacker	Lone Attacker	Non- Attacker	Lone Attacker	Non- Attacker	Lone Attacker	<i>p</i>	Used	<i>p</i>	Non- Attacker	Lone Attacker
Agency	4.54 (2.10)	6.13 (2.33)	3.49	-1.06	-3.40	-0.35	0.659	U	0.032*	1	0
I	1.98 (2.53)	3.82 (3.10)	-0.98	-0.49	1.66	0.30	0.270	T	0.006*	0	0
Sadness (emo_sad)	0.10 (0.22)	0.99 (0.12)	3.75	9.36	5.61	3.54	0.086	U	0.003*	0	0
Anxiety (emo_anx)	0.11 (0.19)	0.13 (0.15)	1.02	1.27	3.99	0.56	0.309	U	0.035*	0	0
Friend	0.04 (0.13)	0.10 (0.12)	17.59	2.58	10.13	2.33	0.436	U	<.001*	1	0
Positive Emotion (emo_pos)	0.39 (0.44)	0.66 (0.58)	-0.50	1.00	1.83	1.67	0.957	T	0.034*	0	0
You	0.52 (0.88)	2.30 (2.08)	1.44	-1.44	3.34	0.00	0.014	U	0.001	0	0
Mental	0.03 (0.10)	0.05 (0.05)	9.85	-0.33	8.44	1.09	0.739	U	0.001	2	0
Food	0.10 (0.23)	0.12 (0.14)	3.26	4.48	5.40	2.36	0.221	U	0.002	0	0

Memory	0.04 (0.10)	0.10 (0.14)	12.08	3.84	8.29	3.08	0.146	U	0.003	1	0
Female	0.17 (0.46)	0.47 (0.68)	6.47	2.12	6.95	2.13	0.036	U	0.004	1	0
Want	0.21 (0.35)	0.42 (0.45)	3.95	4.65	4.84	3.21	0.010	U	0.006	1	0
Polite	0.12 (0.24)	0.33 (0.71)	6.38	9.19	6.15	5.08	0.139	U	0.007	1	0
Lack	0.07 (0.13)	0.15 (0.11)	2.65	-0.73	4.79	0.46	0.735	U	0.007	0	0
Substances	0.02 (0.09)	0.02 (0.04)	30.89	8.14	13.98	3.67	0.843	U	0.008	1	0
Assent	0.09 (0.27)	0.06 (0.06)	14.47	0.14	9.40	1.65	0.119	U	0.008	1	0
Nonflu	0.02 (0.06)	0.02 (0.04)	15.32	5.52	10.34	3.85	N/A	U	0.008	2	0
Home	0.07 (0.11)	0.15 (0.20)	1.09	0.11	3.88	3.92	0.481	U	0.011	0	0
Risk	0.24 (0.41)	0.41 (0.26)	1.38	0.80	3.92	-0.49	0.127	U	0.011	0	0
Leisure	0.25 (0.49)	0.32 (0.31)	3.90	-0.27	5.10	3.16	0.104	U	0.012	1	0
Conflict	0.79 (0.92)	1.24 (0.71)	1.79	-0.34	2.71	1.17	0.430	T	0.020	0	0

Family	0.13 (0.27)	0.28 (0.32)	6.57	0.33	6.43	2.05	0.567	U	0.026	1	0
Sexual	0.09 (0.19)	0.19 (0.31)	4.80	3.35	5.92	3.37	0.258	U	0.026	1	0
Auditory	0.15 (0.30)	0.14 (0.13)	2.97	3.52	5.09	2.78	0.031	U	0.026	0	0
Fatigue	0.09 (0.27)	0.02 (0.02)	8.52	4.22	7.93	2.78	0.030	U	0.029	1	0
Netspeak	0.13 (0.22)	0.18 (0.24)	0.49	4.01	3.63	3.42	0.502	U	0.031	0	0
Curiosity	0.15 (0.23)	0.26 (0.20)	0.82	-0.44	3.48	0.41	0.321	U	0.033	0	0
Wellness	0.04 (0.13)	0.02 (0.02)	8.95	-1.37	7.91	0.76	0.047	U	0.044	2	0
Male	0.85 (1.06)	1.42 (1.11)	-0.32	0.14	1.99	0.44	0.718	T	0.050	0	0
Article	8.17 (2.54)	6.66 (1.91)	1.92	0.83	-0.84	-2.54	0.977	T	0.050	0	0
Number	1.30 (1.06)	2.52 (2.32)	-0.46	0.82	-0.55	2.02	0.559	T	0.06	0	0
Ppron (Personal Pronouns)	7.60 (3.75)	9.48 (4.54)	-0.08	0.79	-1.84	-0.86	0.961	T	0.07	0	0
Health	0.30 (0.35)	0.38 (0.54)	-1.30	0.13	0.75	-0.37	0.002	T	0.07	0	0

