Online Communication of Environmental Causes:

A Mixed Methods Study of Topics, Frames, and Network Structures of Environmental NGO 350's Twitter Coverage of the COP26

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ABSTRACT

As the effects of climate change become increasingly tangible, governmental institutions, private organizations and NGOs, as well as citizens all over the world mobilize in the name of climate change mitigation. One such instance is the United Nations Climate Change Conference, which saw its 26th edition in 2021, in Glasgow (COP26). This conference does not only gather heads of State and powerful decision makers, but also grassroots organizations such as 350. The latter is an online-mediated environmental non-profit with chapters all over the world, which focuses on grassroots mobilization. This thesis seeks an answer to the question of how 350 used persuasive digital marketing to communicate environmental causes on Twitter during the COP26 of 2021. The strategic and epistemological aspects of the online communication of environmental causes are investigated through mixed digital methods of qualitative and quantitative nature. These include automated text analysis, topic modelling, sentiment analysis, network analysis, and frame analysis. The analysis is approached through the lenses of frame theory, persuasion theory, frameworks of social marketing, and insights from previous empirical studies on NGO communications. Findings show that Twitter was mainly used for commentary of current events instead of mobilization, thus complementing rather than replacing offline action. Moreover, a variety of topics covered and frames used were centred on inequality, sustainable investments, net-zero emission policies, and representation of disenfranchised communities, as well as solidarity and support of other environmentalists. Furthermore, 350 extensively tagged activists and small NGOs, reaching audiences all over the world in an indirect yet capillary way. The results highlight the need to update and expand current definitions of social marketing as well as the frameworks used for the analysis of networked organizational communications.

KEYWORDS: *Environment, 350, Communication, Strategy, Twitter*

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1. Introduction: 350's Environmental Advocacy

In 2008, a study revealed that to avoid the most disastrous effects of climate change, global CO2 emissions should have dropped from 385 parts per million (ppm) to 350 ppm (Hansen et al. 2008). That same year, a group of American college students created an environmental NGO (ENGO) in the hope of achieving this ambitious goal, and named it 350, after the 350 ppm of CO2 mentioned in the study. Today, the measurement has not decreased but increased to 418 ppm (Nasa, 2022).

The goal of reaching 350 ppm of CO2 is far from our reach, but NGO 350 is still alive, and it developed into a global organization for environmental advocacy. 350 focuses on online and offline citizen mobilization and it has local chapters all over the world (Hestres, 2015). 350's co-founder Jon Warnow explained in 2015 that the organization's approach is concentrated on bottom-up change: it relies on the mobilization of invested people, who are given the means to enact political action and tackle issues of climate change (Hestres, 2015). In 2014 and 2015, 350 was included in two different articles (Hesters, 2014; 2015). In 2014, 350 was compared to other environmental organizations in order to survey how different kinds of ENGOs communicate and mobilize the public based on the underlying assumptions on which their strategies are designed. In 2015, instead, Hestres examined 350 as a newborn kind of advocacy organization. This kind of organization is mediated by the internet, it uses digital tools to enable offline action, and it is geographically dispersed (Hestres, 2015). According to Hestres, organizations such as 350, widely adopt communication channels like e-mailing, relation management software to easily overview their supporters, blog posts, search engine optimization (SEO), online advertising, and to a great extent, social media (Hestres, 2015). In 2019, 350 was also studied by Evans Comfort and Hester, who focused specifically on the organization's social media communications. They examined 350's Twitter communications on occasion of the 21st edition of the United Nations Climate Conference (COP21). The conference took place in Paris, in 2015, it led to the signature of the Paris Agreement, and it was considered the most important climate conference held until then (Evans Comfort and Hester, 2019; UNFCCC, n.d.; UNFCCC, 2015). Evans Comfort and Hester studied the tweets related to the hashtag #climatemarch, which the organization had been pushing in combination with offline events on occasion of COP21. They measured specifically the number of tweets (volume), the pertinence of the tweets (valence), and the demographics of the audience.

This body of studies, which increasingly concentrates on the role of online communications to enable offline non-for-profit political action is a relevant point of interest because it represents a central node in the functioning of today's and tomorrow's society. The communication practices of newly-born hybrid ENGOs such as 350 reveal patterns in the growth and mobilization of grassroots communities invested in climate change issues (Hestres, 2015). However, a comprehensive study that couples theory and empirical findings with an examination of quantitative and qualitative measures of performance is lacking. Previous studies focused on the theoretical classification of 350 (Hester 2014), on the strategy elaborated by its management (Hester, 2015), and on the engagement with its audience (Evans Comfort and Hester, 2019). The present thesis aims to cover this gap in the literature by investigating not only measurements of volume, valence, and audience, but also topics covered in 350's Twitter activity, the narratives found in it, the feelings expressed in it by both 350 and its audience, and the network structure composed of the accounts close to 350. Moreover, the investigation encompasses some principles of persuasion used by 350, and the theoretical classification of 350's communications according to marketing frameworks. The analysis examines tweets posted by 350 and reposted by its audience throughout the 26th edition of the United Nations Climate Change Conference (COP26), which took place in Glasgow between October 31st, 2021 and November 12th, 2021. This allows a parallel chronological comparison with the study by Evans Comfort and Hester on the COP21. The research presented here leverages a variety of mixed methods, including automated topic modelling, quantitative sentiment analysis, and network analysis, as well as the application of van Gorp's theoretical model of frame packages to detect and analyse systematically the presence and meaning of frames in the dataset (2007).

This study is concerned with a social media dataset because of the relevance of social media's role in shaping our individual and communal lives. Social media are websites and online platforms where people can share information in different formats (Becker et al., 2011). Examples include Facebook, Instagram, YouTube, LinkedIn, and Twitter. Twitter's format has been described as micro-blogging since it revolves around sharing messages limited to the length of 140 characters (Leonardi et al., 2013). Twitter is mostly used to comment on live events as they happen (Becker et al., 2011). However, trends show that conversations taking place on Twitter can influence real-world happenings and not just the other way around. Examples are the use of Twitter for the mobilization of political action on parts of human rights movements (Martínez García, 2017; Lamer, 2012; Lyons & Veenstra, 2016), or tycoon Elon Musk's use of Twitter which can greatly influence dynamics in the

stock market (Huynh, 2022; Ante, 2021; Hamurcu, 2022). Twitter currently hosts 229 million users, it generated a revenue of 5 billion US dollars in 2021 (Dixon, 2022), and it is an important avenue of scholarly research across computer sciences, statistics, social sciences, and business research (Tong & Zhang, 2016).

The research question guiding this thesis is "how did NGO 350 make use of persuasive digital marketing to communicate environmental causes on Twitter during the COP26 of 2021?" To answer this question, the analysis builds on an extensive theoretical framework and literature review, that couples empirical findings and theoretical elaborations on the topics of frame theory, persuasion models such as the Elaboration Likelihood Model (ELM) and the Heuristic Systematic Model (HSM), social marketing, and empirical studies on the online communication of social and environmental causes on part of NGOs. The first focus on frames is justified by the role that frames play in shaping our world. Frames are defined as ways of communicating so as to indicate problem definitions, causal interpretations, moral evaluations, and solution recommendations (Entman, 1993). It follows that the frames used to communicate environmental causes can influence relevantly the urgency with which the latter are perceived. Instead, literature on persuasion principles gains salience in consideration of 350's focus on online and offline citizen mobilization. This literature shines a light on possible criteria to use in the evaluation of 350's communication strategy. For instance, this may leverage argumentative strength, or rhetoric indicators of authority and rapport with the readers (Petty & Cacioppo, 1986). The scholarly literature on marketing follows as one of the fields that made most use of theories of persuasion to apply them to professional contexts. The difficult relationship between marketing and the NGO world is discussed, and a middleground between the two is found in social marketing. Social marketing can be defined as the application of marketing principles to enhance the efficacy of the communication of social and environmental causes. The use of this theory allows the assessment of 350's use of marketing principles in its communications, but also the assessment of the validity of theories and frameworks used to assess social marketing up to today. Finally, academic research on the topic of NGO communications is extremely valuable, as it offers a variety of measurements and insights useful for the research.

Each thematic section in the theoretical framework leads to the formulation of a sub-question, which supports the structure of this thesis and justifies the research methods utilized. The first sub-question asks what frames can be found in the dataset, and it is answered thanks to the application of automated topic modelling, sentiment analysis, and van Gorp's model on framing packages (2007). The second sub-question stems from theory on

persuasion models, it enquires about the use of the HSM within the dataset, and it is answered thanks to the application of theory, in combination with automated text analysis and qualitative in-depth analysis of the tweets. The third sub-question stems from literature on social marketing and it aims to the assessment of whether 350's communications can be categorized as such. This question is answered, like the previous one, thanks to the application of theory and insights from automated analysis. The fourth and final question stems from the empirical findings of previous studies on the performance of NGOs in online communications and it asks how 350's network of interactions can be described. This question is answered thanks to mention network analysis. Additionally, Evans Comfort and Hester's measurements of volume, valence, and audience are utilized to allow for a chronological comparison and to enhance the depth of the findings.

The theoretical framework is followed by the in-depth illustration of the sampling procedure, the software and digital tools used, as well as the methods deployed for this study. These include automated text analysis, topic modelling, sentiment analysis, and mentions network analysis. This section also comprises the operationalization of van Gorp's model of framing packages (2007), measurements relative to the HSM, and the operationalization of the definition of social marketing. Following, validity, reliability, and ethical considerations are discussed. After the methodology, results are illustrated in the same order in which the treatment of the data took place: firstly, the reports on the scraping of the dataset and its relative metadata. Secondly, a quantitative text analysis, bringing to the surface patterns and trends in the corpus. Thirdly, topic modelling, followed by the application of van Gorp's (2007) framing packages, and sentiment analysis. The Results section concludes with the visual and quantitative analysis of 350's Twitter network. The discussion section, then, offers an elaborated answer to each sub-question, from the first to the fourth, as well as a chronological comparison between the findings of Evans Comfort and Hester (2019) and the present research. The thesis concludes with the theoretical implications of the findings, the limitations of this study, and some indications for future research.

2. Theoretical Framework: Frames, Persuasion, Marketing, and Online Issue Advocacy

This thesis deploys a varied theoretical framework, which informs methodology and operationalization, drawing from theories on frames and persuasion, insights from the marketing field, and studies on the effectiveness of NGO communications. In this order, each topic is illustrated in a different subsection: firstly, frames, framing processes and framing effects are discussed in accordance with relative literature.

2.1 Frames, Framing, & Sub-Question I: the Role of Language in Shaping Our World

Among other advocacy movements, ENGOs such as 350, Fridays for Future (FFF), and Extinction Rebellion (XR) have repeatedly succeeded in mobilising groups of great size to bring protests and civil disobedience into the public space, influencing policymakers, and even impacting market trends (Buzogány & Scherhaufer, 2022). In front of this phenomenon, many scholars have started to focus on the ways in which environmental movements produce knowledge and impact society (Buzogány & Scherhaufer, 2022). This field of academic research has existed since the 70s and it yielded numerous insights into various social movements. Specifically, scholarly literature on frame and framing explores the selection of problems to be addressed, how they are interpreted, and how they are communicated (Buzogány & Scherhaufer, 2022). Frames are ways to communicate about a topic so as to ascribe it a certain meaning, hence constructing knowledge around and about it (Vliegenthart & Van Zoonen, 2011; Buzogány & Scherhaufer, 2022). Framing, instead is the process of creation, negotiation, and use of frames, in which cultures, content creators, and audiences all play a variety of roles (Vliegenthart & Van Zoonen, 2011). In fact, framing is not always applied deliberately, but is often the result of cultural biases reflecting the writer's views (Schön and Rein 1994). Additionally, scholars have studied the field of frame effects, which investigates the impacts and outcomes of frames on behaviour, opinions, and society (Vliegenthart & Van Zoonen, 2011). It has been observed that frames can in fact impact the way messages are perceived and decisions are taken (Reese et al. 2001; Gifford and Comeau 2011; Grabe and Bucy 2009; Spence and Pidgeon 2010).

Snow and Benford define frames as "action oriented sets of beliefs and meanings that inspire and legitimise the activities and campaigns of a social movement organisation" (2000,

p. 614). Yet, the nature of frames is more complicated than that. Generally put, frames are conceptual and linguistic tools which we all use in writing as well as speaking and images, to convey, interpret, and evaluate information in a particular way (Van Gorp, 2007). Frames hint readers at problem definitions, causal interpretations, moral evaluations, and solution recommendations (Entman, 1993). Frames can greatly influence the perception of any given issue, yet they are always negotiated between the creator of the message and the audience (van Gorp, 2007; Scheufele and Tweksbury, 2007). Moreover, frames exert power by reiterating, negotiating, or rejecting discourses, but they are in turn also constantly strategized and negotiated (Buzogány & Scherhaufer, 2022). Furthermore, frames can give salience to selected issues and mobilise or impose meanings (Buzogány & Scherhaufer, 2022): their relevance for the construction of meaning in society cannot be overemphasised.

Scholarship is rich in empirical research of frames, framing processes and framing effects, applied to all kinds of contexts, especially those characterized by contrasts and negotiations of power between different social groups. For example, as early as 1980, Gitlin demonstrated how the student movement of the 1960s was framed in the U.S. news as chaotic and radical. Similarly, van Zoonen (1992) showed that the 1970s women's rights movement was framed by news media as extremist and leaderless, as opposed to the moderate majority. More recently, Greussig and Boomgarden (2017) used automated quantitative analysis of six Austrian newspapers to identify the frames applied to topics of immigration during the so-called "refugee crisis" of 2015. Graham (2014) researched empirically the frame negotiation processes between citizens of the Democratic Republic of Congo and photographers, in the context of humanitarian crisis images that have the intent of raising money. Her findings unveil a variety of negotiation processes that take place between the photographer, the camera, and the subject of the picture. In recent years, researchers have started to empirically explore the link between framing effects and environmentally-friendly behaviours. Newman et al. (2012), cross-tested the effects of positive and negative frames on the behaviour of consumers with varying degrees of concern for climate change. Scannell and Gifford (2013), instead, explored the varying effects of the framing of climate change as a local or global issue. Hurst and Stern (2020) on the other hand looked at the different appeals that environmental messages can have when framed in alignment with republican or liberal ideals, in the context of the U.S. Snow and Benford 1988), finally, offered a framework to raise issues and mobilise people in their support in a structured and systematic way, by firstly implementing diagnostic framing (which identifies a problem), followed by prognostic framing (which designates a solution), and lastly motivational framing (which involves calls

to action). Unfortunately, many NGOs seem to use frames inefficiently, for example, by putting an excessive emphasis on motivational frames rather than on diagnostic, prognostic, personal, or economic frames (Anspach & Draguljić, 2019). Scholarship has approached frame analysis with a variety of methods, including qualitative content analysis, critical discourse analysis, and automated frame analysis (van Gorp, 2007).

These insights into how issues are represented and communicated open to the third sub-question of this thesis: the question of what frames can be found in 350's communication of the COP26 events. According to van Gorp's (2007) theoretical model of framing packages, frames are mostly composed of words and phrases, which in a text can make up the three main building blocks, each of them making frames recognizable. The first building block is composed of manifest framing devices: groups of words that allow the identification of specific frames. The second building block is that of reasoning devices: arguments that deal with justifications, causes, and consequences of the issue at hand. The third building block, lastly, is composed of cultural phenomena: rhetorical figures used to refer to archetypes, mythologies, or narratives, such as the archetype of the hero, the mythical figure of Pandora's Box, or the narrative of the prodigal son (van Gorp, 2007). Together, these three building blocks compose framing packages, which in turn allow the identification and thorough description of frames (van Gorp, 2007). Van Gorp's framework is operationalized in the methodology section below and functions as fundamental tool to identify the frames used in 350's communication, through sub-question I: "what frames can be found in 350's communication of the COP26 events?" This sub-question has the potential to yield insights into how knowledge about climate change is being constructed by the ENGO 350, and possibly, further trends in the communication and epistemological construction of climate change action.

2.2 Persuasion & Sub-Question II: How we Evaluate What Actions to Take

2.2.1 The Elaboration Likelihood Model (ELM)

Persuasion can be considered as intentional communication, which is aimed at any type of cognitive, affective, or behavioural change in the interlocutor, without any coercion (Miller & Levine, 2029). Research on persuasion has so far revolved around three areas of research. Firstly, researchers have investigated the isolation of the factors that influence the

success or failure of persuasive efforts; secondly, the reasons why such factors have certain effects; and, thirdly, the selection and generation of persuasive messages (Miller & Levine, 2019). Researchers have developed a variety of descriptive and prescriptive theories of persuasion, one of them being the ELM (Petty & Cacioppo, 1986). This theory attests that persuasion may be induced via a central route of cognition or reasoning, through which our brains focus on argumentative strength, or via a peripheral route of cognition, through which we focus on the delivery and context of the message (Petty & Cacioppo, 1986). For example, when watching an advertisement, the central route of cognition would bring us to form opinions based on the price, guarantee, and technical characteristics of the offer, while the peripheral route of cognition would bring us to base our opinion on whether we like the actors, music, and colours of the advertisement.

The ELM offers a variety of conceptual tools to understand some of the dynamics of persuasion. For example, the theorization of the three main ingredients needed to produce behavioural change: motivation, involvement, and ability (Cyr et al., 2018). According to this principle, an individual's motivation to achieve a certain result will influence their level of involvement. In other words, the time and energy they are willing to spend on a decision - named elaboration likelihood. Those who present high involvement are probably invested in the topic or decision to make, while those with high ability have the cognitive capacity to process the information included in the message (e.g. previous knowledge and no distractions). Individuals that have high motivation, involvement, and ability are more likely to engage in central route elaboration, while individuals that show low motivation and ability are more likely to engage in peripheral routes (Cyr et al., 2018). A further assumption of the ELM is that individuals tend to strive to form and maintain attitudes that they deem correct and fact-based (El Hedhli & Zourrig, 2022).

The ELM theory has sparked a lot of academic interest, contributing to the understanding of a variety of persuasive phenomena across academic disciplines (El Hedli & Zourrig, 2022). Some scholars go as far as claiming that "ELM is considered advertising gospel" (Schultz et al., 2019, p. 13). On the other hand, the ELM has attracted critiques too: firstly, its conceptualization of the central and peripheral routes is deemed overly simplistic and descriptive (Cyr et al., 2018). Moreover, the division of the two routes has been called into question (Eagly and Chaiken, 1993; Park et al., 2007; Stiff, 1986). Early assumptions argued the two cognitive routes could not be used simultaneously (Bitner & Obermiller, 1985), whereas scholars demonstrated that the two routes interact and influence each other, they are not mutually exclusive, and ultimately they are part of a cognitive whole (Cyr et al.,

2018). Furthermore, the ELM's conceptualization of argument quality has also been criticised for its lack of directions for operationalization (Miller & Levine, 2019).

Many alternatives to the ELM have been proposed, including the Unimodel (Kruglanski and Thompson, 1999), the Dual Mediation Model (Coulter & Punj, 2004), and the HSM (Chaiken & Ledgerwood, 2011). The latter is explained and used in the next pages to supplement and support the ELM.