Shehe	0.58 (1.10)	0.96 (1.08)	1.77	0.06	3.93	1.55	0.798	U	0.076	0	0
Conversation	0.25 (0.47)	0.25 (0.23)	3.05	0.09	4.56	2.43	0.117	U	0.078	0	0
Feeling	0.25 (0.47)	0.22 (0.18)	2.09	0.11	4.28	0.59	0.024	U	0.08	0	0
Culture	4.13 (2.53)	2.87 (1.86)	0.40	0.51	-2.50	-1.62	0.735	T	0.10	0	0
Tone_pos (Positive Tone)	1.95 (1.48)	2.92 (1.37)	0.13	0.44	1.09	1.15	0.455	T	0.11	0	0
Allure	6.05 (2.86)	6.35 (2.03)	1.16	0.76	-1.12	0.40	0.422	T	0.12	0	0
Pronoun	12.33 (4.60)	13.66 (5.26)	-0.45	0.98	-1.21	-1.06	0.839	T	0.13	0	0
Focusfuture	1.38 (1.10)	1.72 (0.86)	-0.06	0.42	0.30	-1.87	0.563	T	0.132	0	0
Differ	4.17 (1.51)	3.26 (1.08)	0.27	0.74	-0.49	-1.67	0.716	T	0.139	0	0
Comma	4.41 (2.41)	5.16 (1.25)	2.30	0.77	-3.13	-0.60	0.019	T	0.14	0	0
BigWords (>6 letters)	19.41 (5.46)	19.07 (5.41)	0.21	1.33	1.06	-0.73	0.511	T	0.144	0	0
Tech	0.19 (0.30)	0.41 (0.68)	-0.58	0.20	2.21	3.96	0.505	U	0.145	0	0

QMark	0.33 (0.62)	0.40 (0.52)	3.33	0.13	4.82	1.96	0.799	U	0.153	1	0
Money	0.36 (0.52)	0.51 (0.46)	0.58	0.29	2.80	1.42	0.245	T	0.16	0	0
Focuspast	2.60 (2.46)	3.19 (2.25)	0.16	0.47	0.62	-0.03	0.241	T	0.157	0	0
Politic	1.60 (1.89)	0.81 (0.99)	-0.18	0.27	1.61	0.95	0.390	T	0.17	0	0
Infrahumanization (primary emotions)	0.08 (0.18)	0.15 (0.21)	2.80	0.02	5.12	3.15	0.868	U	0.17	0	0
Anger	0.50 (0.81)	0.22 (0.20)	1.09	0.04	3.99	0.56	0.021	U	0.172	0	0
Agency & Communion Dictionary	7.64 (2.98)	8.97 (3.16)	1.27	0.86	-2.29	-0.29	0.558	T	0.173	0	0
Social	11.99 (3.84)	13.71 (5.09)	1.77	0.93	-2.37	-0.91	0.376	T	0.19	0	0
Time	3.11 (1.96)	3.32 (1.20)	0.65	0.60	-2.01	0.82	0.119	T	0.203	0	0
Socrefs (Social references)	7.80 (3.37)	8.87 (3.78)	-0.08	0.76	-1.41	-1.36	0.774	T	0.22	0	0