2.2.2 The Heuristic Systematic Model (HSM)

Instead of conceptualising central and peripheral cognitive routes to persuasion, the HSM outlines two ways of processing information: systematic processing and heuristic processing (Chaiken & Ledgerwood, 2011). Systematic processing entails the deep and careful consideration of all and any information available, deep thinking, and intensive reasoning (Chaiken & Ledgerwood, 2011). This can entail thinking carefully about the argument, the interlocutor, the context, and the personal background behind the interlocutor's arguments (Chaiken & Ledgerwood, 2011). Similarly to the ELM principles mentioned above, systematic thinking entails the concentration, knowledge, and cognitive capacity to process the information, as well as the motivation to do so (Chaiken & Ledgerwood, 2011). On the other hand, heuristic processing focuses on immediate credibility indicators such as the interlocutor's credentials, their group membership, the number of arguments presented, and the reactions of other people to their message (Chaiken & Ledgerwood, 2011).

The HSM processing styles are evidently similar to the ELM's cognitive routes, yet more easily operationalizable, and more apt to the rectification of the ELM's blind spots mentioned above. For instance, the HSM incorporates the idea that systematic and heuristic processing act in conjunction (Chaiken & Ledgerwood, 2011). The HSM contributes several guiding principles, or assumptions, such as the least effort principle, according to which individuals try to arrive at attitudinal decisions as efficiently as possible. The sufficiency principle, instead, assumes that individuals will likely perform additional cognitive effort to reach their desired level of judgemental confidence. A third principle is defence motivation: ego-involvement and personal commitment, as well as confirmation biases, can lead to selective information processing. In other words, individuals tend to cherry-pick or pay more attention to the information that confirms their original or preferred standpoint (Chaiken, & Ledgerwood, 2011). The impression motivation principle, lastly, states that individual interests, group dynamics, and affiliative concerns push individuals towards socially acceptable attitudes. Like defence motivation, impression motivation pushes individuals to

process information selectively, thus adopting the heuristic style of processing rather than the systematic one (Chaiken & Ledgerwood, 2011).

These insights raise the question of whether 350's Twitter communication relied more on heuristic or systematic persuasion routes during the COP26. To provide an answer to this question, the HSM and the ELM are operationalized in the methodology section, forming sub-question II: "how did 350 use heuristic and systematic persuasion routes during COP26?" This sub-question allows the analysis to encompass insights into the persuasion principles that play a role in the ENGO's Twitter communications. The next section discusses one of the disciplines that made the most use of persuasion theories: marketing. More specifically, marketing applied to environmental and social cause advocacy.

2.3 Social Marketing & Sub-Question III: Persuasive Communication for Good

There is no universally agreed-upon definition of what marketing entails, but its core can be described as the process whereby two or more parties have something to exchange, and carry out communication and distribution activities in order to enable said exchange (Kotler & Zaltman, 1971). This definition was first published in 1971 and it remains today one of the most cited by scholars and marketeers. In the present thesis, theories of marketing management and social marketing are illustrated to be used as theoretical lenses for the reading of 350's Twitter activity during the COP26.

Marketing management is the "analysis, planning, implementation, and control of programs designed to bring about desired exchanges with target audiences for the purpose of personal or mutual gain" (Kotler & Zaltman, 1971, p. 4). It follows that marketing strategy entails decisions on product, market research, marketing activities, and the resources to be devolved into such activities (Morgan et.al, 2019). These activities used to be carried out analogically, but with the advent of the digital, marketing executives require the use of data-driven technologies and high volumes of in-depth information about customers, products, and the marketplace (Bala & Verma, 2018). Online platforms such as social media offer plenty of such data, analytics, visualisations, and insights. As a result, the newborn field of digital marketing and advertising is ever-present in the digital lives of individuals and it involves the use of online tools and platforms to market goods and services (Bala & Velma, 2018). In 2016, Felt and Robb predicted that the expansion of phones and social media would be a threat to many companies: on the contrary, companies and non-business institutions have

embraced online marketing as a means to further their operational sustainability and goals (Adgate, 2021). Non-profits slowly started adopting marketing techniques from the for-profit sector to cope with challenges such as competition and dependence on donations and to fulfil their missions (Dolnicar & Lazarevski, 2009). However, studies show that non-profits have a limited understanding of marketing processes and are diffident towards them. This is arguably because marketing is often seen as a way of manipulating people to sell them things they do not need, which stands in contrast with NGOs' noble missions (Dolnicar & Lazarevski, 2009). Yet, scholarship on the topic largely agrees that NGOs would largely benefit from a thorough understanding of marketing and the adoption of market logics, whereby market needs acquire great importance in the drafting of strategies (Gonzalez et al., 2002; Andreasen and Kotler, 2003; Kara et al., 2004; Macedo and Pinho, 2006; Padanyi and Gainer, 2004; Sargeant et al., 2002)

Governments, non-profit NGOs, and activist movements have not only started to come to terms with marketing, but also with digital tools such as social media, to spread awareness and mobilize support for their causes (Adgate, 2021; Jackson & Foucault Welles, 2015). Social media are at the tips of everyone's fingers, fulfilling an always stronger mediatory role in the construction of our worldviews, lives, and societies. Thus, virtually every part of individual decision-making processes is in some way prone to the influence of communication strategies that take place on social media (Appel et al., 2020). This development gives space to the use of digital marketing on social media, not to sell products, but to support social and environmental causes at large scales and with lower entry barriers: in other words, social marketing.

There are many ways to define social marketing (Bedi & Ahluwalia, 2020): this research uses the definition by Akbar et al.: "the application of marketing principles to deliver planned behaviour change strategy, focused on creating social good" (2019, p. 2). The goal of social marketing is that of influencing the behaviour of the target audience to increase individual and societal well-being (Andreasen, 1995) or simply maintain positive behaviours (Szablewska & Kubacki, 2019, p. 1). Social marketing can be transaction based (e.g. donations, or ethical products), or purely activistic when the intended behaviour entails an action such as the participation in a protest (Bedi & Ahluwalia, 2020; Aggarwal, & Singh, 2019). In return for the transaction, social marketing can entail products, but also emotional, moral and ethical rewards, or the social value of cause-affiliation (Alford, 2002). A peculiarity of social marketing theory is a special trickle-down effect, stemming from social

exchange theory, whereby the positive effect of the exchange involves individuals, NGOs or protest movements, beneficiaries, governments, and the wider society (Sargeant et al., 2010).

Not surprisingly, recent years have witnessed the establishment of a Social Marketing Quarterly, the Journal of Social Marketing, and the International Social Marketing Association (Truong et al., 2015). However, social marketing is still not considered a research field in itself (Akbar et al., 2019). Rather, it gathers useful insights from behavioural sciences, management, and marketing (Akbar et al., 2019). Because of this, and due to the relatively recent interest in the concept, studies on the topic of social marketing tend to utilize different definitions and study the phenomenon from a variety of different angles. For example, Malafarina and Loken (1993) examined the claims on the pitfalls and difficulties of social marketing made in theoretical literature and compared them with findings in empirical research, identifying a concerning gap. More than twenty years later, Mitchell et al. (2015) explored how socially-invested enterprises perceive and practice marketing in an empirical study based on grounded theory. Their findings suggest that social marketing is generally viewed as legitimate and useful by social enterprises, yet not often fully implemented. On the other hand, Carins and Rundle-Thiele (2013) researched the effects of social marketing on healthy eating habits. They found that social marketing can relevantly impact healthy consumption patterns. Akbar et al. (2013) surveyed inputs, strategies, and approaches coming from management schools. They used them to compile a list of 14 approaches to the design and implementation of social marketing campaigns, which encompass a variety of insights, principles, and processes to achieve successful social marketing. They concluded that social marketing is overall characterised by the goal of influencing behaviour to the benefit of the individual and the collective; by the guiding role of ethical principles; by the aim of integrating insights from data, theory, and professional best practices; and lastly, by the tight interaction between practitioners and audiences geared towards the delivery of segmented social change that is "effective, efficient, equitable, and sustainable" (Akbar et al., 2013, p.27).

This raises the question of whether 350's communication can be categorized as social marketing. To find an answer, the above definition of Akbar et al. (2013) is operationalized in the methodology section, along with sub-question III: "Can 350's Communication During the COP26 be Categorized as Social Marketing?" This sub-question allows the analysis to combine theories of marketing and social marketing with empirical insights into the NGO's professional practices. The combination of theory and empirical findings, in turn, allows the assessment of potential gaps between the two realms. The next section delves into the ways in

which NGOs, and especially ENGOs, have been observed to structure their strategies of communication and mobilisation online. The coming section outlines some of the affordances of social media use for social causes, how NGOs are actually using social media so far, and a few useful measurements of NGO social media communication success.

2.4 NGO Communications & Sub-Question IV: Networks, Measurements of Engagement, and Online Issue Advocacy

Online tools allow to effectively and efficiently raise awareness and spread knowledge to more people than off-line activities (Hooghe et al., 2010), especially since the internet lowers significantly the costs of communicating social causes (Shirky, 2008). The internet made access barriers lower, allowing more people than ever to create and distribute content, to report on events, and to express their opinions in a non-professionalized way (Jackson & Foucault Welles, 2015). In this way, the role of the public has changed from that of spectator or cause-supporter to active participant and representative of social and environmental causes (Katz-Kimchi & Manosevitch, 2015). This shift came with a variety of issues, but also with the opportunity for marginalised groups to grow influential voices in public debates, and the opportunity for NGOs to reach a wider public (Shirky, 2008). An example on point is the ENGO Greenpeace, which seized Facebook's affordances and managed to effectively engage a diverse and international public thanks to online tools (Katz-Kimchi & Manosevitch, 2015). Studies show that thanks to social media, NGOs are no longer dependent on mainstream media attention to reach a wide public (Katz-Kimchi & Manosevitch, 2015). Social media have in fact become a platform for public mobilisation of foremost importance, where media coverage of any given issue can be boosted and brought to policymaking (Nisbet & Huge, 2007). Social media are often the first space within which social groups -across social classes and national borders have the space to articulate their grievances, before they are noticed (often by NGOs), and brought onto offline policy-making conversations (Leung & Lee, 2014).

Voluntary organisations increasingly rely on online mobilisation campaigns, yet not always successfully (Hooghe et al., 2010). Difficulties encountered by many NGOs include, firstly, the distrust of many professionals in the non-profit sector in front of marketing concepts (Dolnicar & Lazarevski, 2009). Moreover, the lack of face-to-face interactions is regarded as a cause of overall declining civic engagement in Western countries (Stolle &

Hooghe, 2005). In fact, social media are useful tools for the mobilisation of individuals, especially due to their informational reach, but they seem to complement rather than replace off-line actions and community-building (Stolle & Hooghe, 2005). One more difficulty lies in the fact that many organisations seem to fear losing control over their image and branding (Evans Comfort & Hester, 2019), hence they often prefer engaging in one-directional dialogues rather than in conversations with their audiences. This is problematic for NGOs because it goes against recommendations for effectiveness coming from academia (Evans Comfort & Hester, 2019; Brulle, 2010; Lovejoy et al., 2012). On the opposite, Brulle (2010) suggests that to be effective, NGOs' mobilisation campaigns should prioritise the creation and facilitation of public dialogues instead of trying to influence opinions in one-directional manner. While environmental campaigns can positively influence public opinion toward supporting legal actions to tackle global warming, they can incur one further difficulty, being the risk of having only short-term limited impacts, mediated by the interests of institutional and economic interests (Brulle, 2010). However, research shows that once brought to public attention, issues keep being discussed online even when media attention has shifted to the next topic (Evans Comfort & Hester, 2019).

Voices in the academic debate around the topic of online advocacy have so far been fragmented, revolving around the two opposite ideas that online activities can enhance greatly the work of NGOs (Earl and Kimport 2011; Kingston and Stam 2013), or that online issue advocacy is superficial at best, if not useless (Kemekenidou, 2020; Hestres, 2014). However, proponents of a different theory have emerged: according to Karpf (2012), social media and online tools are giving rise to new kinds of NGOs and advocacy organisations. These new organisations, such as MoveOn.org and 350 (Hestres, 2014; Karpf, 2012), present a hybrid-mobilisation model, whereby the engagement with the organisation's following changes in intensity according to the needs of the cause (Hestres, 2014). These organizations rely heavily on online communication strategies to mobilize offline political actions in support of environmental initiatives in geographically dispersed areas (Hestres, 2014, Karpf, 2012). Social media are the locus of a saturated market where user attention is the main currency and where messages can reach both favourable and unfavourable audiences (Thrall et al., 2014). In fact, the affordances of social media such as lower access thresholds, also come with increased competition for the limited attention of social media users (Thrall et al., 2014). Studies found that attention is in fact skewed towards a few large NGOs, leaving little space for less well-funded or smaller NGOs (Thrall et al., 2014). Within such a scenario, the survival and impact of NGOs rest on organisers' ability to swiftly calibrate strategies

according to the needs of the cause, and to retain the attention of users by following current events (Hestres, 2014). These insights lead to the question of how 350 interacts with its public, how it copes with competition for attention, whether it engages in one-way conversations or communicates with multiple stakeholders and, at last, how it does it. This inquiry is operationalized in sub-question IV: "how can 350's network of interactions be described?" To measure an answer to this inquiry, network analysis is applied in the methodology, and a variety of measures is operationalized from the literature below.

To measure the success of communication campaigns, Evans Comfort and Hester (2019) offer a framework of three theoretically-informed criteria for the evaluation of NGOs' social media success: namely, volume, topic-valence, and participants (Evans Comfort & Hester, 2019). They do not define their conceptualization of success, but they explain that volume stands for how often messages are shared (Evans Comfort & Hester, 2019). Topic-valence, secondly, measures whether the NGO's posts remain on topic and are in support of the NGO or not (Evans Comfort & Hester, 2019). Measuring participants, thirdly, indicates whether the NGO's communication is on target and/or reaches a variety of audiences which may have roles of varying strategic interest (Evans Comfort & Hester, 2019). On this note, Hestres (2014), elaborates on the concept of issue publics: groups that follow specific issues or themes more closely than other people. 350's communications mostly target people that are already interested in environmental issues and that already hold similar beliefs and values as the organization (Hestres, 2015). In a 2014 interview, 350's executive director and co-founder May Boeve revealed:

> Our most consistent audience is the community of people who care about climate change and see it as a problem and are committed to do something about it. Yes, there's an issue of preaching to the choir, but imagine if you could have the choir all singing from the same song sheet. (Hestres, 2014)

With "preaching to the choir" Boeve and Hester indicate the problematic nature of communicating with people that already share similar opinions. This, in fact, can seem to be a hypocritical act whereby organizations approach the low-hanging fruit instead of spreading awareness to new demographic groups. However, Boeve points out the utility of an increasingly united and empowered group of people asking for the same kind of changes.

Scholars have suggested a variety of measures of successful engagement specific to Twitter: the average number of retweets per post, following (following and followed users),

mentions used, tweet frequency, and number of hyperlinks used (Lovejoy et al., 2012). The average number of a post's retweets measures the volume mentioned above, while the following can give an indication of the users that are regularly interested in the NGO's content and may represent an issue public. Mentions used can allow the assessment of the organisation's formal links, cooperation, sympathies, and the wider environment. Tweet frequency helps to put the above measures in perspective (i.e. receiving 100 retweets per post while posting once every week has a different meaning than receiving the same number of reposts while posting twice per day). At last, hyperlinks indicate how and where NGOs redirect users to more in-depth information (to expand further than 140 characters allowed on Twitter). All these measurements are operationalized in the methodology of this thesis in order to measure accurately the way in which 350 has engaged with its audiences during the COP26, and give an answer to sub-question IV. The following section delves into the methodologies used in this thesis: a mix of qualitative and quantitative methods to analyse 350's communications in search for frames (sub-question I), persuasion techniques (sub-question II), elements of social marketing (sub-question III), and network constructions (sub-question IV).

3. Methodology: Mixed Digital Research Methods and Automated Analysis Tools

350 is an internet-mediated ENGO with a special focus on online mobilisation, started in the USA but with a global reach. Its online communication was previously examined by Evans Comfort and Hester (2019) on occasion of the COP21 in 2015. Evans Comfort and Hester chose this specific NGO because of its goal of influencing the outcomes of the conference, and they decided to analyse the organization's tweets volume, topic valence, and participants (as mentioned in the theoretical framework and again the operationalization section below). Because of the characteristic digital nature and mobilisation goals of this NGO, 350 is a suitable fit for the present study. Furthermore, the study of the 2021 COP26 allows the present research to create a chronological comparison with the findings of Evans Comfort and Hester (2019), giving depth to the analysis. Hence, the decision of researching 350's communications.

The research question guiding this thesis is "how did ENGO 350 make use of persuasive digital marketing to communicate environmental causes on Twitter during the COP26 of 2021?" This entails the measurement of frames, persuasive strategies, social marketing principles, and network composition. To measure results in these fields, the present thesis leverages a combination of quantitative digital methods such as automated text analysis, topic modelling, sentiment analysis, and network analysis. Moreover, based on van Gorp's (2007) theory of framing packages, a qualitative manual frame analysis is carried out. A corpus of 1.000 Tweets is scraped to reflect the activity of 350 around the COP26 conference, which took place between October 31st, and November 12th, 2021. The data reveals the date of each tweet, username, user location, user's following count, follower count, user status count, and user favourite count, as well as tweet language, tweet source (e.g. if the tweet came from a phone or a tablet), tweet reply count, retweet count, like count, the URL where each tweet can be found online, and finally, the content of the tweet. One necessary note is that the sample used here is hardly representative of 350's Twitter communication practices during the rest of the year. In fact, the events of the COP26 are likely to be covered in special and different ways than other events during the rest of the year. The following pages discuss these methodological decisions in further depth.

3.1 Data collection and Analysis: Scraping Twitter Data with SNScrape and Visualizing Statistics with Tableau

Research on Twitter data has long been common in studies based on the methodologies of topic modelling, sentiment analysis and network analysis (explained in the following pages), as well as other quantitative computational approaches, and various ethnographic approaches (Giglietto et al., 2012). One popular area of study of Twitter data investigates the political implications of dynamics that take place on Twitter: this social media in fact, is widely used to comment on events, to debate politics, and denounce injustices. These special topics and kinds of interactions are coupled with the demographics of Twitter users. For instance, Twitter users tend to be highly educated and generally interested in politics, thus representing only a portion of society and affecting negatively the generalizability of the results. Moreover, Twitter data can only be collected over limited periods of time, hence representing only partially wider trends and patterns. Furthermore, conversations on Twitter are limited to 140 characters, thus they will present patterns that are unique to the platform and incomparable to communications of longer format. The widespread use of Twitter datasets is arguably due to the platform's easily available and well-structured data (Giglietto et al., 2012). Twitter data is in fact freely available, public, textual, and easily understandable (Giglietto et al., 2012). The data can be gathered by scraping it with a variety of different tools such as Application Program Interfaces (APIs), like SNScrape – which stands for Social Network Sites Scrape (Giglietto et al, 2012; Thelwall, 2014). Accordingly, SNScrape is the program used to gather the data necessary for this thesis. This program scrapes new and old tweets from Twitter. The tweets scraped can go as far back as 2006, the year when SNScrape was created. The corpus offered by SNScrape does not correspond to the complete dataset available to Twitter itself, but rather to a selected sample of tweets of varying relevance, selected in chronological order. SNScrape is limited by its ability to only sample most recent tweets in chronological order instead of a randomized sample of equal amounts of tweets per day. Nevertheless, the sample has been checked manually to ensure that there are relevant amounts of tweets for each day in the dataset's time frame.

The version of SNScrape used in this thesis is named SNScrape 36, after Python 3.6: the language used to create and package the program. Through the program interface, users can, as in this case, write a short Python 3.6 code, whereby they command the data to be scraped. Twitter data can reveal details about single tweets but also about the users themselves, and it includes information such as name, location time, number of followers,

reposts, likes, and more (Giglietto et al, 2012). This data can then be visualised using other software such as Tableau: and interactive data visualisations tool, which allows users to visually analyse the data, compare measurements and discover trends and patterns. Accordingly, Tableau is used in this thesis often to analyse the results of the measurements run. The first step is automated text analysis and topic modelling, which are run with ConText, as explained below.