Emo_neg (Negative Emotion)	1.09 (1.48)	0.64 (0.46)	0.06	0.12	1.37	0.45	0.040	T	0.222	0	0
Analytic	55.31 (24.40)	54.23 (22.38)	10.34	1.83	-6.77	-1.32	0.778	U	0.246	1	0
Ethnicity	2.37 (1.98)	1.68 (1.56)	-0.93	0.27	-0.48	-0.54	0.293	T	0.25	0	0
Attention	0.32 (0.54)	0.33 (0.22)	-1.12	0.13	1.01	-0.23	0.017	T	0.29	0	0
Det	15.17 (2.89)	14.90 (1.87)	0.12	1.12	-0.88	-1.68	0.360	T	0.32	0	0
Animalistic Dehumanization	0.24 (0.30)	0.16 (0.12)	-0.57	0.06	2.29	1.03	0.003	T	0.331	0	0
Adverb	5.51 (2.44)	4.54 (0.96)	-0.15	0.71	0.39	0.16	0.093	T	0.35	0	0
Social Behaviour	4.06 (2.06)	4.57 (2.11)	-0.35	0.55	0.84	1.65	0.876	T	0.36	0	0
Swear	0.58 (0.91)	0.55 (0.92)	1.29	0.05	3.59	4.84	0.509	U	0.366	0	0
Cause	1.76 (1.25)	1.58 (0.76)	0.59	0.47	-1.69	-1.01	0.160	T	0.372	0	0
Power	3.42 (2.26)	3.23 (1.39)	-0.44	0.56	0.04	0.15	0.208	T	0.374	0	0
Authentic	37.96 (27.07)	40.25 (24.40)	-0.75	1.51	-1.14	-4.27	0.289	U	0.375	0	0

Period	7.51 (4.76)	6.62 (1.25)	4.74	0.83	3.57	1.21	0.036	U	0.375	1	0
Tone	16.32 (22.87)	16.90 (12.06)	-1.16	1.22	0.39	-0.12	0.013	T	0.38	0	0
Affect	6.44 (3.07)	6.78 (2.34)	-0.20	0.71	0.18	0.87	0.111	T	0.381	0	0
Drives	7.05 (3.48)	6.34 (2.79)	-0.52	0.79	0.24	1.87	0.543	T	0.40	0	0
Perception	8.88 (2.69)	7.96 (2.44)	1.37	0.94	0.28	-2.31	0.882	T	0.40	0	0
Cognition	13.58 (3.20)	12.48 (2.80)	3.65	1.14	-3.32	-1.19	0.265	U	0.42	1	0
Humanization	0.39 (0.36)	0.44 (0.21)	-0.90	0.12	0.84	-0.88	0.015	T	0.437	0	0
Focuspresent	5.56 (2.56)	4.18 (1.42)	2.13	0.77	-2.82	-4.08	0.236	U	0.46	0	0
Infrahumanization (secondary emotions)	0.24 (0.32)	0.29 (0.23)	0.01	0.03	2.68	0.45	0.172	T	0.461	0	0
Cognitive processes	11.79 (3.00)	10.38 (3.00)	2.58	1.10	-2.78	-0.77	0.533	T	0.48	1	0
Achieve	1.46 (1.05)	1.21 (0.43)	0.26	0.40	-0.40	-1.29	0.049	T	0.49	0	0
Religion	1.68 (1.68)	1.26 (1.27)	-1.25	0.20	0.59	1.04	0.058	T	0.49	0	0

Space	6.22 (2.23)	5.68 (1.53)	-0.14	0.80	0.47	-0.58	0.189	T	0.486	0	0
Certitude	0.79 (1.06)	0.71 (0.85)	0.48	0.19	2.46	3.74	0.113	U	0.49	0	0
Words Per Sentence	16.47 (6.02)	15.61 (3.56)	-0.55	1.38	-0.08	-0.19	0.038	T	0.494	0	0
Clout	47.94 (27.86)	53.90 (25.30)	2.65	1.53	-3.67	-1.41	0.403	U	0.499	0	0
Descriptive Action Verbs	6.92 (2.17)	7.3 (1.44)	0.34	0.89	-0.72	0.57	0.157	U	0.509	0	0
Prosocial	0.43 (0.52)	0.88 (1.45)	1.10	0.10	2.61	5.50	0.471	T	0.516	0	1
Work	1.38 (1.38)	1.18 (0.83)	0.08	0.37	0.33	0.21	0.650	T	0.52	0	0
Tone_neg (Negative Tone)	3.92 (2.54)	3.47 (0.99)	-0.06	0.50	-1.68	0.23	0.026	T	0.54	0	0
Negate	1.85 (1.20)	1.65 (0.78)	-0.02	0.37	-1.71	0.00	0.061	T	0.56	0	0
Moral	0.71 (0.96)	0.94 (0.83)	1.48	0.17	2.55	1.44	0.284	T	0.57	0	0
Need	0.72 (0.82)	0.50 (0.34)	0.63	0.14	2.23	-1.26	0.012	T	0.57	0	0
Prep	13.06 (2.66)	13.01 (1.66)	3.74	1.11	-3.91	0.28	0.133	U	0.58	1	0