3.2 Method I: Automated text Analysis and Topic Modelling with ConText

3.2.1 Text Analysis

After being visualised on Tableau, the data scraped with SNScrape is uploaded onto ConText to conduct topic modelling, which identifies the most relevant themes present in a corpus of written texts. However, before conducting topic modelling, the data needs to be adjusted so that the automated analysis runs as smoothly and correctly as possible. The first step is removing stop words from the texts, followed by stemming, detecting bigrams, and extracting corpus statistics data. Stop words are functional words such as “the" and “a,” which if not removed, would inevitably skew the results of topic modelling (Jelodar et al., 2019). Stemming is a function which reduces words to their morphemes (or stems), and bigrams are words that occur together more often than not. Bigrams are telling of the associations made between people and concepts within the dataset examined, while corpus statistics, reveal a variety of patterns in the frequency and variety of the words used in the corpus.

3.2.2 Topic Modelling

Topic modelling is a class of digital research methods, precisely apt for automated text mining (Mohr & Bogdanov, 2013). Topic modelling allows researchers to code corpora of text (of small and large size) in an automated way (Mohr & Bogdanov, 2013). In other words, it detects recurring groups of words and phrases with similar meanings, called topics. Topics are categorized thanks to an algorithm which requires minimal human intervention, hence making the methods impartial and inductive (Mohr & Bogdanov, 2013). In fact, instead of starting the enquiry with already existing codes or categories, the topics are defined based on the evidence found in the text corpus itself (Mohr & Bogdanov, 2013). In this way, topic

models enable the coding of clusters of words with similar meanings and use in the corpus (Blei, 2021). Topic models are used in natural language processing, to generate a probabilistic framework to automatically organize, understand, search, and summarize large corpora (Tong & Zhang, 2016). Each document is assumed to present all topics to varying degrees and all words in the text are assumed to potentially belong to multiple topics. To calculate the most prevalent topics in the corpus, the generative model of Latent Dirichlet Allocation (LDA) is used (Jelodar et al., 2019). This model determines to what extent each topic is present in each document, and it is among the most common probabilistic text modelling techniques used in natural language processing and machine learning (Jelodar et al., 2019). For instance, in a corpus composed of articles about sports and nutrition the words "running", "strength", and "resistance" will likely appear together, forming topic 1 on the theme of training, while the words "protein", "carbohydrates", and "calories" will likely appear together, forming topic 2 on nutritional properties. To implement LDA, Context uses a topic model package called Mallet, which allows researchers to access fast and scalable results (Mallet, n.d.)

Topic modelling is often used in the social sciences to examine big corpora, which is usually coupled with human-made in-depth assessment. In fact, even though topic modelling is undoubtedly an efficient method, it has several fallacies (Mohr & Bogdanov, 2013). As explained by Mohr and Bogdanov (2013), within scholarly work, the richness and utility of the results of research depend on the quality and clarity of the researcher's knowledge about the topic, even more so in topic modelling (Mohr & Bogdanov, 2013). Hence, researchers that use this method still have to be familiar with the corpus and its context in order to make sense of the word clusters proposed by the algorithm as topics (Mohr & Bogdanov, 2013). Topics need to reflect accurate and useful patterns in the text, and this can be assured only by well-informed hermeneutic human work (Mohr & Bogdanov, 2013). For this reason, the present thesis couples topic modelling with sentiment analysis and van Gorp's (2007) theory of framing packages as illustrated in the theoretical framework and operationalized in the section on methodology operationalization. This this way, this research couples both inductive, automated methods with hermeneutic and empirical insights gained through the close study of the dataset, hence coupling technology with human expertise. After topic modelling, the automated sentiment strength analysis is carried out thanks to SentiStrength, as illustrated below.

3.3 Method II: Sentiment Analysis with SentiStrength

Sentiment analysis is conceptually similar to the topic modelling, but instead of detecting recurring groups of words, it gathers textual mood indicators such as emoticons, intentional spelling mistakes, and punctuation (Thelwall, 2014). In other words, humans express emotions online via symbolic tools like emoticons and punctuation: the sentiment analysis algorithm, on the other hand, uses these symbolic tools to produce an estimate of the sentiment content present in the corpus (Thelwall, 2014). In doing so, sentiment analysis measures proportions of positive and negative sentiments expressed in the corpus via mood indicators that express positive or negative feelings (Thelwall, 2014). The sentiment, whether positive or negative, is expressed along two scales that range between positive and negative, since humans can feel and express both positive and negative sentiments simultaneously (Thelwall, 2014; Norman et al., 2011).

In this thesis, the tool used to carry out this method is SentiStrength, which was developed specifically to detect emotions in social web texts using a lexical approach (Thelwall, 2014). This tool is also useful for the detection of framing packages since frames do not only regard choice of topic, but also entail emotional appeals and triggers. SentiStrength is an established tool for sentiment analysis methodologies, and it reaches close to human-level accuracy in most tested cases (Thelwall, 2014). However, it also presents several pitfalls, one example being its difficulty in detecting sarcasm and irony due to their highly contextual and contradictory nature (Thelwall, 2014). As a result, SentiStrength is bound to yield less accurate results in political conversations where sarcasm is common (Thelwall, 2014). Furthermore, if SentiStrength is applied to highly niched topics, the lexicon may need to be adjusted to the scientific terminology in this specific field. However, the software also offers the possibility of comparing results with human-made analyses, recording the misallocated words and values, and fixing the discrepancies. Lastly, it is also possible to assign a polarity to the phrases that do not have explicit sentiment indicators (Fox, 2008; Thelwall, 2014). These steps were not necessary for the present research since the results did not show any evidence of being skewed, biased, or excessively niched.

Thanks to automated tools, it is not only possible to analyse the topics and sentiments present in a corpus of social media texts (tweets, in this case), but also to analyse the structure of the data and the connections between users and tweets. Topic modelling and sentiment analysis are coupled with frame analysis to answer sub-question I on the presence of frames in 350's communications. On the other hand, network analysis is used to answer question IV

on the structure of 350'communications. As shown below, this can yield relevant insights and is done using Gephi in this research.

3.4 Method III: Mentions Network Analysis with Gephi

From the data scraped with SNScrape, a mention network was extracted using the program Metions_Network. The term mention indicates tweets which include one or more tagged usernames. This program, as hinted by the name, extracts tweets in which users tag each other, and organises the dataset adding the relative details. The result is a new corpus of data on who tags who. This dataset is then inspected from a network perspective using Gephi: an algorithm-based automated tool designed to visualise and analyse networks of interactions (Bastian et al., 2009). Being a descriptive tool, Gephi allows its users to visualise, filter, and manipulate data for an easier reading thanks to its 3D interface (Bastian et al., 2009). Mention networks are by definition directed: this means that just like the tagging goes from the user to the other, so does the direction of the link between the two users represented in Gephi's visualisations. In these visualisations, users are represented by dots (called nodes) and the links between them are represented by arrows (called edges). These can be filtered, resized, and coloured based on a variety of criteria. Gephi's analytics can reveal the number of connections each user has (called centrality degree), the number of shortest edges passing through a given node to connect two more nodes (betweenness centrality, which indicates gatekeepers), how often any user tags others and how often it is tagged (respectively called in-degree and out-degree centrality), what groups and subgroups users belong to within the network (modularity score), the popularity of each user's profile (PageRank), and many more details (Golbeck, 2013).

Network analysis allows the visualisation of networks of information, connections, communities, gatekeepers, and influential users (Golbeck, 2013). This methodology can enable researchers to gain insight into the audiences and strategies of 350's Twitter communications. Yet it can also unveil power dynamics and information about actors and groups that set and lead online conversations. After the illustration of text analysis, topic modelling, and network analysis -the methods used to answer sub-questions I and IV- the coming section delves into the operationalization of theories, such as van Gorp's framing packages (2007), the HSM model of persuasion and the concept of social marketing. These elements of the methodology are used to answer sub-questions I, II, and III.

3.5 Operationalization & Sub-Questions: From Theory to Practice

This thesis is guided by the research question "how did ENGO 350 make use of persuasive digital marketing to communicate environmental causes on Twitter during the COP26 of 2021?" To answer this question, the present thesis leverages theories and empirical studies in the theoretical framework, from which four sub-questions are drawn: firstly "what frames can be found in 350's communication of the COP26 events?" Secondly, "how did 350 use heuristic and systematic persuasion routes during COP26?" Thirdly, "can 350's communication during the COP26 be categorized as social marketing?" And Fourthly, "how can 350's network of interactions be described?"

Evans Comfort and Hester's 2019 framework of volume of reactions, topic valence, and participants is used. This framework was used to analyse 350's Twitter activity during the COP21 and now allows a consistent chronological comparison. This framework is assessed thanks to 350's retweet and like counts, the topics covered within the tweets, and the network of mentions around the organization.

To identify and measure frames a combination of topic and sentiment analysis is used, coupled with in-depth reading of tweets and profiles, based on van Gorp's (2007) conceptualization of manifest framing devices (that allow the detection of a certain frame), manifest or latent reasoning devices (that assign particular readings), and implicit cultural phenomena (such as archetypes or mythologies). As illustrated above, topics are groups of semantically interlinked terms, which are often used in sets of documents within a corpus. This implies that while topic modelling can facilitate the detection and definition of frames within a corpus, topics do not correspond exactly with frames. Hence, based on the recommendations of Calderon et al. (2022), the first step taken is the assessment of the face validity of topic modelling results, which is followed by the manual, in-depth examination of top tweets per topic. In this phase, van Gorp's (2007) framework is employed, looking for words that are frequently used and share semantic patterns (framing devices), phrase formations that hint readers towards a specific reading of the events of COP26 (reasoning devices), and common archetypes or narratives used (implicit cultural phenomena). This outlines the criteria used to reply to sub-question I: "what topics/frames can be found in the dataset?"

The principles of the ELM and the HSM (Chaiken & Ledgerwood, 2011; Petty & Cacioppo, 1986), are operationalized by an assessment of 350's use of credibility indicators such as group membership (relating to heuristic processing) or argumentative strength

(relating to systematic processing). Through this operationalization an answer is elaborated to sub-question II: “how did 350’s communication use heuristic and systematic persuasion routes during COP26?”

The concept of social marketing is operationalized according to the definition of Akbar et al., (2013), according to which social marketing is can be recognized by its (1) aim to influence behaviour toward individual and collective benefits, its (2) reliance on ethical compliance to ethical principles, by its (3) integration of data and theory, and its (4) interaction with audiences to deliver segmented social change. This, allows an answer to sub-question III: “can 350’s communication during the COP26 be categorized as social marketing?”

To assess 350’s communication with its audience, network analysis is applied to the dataset as illustrated in the previous section. Additionally, Twitter-specific measures are integrated: the average number of following, mentions used, tweet frequency, and hyperlinks (Lovejoy et al., 2012). The next section discusses the validity and reliability of the various methods employed in this thesis.

3.6 Validity and Reliability

The validity and reliability of the results of this research are ensured by the consistent use of established academic theories and empirical studies as operationalized above. Furthermore, the reliance on concepts defined and operationalized in previous academic literature ensures further validity and reliability. For instance, this includes the operationalization of the HSM, the ELM, framing packages, social marketing, and bodies of literature that include both established theories and empirical studies.

When it comes to topic modelling, validity is hard to measure due to the nature of the method itself: in fact, researchers do not know exactly what topics they want to find and measure before topic modelling is carried out, hence the difficulty of assessing what one wants to measure. However, Calderon et al. (2022) suggest striving to achieve coherence and interpretability of the topic models by making sure that topics are characterised by semantic similarity. The reliability of topic modelling, on the other hand, is usually assessed thanks to the analyses carried out independently by second and third coders. This, however, is beyond the scope of this thesis due to time constraints. Nevertheless, the systematic illustration of each step and decision taken will allow replicability of this research, while keeping in mind that topic modelling results always present a slight variation due to how the algorithm works.

In network analysis, sentiment analysis, and topic modelling, the use of representative samples is a common mechanism used to ensure replicability and generalizability (Jordan, 2018). However, the current study regards the activity of a single specific NGO with a distinctive identity, and a relatively small Tweet sample recorded during a non-typical event- the COP26. Moreover, SNScrape comes with the limitation of only allowing the sampling of tweets in chronological order instead of randomly selected equal amounts of tweets for each day in the dataset time frame. Despite the sample being representative of 350's Twitter activity during the COP26, no claim is made towards the strength of the generalizability of the results.

As a last limitation, access restrictions and privacy regulations can damage the validity and reliability of a study by introducing a bias in the dataset, whilst being necessary for consumer protection - a case on point of such an occurrence is the fact that the current study cannot encompass geographical analyses due to the inaccurate data on user location (as illustrated in the Results section). The next section delves deeper into issues of privacy within the context of ethical considerations pertaining to this thesis.

3.7 Ethical Considerations

Studies based on online data can yield great if not fundamental insights into how social structures are formed, replicated, appropriated, and challenged. Moreover, they can shine a light on how social movements are organized, how processes of sensibilization become successful, or, as in this case, how narratives on environmental causes are spread and branded. These studies can investigate the functioning of our societies at a macro-level, but they can also be granularly precise in the identification of individual users. Hence, ethical considerations of privacy are widespread in the literature on digital methods, especially those methods that rely on scraping user data without users being aware of it. All the data used is technically public and freely available: this means that while users grant access to their data, they are often not aware of what their consent entails (Lomborg & Bechmann, 2014). Because of this, it is of uttermost importance to carefully consider possible implications for individual users and online groups (Jordan, 2018). This issue rose to prevalence especially after the Cambridge Analytica scandal (Venturini & Rogers, 2016). A partial yet fundamental solution to the dilemma of privacy and academic research is to pay attention to specific settings, research topics, and demographics within the sample (Jordan, 2018). In this way, individual researchers can assess the ethical standards of their studies and decide whether to

publish them or not (Jordan, 2018). The current thesis mentions people that are already in the public eye as environmental activists or public personas. Furthermore, the topic of the study does not involve data which could lead to violence, discrimination, targeting, or prosecution. Hence, in conclusion, the use of sensitive data is deemed appropriate.

4. Results

4.1 Scraping the Data and Analysing the First Layer with SNScrape & Tableau

As illustrated in the methodology section above, the corpus on which this thesis is built was gathered with SNScrape36. A short Python 3.6 code was written into the program to assign the scraping on the following information (see appendix A1): date of each tweet, username, user location, user's following count, follower count, user status count, and user favourite count, as well as tweet language, tweet source, tweet reply count, retweet count, like count, and the content of the tweet, and the URL where teach tweet can be found online. The text commands the sourcing of 1.000 Tweets between October 31st, 2021 and November 12th, 2021, weeks during which the Glasgow COP26 took place. The Python 3.6 code tailored for the SNScrape of this thesis can be found in Appendix A1.

The data gathered is then uploaded onto Tableau for data visualisation. Unfortunately, data on user location was not consistent enough to be relevant to the sample, since most accounts have set their location in "worldwide", "global", etc. Nevertheless, the data collected was mostly in English, with a few tweets in Japanese and many others in unrecognised languages ("und"). 832 tweets were in English, 236 in undetected language -yet typically still in English or composed of links to websites- 10 in Japanese, 4 in French, and 4 in German. The data was not cleaned from the languages that do not correspond to English, yet no tweets in foreign languages appeared anywhere in the results nor did they amount to quantities significant for this research.

350, with more than 10.000 total statuses recorded the highest total number of Tweets published throughout the lifetime of their profile -a measure known as Status Count. The second account with the most statuses was @Allafrica: the account of an African news agency. The third account with the most statuses is @Lulex: a Canadian environmental activist named Leuisette Lanteigne, who focuses on water and public participation (@Lulex, Twitter). Lanteigne, being an environmental activist, published consistently both during the duration of the COP26 and in general.

350 was also recorded to be the most active account during the COP26 and to have the most followers (tables I and II). This could be partially due to the composition of the

dataset itself, which is gathered around the search term "350". The accounts with the most followers in the dataset feature Indian financial trader P. R. Sundar (@PRSundare64); Bill McKibben (@Billmckibben), founder of 350, author, and educator; Sierra Club (@SierraClub), an ENGO based in the US; and Belgian visual artist and environmental activist Joanie Lemercier (@JojanieLemercier). This initial examination partially reveals some characteristics of 350's communication- namely its international reach in South East Asia, Europe, and Canada, as well as 350's primacy and popularity in respect to the components of its outgoing communications network. In other words, 350's outgoing communications appear to connect with fewer followed yet more localized accounts which may be more tightly connected with the grassroots realities and communities of their area.

Table I. Followers by Account.

Account	350	AllAfrica	PRSundar64	BillMckibben	SierraClub
Followers	71.087.704	2.313.310	405.322	395.627	384.452

To further contextualize and weigh the activity levels and popularity of the top accounts, it is useful to compare the number of retweets (Retweet Count) divided by User and tweet output during the weeks of the COP26 (Count of Output). 350, @OneMoreScotYes, and @bbcdebatenights proportionally got the most retweets with the least posting (One More Yes, 2021). BBC Debate Night is a television talk show, that, during the COP26 hosted a panel discussion on the conference, inviting speakers from a variety of backgrounds and expertise, whose names feature in the results consistently. Speakers included a representative of 350's Pacific division. @OneMoreYesScot stands out with 492 retweets for its single tweet posted throughout the COP26. This account is followed by about 1500 users and it is tied to the cause of Scottish independence.

Table II. Retweet Count by user and Output Count in Dataset.

User	Count of Output	Retweet Count
350	184	4.152
OneMoreYesScot	1	492
bbcdebatenight	3	213

The particularly popular tweet by OneMoreYesScot cites Joseph Sikulu, Pacific Regional Managing Director at 350, and speaker at the BBC Debate Night on COP26, saying "Climate change is about self-determination, it's about agency, it's about our ability to decide what happens to our people and to our country… I know the people of Scotland understand that" (One More Yes, 2021). This tweet is interesting because it features the deeply emotional topics of self-determination, group identity, and agency, coupled with the use of the rhetoric technique of repetition. This tweet, moreover, brings the analysis one step further by symbolising the way in which users interact and reappropriate each other's content every day, repurposing it for their own causes or objectives. This connects with theories whereby frames are continuously negotiated, challenged, and appropriated by content creators and audiences (van Gorp, 2007; Scheufele and Tweksbury, 2007).

4.2 Quantitative Text Analysis with ConText

After analysing the first layer of data on the dataset, the research starts looking more in-depth at the corpus. Firstly, lemmatization is conducted to reduce words to their semantic stem. Secondly, stop words such as "the" and "and" are removed. Thirdly, bigram detection is conducted (table III), to measure words occurring more often together than separately. In table III below, results are detected and ranked in descending order of frequency, considering how often words are found in conjunction through the corpus. The first result is the bigram "fossil fuel", which hints at a possible focus of many tweets on non-renewable energy sources rather than other topics within the wider discourse on climate change. 350's name appears several times in conjunction with the username of its founder Bill Mckibben (@billmckibben).

Table III. Bigram Detection.