State Verbs	4.42 (2.20)	4.40 (1.04)	0.26	0.69	-1.33	0.31	0.019	T	0.59	0	0
Allnone	1.72 (1.11)	2.05 (1.37)	0.54	0.34	-2.03	2.42	0.595	T	0.59	0	0
Auxiliary Verbs	9.06 (2.40)	8.15 (2.27)	0.39	0.94	1.84	-0.30	0.559	T	0.60	0	0
Threat	1.60 (1.35)	1.27 (0.60)	-0.24	0.34	0.00	0.17	0.027	T	0.663	0	0
Reward	0.20 (0.36)	0.14 (0.12)	-0.58	0.05	2.39	0.00	<.001	T	0.665	0	0
We	1.65 (1.03)	1.08 (1.64)	-0.83	0.22	1.56	2.47	0.092	T	0.668	0	0
Physical	1.93 (1.48)	1.99 (0.91)	3.26	0.40	0.08	0.98	0.531	T	0.67	0	0
Adjectives	6.38 (2.26)	6.31 (1.52)	-0.02	0.91	-0.42	-2.74	0.567	T	0.67	0	0
All punctuation	21.79 (12.96)	18.54 (4.79)	3.93	1.38	3.31	-0.12	0.186	U	0.681	1	0
Apostrophe	2.11 (1.78)	1.40 (1.07)	-0.88	0.29	-0.23	0.15	0.123	T	0.693	0	0
Exclamation points	0.25 (0.60)	0.17 (0.37)	5.45	0.02	6.13	2.46	0.014	U	0.714	2	0
Conj	6.76 (2.39)	6.48 (1.35)	0.49	0.89	0.31	-0.60	0.273	T	0.72	0	0

Baseline Dic	87.36 (4.21)	87.89 (4.87)	1.67	1.90	-2.59	-1.14	0.403	T	0.72	0	0
Lifestyle	3.75 (2.22)	3.43 (1.49)	1.14	0.60	-2.01	-0.90	0.069	T	0.724	0	0
Visual	1.06 (0.94)	0.85 (0.66)	-0.66	0.25	-0.75	0.50	0.309	T	0.728	0	0
Tentative	2.04 (1.26)	1.64 (0.82)	0.61	0.58	-1.31	-1.30	0.182	T	0.743	0	0
Interpretive Action Verbs	10.58 (2.28)	10.26 (1.25)	-0.10	1.03	-0.89	-2.24	0.028	T	0.755	0	0
Discrepancy	2.12 (1.53)	1.91 (1.28)	0.55	0.45	-0.05	4.20	0.166	U	0.76	0	0
Communion	7.19 (11.30)	4.79 (4.68)	-0.07	0.44	0.19	0.12	0.219	T	0.761	0	0
Emotion	1.54 (1.55)	1.44 (0.99)	0.13	0.19	0.67	1.78	0.542	T	0.78	0	0
Comm	1.29 (1.36)	0.96 (0.45)	-0.35	0.16	0.38	0.64	0.099	T	0.79	0	0
Other Punctuation	7.19 (11.30)	4.79 (4.68)	1.46	1.08	0.70	0.43	0.655	T	0.794	0	0
Verbs	16.25 (4.17)	14.89 (2.86)	0.60	1.13	-0.01	-1.00	0.659	T	0.80	0	0
Insight	2.07 (1.45)	1.77 (0.79)	-0.35	0.40	-1.26	-1.13	0.004	T	0.80	0	0