Word A	Word B	Frequency
fossil	fuel	78
Billmckibben	350	67
350	GretaThunberg	78
350	LeilaniMunter	67
EnvAm	billmckibben	78
LeilaniMunter	joshfoxfilm	67

SierraClub	100IsNow	78
100IsNow	EnvAm	67
Jojshfoxfilm	KrapelsMarco	78

350 also appears in combination with environmentalist Greta Thunberg and with Leilani Münter (@Leilanimunter): a biology graduate turned race car driver and environmental advocate. More specifically, Münter's advocacy converges around renewable energy, plant-based diets, and animal rights. Moreover, Münter sits on the board of non-profits Oceanic Preservation Society, Empowered by Light, and EarthxFilm. The connection between 350 and this special advocate is telling because it indicates one of the many ways in which individuals are taking up environmental causes and using their popularity and individual storytelling to support ENGOs publicly. Upon more in-depth reading on Münter's website, the communication style and tone she offers appear to be lively and witty, as well as empowering: "never underestimate a vegan hippie chick with a race car" (Leilani.Green, n.d.) The use of both funny slogans, a strong personality against stereotypes, and the colour green, offer a hopeful and entertaining impression, representing a wing of environmental communication which thrives on themes of empowerment (see figure I).

Figure I. Leilani Münter's Website banner.

Lastly, corpus statistics assessed to show the most used terms present in the corpus (under "Ratio of texts occurring in", table IV), however, it is up to the researcher to investigate and determine which of these words are actually relevant to the analysis. In table IV below, for example, the name 350 appears first, due to the nature of the dataset and is, thus, not relevant. "Thhp", instead indicate frequent use of external links, leading to the inference that many users may have linked their opinions and statements to more in-depth

materials, be it articles or videos. The words ‘COP26’, ‘climate’, and ‘Greta Thunberg’ had to be expected as well, based on the topic of the conference, and on the young activist's frequent statements. Most of the other frequently used words are usernames, indicating that a few organisations dominate the conversations taking place either as a topic or as interlocutors: Fridays For Future, Greenpeace, Fridays For Future Most Affected People and Areas (FFFMAZA), Sierra Club, Sunrise Movement, and Environmental America, are all action groups, movements, and environmental non-profits. Investigating the nature of these organisations, a spatial dimension emerges about the conversations taking place, which appears to be strongly focused on the Americas.

Table IV. Corpus Statistics, Ratio Of Test Occurring In.

Term	Ratio of Text Occurring in	Term	Ratio of Text Occurring in
350	0.812	SierraClub	0.076
http	0.496	fuel	0.075
COP26	0.291	Fossil	0.074
climate	0.188	sunrisemvmt	0.073
GretaThunberg	0.15	people	0.071
Amp (&)	0.132	world	0.066
Fridays4future	0.114	Glasgow	0.058
billmckibben	0.106	bbcdebatenight	0.055
Greenpeace	0.098	LeilaniMunter	0.053
FFFMAPA	0.091	100isNow	0.053
350	0.812	EnvAm	0.053

4.3 Topic Modelling with ConText

While carrying out topic modelling assessment on ConText, it is the researcher who must command the program how many topics are expected to be found: the present analysis is based on the standard suggested number of seven topics per 1.000 tweets, which should provide an overview of the contents of the dataset (Mallet, n.d.). The same goes for the number of words to be included in each topic, which is generally recommended to be between eight and ten words for Twitter datasets (Mallet, n.d.). As a last step, the researcher

names manually the seven topics, assigning a label to each of them based on the semantic patterns found. The results are shown below in table V.

The LL/token value indicates the accuracy of the model's prediction and it should be as high as possible. The model in table V measured a LL/Token value of about -774. A new model was tested with a lower number of topics (from seven to five) and a higher number of iterations (from 1.000 to 2.000) to achieve a higher LL/token. However, the LL/token actually decreased from -774 to -798. Hence, the current results are kept for analysis.

Table V. Topic Modelling Results and Labels.

Topic	Weight	Topic Members	Label
Topic1	0.21	cop - climate - people - pacific - Glasgow - world - action -	Community representatives travel to Glasgow for world climate action.
Topic2	0.09	fossil - fuel - cop - coal - end - country - finance -	Countries and finance must end fossil fuel at COP26.
Topic3	0.07	future - gretathunberg - fridays - fffmapa - greenpeace - saleemulhuq - careclimate - saberhc - parents - fffinbd -	Act for the future.
Topic4	0.05	europe - greenpeace - priceofoil - unep - sierraclub - foeeurope - foeint -	Europe and Institutions.
Topic5	0.05	gretathunberg - georgemonbiot - vash - vanessa - future - fridays - bbcdebatenight - ogukenergy - rmtunion -	BBC Debate Night speakers and topics.
Topic6	0.05	sunrisemvmt - billmckibben - sierraclub - krapelsmarco - joshfoxfilm - leilanimunter - envam - isnow - berniesanders - mzjacobson -	North American environmental storytellers around 350.
Topic7	0.04	canada - ienearth - onemoreyesscot - canintl - climatereality - actonclimate - standearth - scotland -	Scottish and Canadian NGOs conversation with one another.

At a first glance, certain terms seem odd: this is because ConText ignores punctuation such as “@” or ”#”, while many terms are actually mentions such as “GretaThunberg” or hashtags such as “#Scotland”. As can be noticed on a closer look in the topic member column, not all topics are composed of the same number of member terms. This is because the words that were useless to the assessment have been deleted, for example “http” or “amp” (which stands for “&”). The following section presents the in-depth analysis of each topic found. The exploration starts from the words in the column of topic members. These are the words most often used within each topic. Each topic is illustrated in combination with a variety of examples drawn from the dataset. Finally, each section applies van Gorp’s theory of framing packages (2007), examining framing devices (which allow the detection of a certain frame), reasoning devices (that assign particular readings), and cultural phenomena (such as archetypes or mythologies) to assess whether the topics found indicate the presence and establishment of frames. The report, then mentions the weight of the topic, which indicates how often the topic is found in the corpus. Based on the weights and insights found in each topic, topics 1 and 2 are discussed separately from topics 3 to 7.

4.3.1 Topic 1: “Community Representatives Travel to Glasgow for World Climate Action”

Topic 1 is named “Community representatives travel to Glasgow for world climate action”. This topic relates to those tweets where users call for representatives attending the COP26 conference to act in the interests of the people and to stress global collaboration to tackle the climate crisis. Some examples include 350’s tweet “Global Climate Strike has kicked off! Strikers, young & old, from all over the world have come together to demand #climatejusticeNow at #COP26 Glasgow today! This is one of the most globally representative demos @Fridays4futurehave ever had. #peopleToTheFront #UprootTheSystem!” (350 dot org, 2021a). This topic is characterized by the image of people going to Glasgow from the Pacific region to share their demands with decision makers at the COP26. Another example is 350’s tweet “The world's richest countries left the G20 summit in Italy with zero commitments to the urgent climate action we need. Luckily, people all around the world are heading to #COP26 in Glasgow to hold these so-called leaders accountable” (350 dot org, 2021b) At a first glance, this topic may seem to be characterised by calls to action, asking people to come together in Glasgow. However, upon closer inspection, these tweets do not include calls to action. On the other hand, this topic

specifically shines a light on the special attention received by communities from territories in the Pacific in 350's communication. This attention is probably due to the presence of the organization's Pacific branch representative Joseph Sikulu at the conference.

This topic features framing devices such as "people", "Pacific", "Glasgow", and "world", as seen in the topic model table above. Yet this topic also shows reasoning devices such as "carried the flags of our homes and the spirit of our people", "taking the demands of the Pacific to COP26", and "people around the world are heading to COP26". These reasoning devices do not assign a problem, responsibility, and solution, but rather, they tell a story of representatives of a region of disadvantaged communities travelling far away with great responsibility to voice the demands of their communities. The implicit cultural phenomenon behind this narrative can be thought of as the archetype of the mission, the travel, or the quest. Because all these framing devices, reasoning devices, and cultural phenomena are identifiable, they compose a framing package hence qualifying topic 1 - "Community representatives travel to Glasgow for world climate action"- as a frame. This frame, considering the long label of the topic, is named "the travel frame" for the sake of clarity and readability.

This frame is relevant to the analysis because it unveils the theme of the representation of grassroots communities (often located in the global south and disproportionally impacted by the effects of climate change) in climate change mitigation negotiations as a matter of self-determination and community preservation (Biermann and Möller, 2019; Sen Roy, 2018). The first topic, notably, is twice as present in the dataset as the second most common topic. To explain the prevalence of topics with percentages, a simple addition of all topic weights, divided by the topic weight being discussed can be calculated: topic 1 represents 15% of the dataset.

4.3.2 Topic 2: "Countries and Finance End Fossil Fuel Investments at COP26"

Topic 2, which accounts for 6% of topics found in the corpus, is named "Countries and finance end fossil fuel investments at COP26", and it is well exemplified in 350's Tweet:

> BREAKING: We welcome news that more countries & financial actors have joined the Powering Past Coal Alliance @PastCoal, whose members pledge to end investments in new coal plants at home & abroad + phase out coal power by 2030s for rich countries & 2040s for the developing world! (350 dot org, 2021c).

This topic couples terms that are usually found in economic frames such as “rich”, “investment”, and “financial”, with climate-change and fossil-fuel specific terms such as “climate finance”, “greenwashing”, “net-zero”, “rich countries,” and “developing world”. These framing devices are easy to identify since a lot of them belong to financial jargon. With “net-zero,” 350 indicates the stream of policies concerned with the regulation of CO2 emissions so that states and companies can buy and sell emissions as long as the bottom line remains a “net-zero” emission level (Bataille et al., 2021). This line of policy has been strongly criticized by environmentalists, and 350 joins the choir prevention, for example, with the tweet: “We say no to carbon markets, escapist 'net zero' plans & other #FalseSolutions! Decision-makers must listen to the voices of Indigenous peoples & be guided by their knowledge. #EndFossilFinance #PeopleToTheFront” (350 dot org, 2021d) Another theme that emerges from this topic is the unequal dynamic and constant comparison between “rich countries” and the “developing world”. This narrative comparing structural advantages and disadvantages can be argued to be rooted in post-colonial literary and scholarly literature (Hill et al., 2020). It highlights structures of global inequality as a result of historical dynamics, claiming back the dignity of less powerful voices within global debates on climate change mitigation (Hill et al., 2020). The reasoning devices in this topic, such as “rich industrialized countries must meet their climate finance obligations as part of their fair shares of climate action” (350 dot org, 2021e), indicate that rich countries are seen as having the responsibility of investing in solutions against climate change as well as the duty of regulating their financial industries so as to pollute less.