Acquire	0.64 (0.55)	0.60 (0.31)	-1.23	0.16	-0.28	-3.06	<.001	T	0.818	0	0
Affiliation	2.31 (2.02)	1.99 (1.53)	-0.56	0.32	0.66	1.48	0.050	T	0.88	0	0
LCM_Dic	21.92 (3.78)	21.96 (1.50)	-0.63	1.33	-0.71	-0.94	0.000	T	0.877	0	0
Linguistic	68.12 (5.22)	66.74 (7.37)	1.24	1.77	-1.20	-1.02	0.133	T	0.89	0	0
Death	0.75 (0.84)	0.82 (0.74)	-0.68	0.11	1.07	1.13	0.145	T	0.90	0	0
Fulfill	0.20 (0.35)	0.17 (0.16)	0.32	0.10	3.20	1.83	0.009	T	0.901	0	0
Motion	1.30 (0.88)	1.08 (0.52)	0.83	0.35	1.63	-3.50	0.271	U	0.95	0	0
Quantity	4.02 (1.91)	4.34 (1.09)	0.31	0.74	0.49	1.87	0.114	T	0.97	0	0
Function	54.91 (4.57)	53.96 (7.43)	0.60	1.67	-0.95	-1.04	0.097	T	0.98	0	0
Ipron	4.72 (1.94)	4.18 (1.50)	0.73	0.64	-1.70	-0.05	0.207	T	1.00	0	0
Word Count	316.90 (286.98)	15 534.93 (29 543.35)	12.80	0/82	7.50	0.59	< .001	N/A	N/A	1	0
Illness	0.16 (0.34)	0.04 (0.05)	1.08	3.84	3.71	2.51	0.001	N/A	N/A	0	0

Mechanistic Dehumanization	0.05 (0.09)	0.03 (0.03)	0.36	-0.72	3.67	1.56	0.002	N/A	N/A	0	0
Filler	0 (0)	0.004 (0.01)	N/A	N/A	N/A	N/A	< .001	N/A	N/A	0	1
Emoji	0 (0)	0 (0)	N/A	N/A	N/A	N/A	< .001	N/A	N/A	0	0

Appendix E: Untransformed LIWC Outputs for Significantly Differing Confirmatory Variables

Attacker Sources	I	LIWC Dictionary				
		Positive Emotion	Anxiety	Sadness	Friend	Agency
Anders Breivik “2083: A European Declaration of Independence”	0.76	0.22	0.1	0.05	0.05	6.32
Brenton Tarrant “The Great Replacement”	1.58	0.25	0.11	0.11	0.02	6.3
Christopher Dorner “A Last Resort”	4.12	0.59	0.04	0.09	0.13	8.03
Christopher Harper-Mercer “My Story”	5.85	1.45	0.31	0.06	0.31	5.91
Dylann Roof “Untitled Manifesto”	3.05	0.41	0.08	0.04	0.04	3.78
Elliot Rodger “Elliot Rodger’s Retribution (Video)”	10.41	2.2	0	0.44	0.15	11
Elliot Rodger “My Twisted World: The Story of Elliot Rodger”	9.53	0.97	0.22	0.27	0.37	2.61
John Earnest “An Open Letter”	4.63	0.83	0.33	0.09	0.09	8.19
Juraj Krajcik “A Call to Arms”	1.25	0.39	0.04	0.09	0.13	6.97
Michael Zehaf-Bibeau Untitled Video	0.51	0.51	0.51	0	0	7.61
Patrick Crusius “The Inconvenient Truth”	2.54	0.08	0.04	0.04	0.04	5
Payton Gendron “What You Need to Know”	1.88	0.19	0.04	0.06	0.02	4.43
Stephen Balliet “A Short Pre-Action Report”	1.95	0.24	0.05	0.05	0	4.09
Non-Attacker Sources	I	Positive Emotion	Anxiety	Sadness	Friend	Agency

@A_I_P “Untitled” (Posted to Gab, 2023)	1.6	0	0	0	0	3.74
@NORDIC 1984 “Untitled” (Posted to Gab, 2023)	0.18	0	0	0	0	6.32
@SuperMario70 “Untitled” (Posted to Gab, 2023)	0.6	0	0	0.6	0	4.22
Anger Management Failed “Torture and Justifications” (Posted on Stormfront Blogs, 2011)	3.38	0	0.24	0	0	7.49
Aquilifer “The White Resistance Manual” (Posted on WhiteHonor.Org. Unknown Date)	0.13	0.13	0.03	0.02	0.02	3.78
Daryl Basarab “Untitled” (Posted to VNN, 2015)	5.26	0	0	0	0	2.92
Dothead “The Aryan Hate Complex” (Posted to VNN, 2017)	2.58	0.16	0.08	0	0	7.84
Gabry Ponte “Untitled” (Posted to VNN, 2009)	0	0.3	0.6	0	0	5.36
Hugh “Untitled” (Posted to VNN, 2010)	0.76	0.76	0	0.13	0	8.08
Igor Alexander “Untitled” (Posted to VNN, 2009)	4.62	0	0	0.42	0	7.59
James Dunet “Pick your Targets Wisely” (Posted to VNN, 2012)	1.32	0.22	0	0	0	9.49
James Harting “Inferior Men Fear Excellence” (Reposted to Stormfront Blogs, 2023)	0	0	0.58	0	0	3.76
Jean West “Untitled” (Posted to VNN, 2013)	4.29	0	0	0	0	4.08
John Evans “Untitled” (Posted to VNN, 2015)	2.59	0	0	0	0	5.17

John from Canada “Untitled” (Posted to VNN, 2012)	0.16	0.49	0.33	0	0	4.72
Karl Lueger “Untitled” (Posted to VNN, 2009)	0.24	0.48	0.24	0	0	4.72
Longbaugh “Untitled” (Posted to VNN, 2020)	0	0	0	0	0	3.39
Luftwaffensoldat “Untitled” (Posted to VNN, December 2013)	0	0.15	0.45	0	0	2.08
Luftwaffensoldat “Untitled” (Posted to VNN, November 2013)	0.21	0.21	0.21	0	0.21	3.91
MedVader “Untitled” (Posted to VNN, 2010)	0	0.83	0	0	0	6.67
Mike Parker “Untitled” (Posted to VNN, 2009)	0.72	0.72	0	0	0	1.44
NegrosRus “Untitled” (Posted to Niggermania, 2023)	7.19	1.27	0	0.21	0.21	2.96
Oy Ze Hate “Untitled” (Posted to VNN, 2009)	0.2	0.81	0.2	0	0	9.96
PeterKramer “Untitled” (Posted to VNN, 2009)	0.32	0.32	0	0	0	3.15
proud_WHITE_chik66 “And another nigger hater joins to say hello!!” (Posted to Niggermania, 2023)	7.44	0.41	0.41	0.41	0	2.07
Rounder “Untitled” (Posted to VNN, 2010)	0	0.65	0.65	0	0	5.19
San Dimitri “Untitled” (Posted to VNN, 2013)	6.25	1.56	0	0	0	3.65
Sean Gruber “Untitled” (Second Post to VNN, 2018)	0.65	0.52	0	0	0	4.05
Sean Gruber “Why not both?” (Posted to VNN, 2018)	1.43	0.71	0	0.71	0.71	7.91

SouthHip “The Continuing Saga of Nathan B. Forrest High School” (Posted to Stormfront Blogs, 2013)	0.35	0	0	0	0	0
SouthHip “The Purple Sea” (Posted to Stormfront Blogs, 2009)	2.79	0.35	0	0	0.17	1.92
SouthHip “Where Black Rules White” (Posted to Stormfront Blogs, 2010)	0.84	0.84	0	0	0	3.93
Steven L. Akins “Untitled” (Posted to VNN, 2012)	0	0	0	0	0	1.64
Unknown Author “It’s the Xians Fault” (Posted to Frontfighter.org, 2023)	1.3	0.87	0	0.87	0	6.49
Vindicator06 “Untitled” (Posted to VNN, 2014)	0.81	0.16	0.16	0.24	0.16	5.58
ZiolKoo “Hi Everyone” (Posted to Niggermania, 2023)	8.99	0	0	0	0	7.3