It is possible to divide topic 2 “Countries and finance end fossil fuel investments at COP26” into three smaller yet more precise topics on (1) finance, (2) zero-net emissions, and (3) inequality. These themes make for strong topics, however, no relevant implicit or explicit cultural devices were found in the tweets that are part of topic 2, hence no frame is found.

4.3.3 Topic 3: “Act for the future”

Topic 3, which accounts for 5% of the dataset, has been named “Act for the future”, and it can be exemplified in 350’s tweet “We're here to fight for the future that they will not steal. Keep it in the ground: we're gonna do that. For our mothers, for our children!” (350 dot org, 2021f). This topic touches on important emotional triggers such as the ideas of “safety”, “future,” and protection of the community against imminent threats. The attention is put on

the importance of acting now for the sake of future consequences through reasoning devices such as “fight for the future” and “we need urgent global climate action to prevent future displacement.” This can be found for example in the tweet: “Migration is barely on the agenda at @COP26, yet as climate impacts escalate, more & more people will be forced to leave their homes. We need urgent global climate action to prevent future displacement & safety & security for those forced to flee” (350 dot org, 2021g). The archetypes in this topic are frequently deeply rooted in cultures all over the world, such as the idea of responsibility towards community and towards future generations, as well as fear of the future. This topic can be operationalized into a frame, called the “future frame”, yet its presence is relatively low (5%) in comparison to the other frame found based on topic 1 (the “travel frame” accounting for 15% of the dataset).

4.3.4 Topics 4 to 7: “Mentions”

Topic 4 is disconnected from topic 3 and it is simply composed of a collection of mentions of European and transcontinental environmental organizations. Because of this, it is labelled “Europe and Institutions”. This topic could not be operationalized into a frame, since it did not feature recurrent framing devices, reasoning devices, or cultural phenomena.

Topic 5, instead is also characterized by mentions, but it features individual speakers invited to the BBC Debate Night, instead of institutions and organizations. For this reason, it is labelled “BBC Debate Night speakers and topics”. Speakers included a representative of 350, Joseph Sikulu, who talked about the disproportionate effects of climate change on countries of the global south, which typically contributed less to pollution and benefitted less from the productive activities that cause pollution. This explains 350’s attention to the British talk show and highlights the use of Twitter as a tool for live interaction and commentary of events as they happen.

Topic 6 is labelled “North American environmental storytellers around 350” and, like the previous topic, it is mostly composed of mentions. This topic gathers conversations about the above-mentioned Leilani Münter, Josh Fox, and Marco Krapels, as well as 350’s founder BillMckibben, and the US-based ENGO Sierra Club, revealing a geographically bound conversation centred around the United States. However, as in the two previous cases, the tweets forming this topic do not have strong themes in common apart from the personalities aforementioned.

Topic 7 revealed again another layer of mentions, and it is labelled "NGOs conversation with one another." In fact, eight of ten words in this topic are names of NGOs. The interesting thing about this last topic is that it brings to the surface a link between Scottish and Canadian NGOs.

To conclude, Topics 4 to 7 each accounted for less than 4% of the corpus, for a total of 12% of the dataset covered by topics 4 to 7. However, each of them unveils a different layer of mentions: firstly international and European institutions, followed by BBC Debate Night Speakers, North American public personas, and finally, Canadian and Scottish NGOs. Despite the great quantity of mentions, no calls to action were detected, either targeting 350's audiences, nor decision makers at the conference. Instead, as observed in topic 5, tweets were mostly used to comment rather than raise awareness or call users to action. The model was unable to identify coherent or relevant topics in as much as 59% of the dataset. This insight signals a fragmentation of the discourses and themes present in 350's Twitter communications during the COP26. On the other hand, this could also be because Twitter data typically presents less clear boundaries between topics in comparison to sources such as newspaper articles, due to the short nature of tweets and the colloquial language generally used in tweets (Tong & Zhang, 2016). This fragmentation of results hints at the relevance of human coding in frame analysis, even in mixed methods, justifying the application of van Gorp's theory of framing packages (2007).

This is done not only in relation to the topics found, but also based on the observations gained through the in-depth study of the corpus. The next section illustrates the process of application of van Gorp's framework to the dataset, offering examples and structuring the examination around framing devices, reasoning devices, and cultural phenomena.

4.4 Application of van Gorp's Framing Packages Theory: The Fight and The Support

The many mentions in the database may induce inferences of a self-referential conversation between ENGOs and activists. This observation leads to the in-depth analysis of the dataset after the face-validity assessment. This step is the perfect avenue for the application of van Gorp's 2007 theory of framing packages (i.e. manifest framing devices, manifest or latent reasoning devices, and implicit cultural phenomena). Upon closer reading, however, a network of solidarity between the organisations is revealed, in tweets such as the

following: “We, the Pacific Climate Warriors, know we’re outnumbered by the fossil fuel industry. Fossil fuel lobbyists in COP outnumber Pacific negotiators 12 to 1. But today, vulnerable nations are sending the message that we are holding the line” (350 dot org, 2021h). This narrative is filled with empowering language, and the narrative of a fight that NGOs, grassroots activists and "the people" are portraited to be leading against oil corporations and policymakers. Another example is “HAPPENING SOON Joseph Sikulu from @350Pacific will be on a panel at @COP26_Coalition People's Summit it connects Indigenous peoples at frontlines of the fight against fossil fuel giants with Indigenous people at frontlines of climate impacts” (350 dot org, 2021i). These examples present words and phrases (manifest framing devices) such as “holding the line”, “frontline”, “fight”, “fight against fossil fuel giants”, “you are not alone”, “a long, hard battle”, “giving up”, “support”. On this note, an emoji often used yet not recognized by ConText, is the raised fist: an international sign of resistance. Despite being used in combination, these terms can be distinguished into two semantic groups: one on the idea of a fight or a struggle of a disadvantaged actor against powerful enemies; and the other on the idea of declaring solidarity and allyship in this struggle against a common enemy.

Reasoning devices are built with phrases such as “we’re outnumbered by the fossil fuel industry,” “vulnerable nations are sending the message,” “Indigenous peoples at frontlines of the fight against fossil fuel giants,” “less visible work.” These reasoning devices assign a reading of climate change as a problem whose responsibility lies in the hands of big and powerful oil companies, and it assigns as a solution to the problem, or at least as a just and fair development, the integration of so-called “frontline communities” into negotiations on climate change-related regulations. But frames go deeper than assignments of responsibility and touch on deep cultural archetypes -or implicit cultural phenomena. In this case, the story being told touches implicitly yet strongly on the idea of the disadvantaged, yet virtuous, hero, not only resisting but actively fighting with dignity against an enemy of overwhelming dimensions. As an example, here, the mythological figure of the Odyssean duel between Ulysses and the Cyclops Polyphemus could be mentioned, even though this is European mythology, which may not be shared by 350’s American and Pacific staff.

The second semantic group, built around the meaning of support comes into play in tweets where first the struggle is outlined and then support for those leading the fight is declared. This can be observed for example in the tweet “It’s a long, hard battle to center frontline voices at #COP26, but groups like @AOSISChair & the #PacificClimateWarriors aren’t giving up on the fight for #ClimateJustice. Send them a message to show your support”

(350 dot org, 2021l). Often, 350 uses phrases such as “we see you” or “we support you,” for instance, in the tweet “Activists & delegates from communities on the frontlines of the climate crisis are here fighting a long, hard battle to get their voices heard. We see you, you are not alone”(350 dot org, 2021m). These phrases can be considered both framing devices and reasoning devices. In fact, by using the plural pronoun and publicly demonstrating allyship to the efforts of grassroots environmental activists, 350 is associating itself with the activists it supports through its pacific branch. The implicit cultural phenomenon behind this frame does not hint to be a ‘white saviour” archetype since there is no trace of victimization and 350 does not claim to be doing work for its “frontline communities.” On the contrary, the implicit cultural phenomenon present here seems to be that of friendship and allyship in face of struggles.

In conclusion, two frames are found outside of the topic model: one of the hero’s fight against oil companies and one of allyship with the hero. These are named respectively the “hero’s fight frame” and the “support frame.” These narratives of worry and struggle lead to the expectation that sentiment analysis results will show negative sentiment, which is investigated below in the next section.

4.5 Sentiment Analysis with SentiStsrength

SentiStrength produces an output which scales the recorded sentiments on two scales, respectively a positive and a negative scale. The positive scale goes from 0 to 4, whereby 0 is neutral sentiment and 4 is extremely positive sentiment. Likewise, the negative scale goes from 0 to -4, whereby 0 represents neutral sentiment and -4 represents extremely negative sentiment. In table VI below, the two scales are represented together, including the percentages of tweets that show varying degrees of both negative and positive sentiment at the same time. The rows represent the negative scale and go from 0 to -4, while the columns represent the positive scale and only go from 0 to 3, because no extremely positive sentiment was found.

Table VI. Sentiment analysis.

	Positive			
Negative	0 (Neutral)	1 (Mildly Positive)	2 (Positive)	3 (Highly Positive)
0 (Neutral)	45.15%	12.9%	7.53%	0.39%

-1 (Mildly Negative)	10.56%	6.06%	1.76%	0.29%
-2 (Negative)	5.77%	4.5%	2.05%	0.2%
-3 (Highly Negative)	1.76%	0.59%	0.29%	
-4 (Extremely Negative)	0.2%			

The highest result is recorded amongst neutral tweets, which amount to 45.15% of the corpus. The quantity of neutral tweets could possibly be explained by the fact that the corpus scrutinized revolves around the official communications of a global NGO, which would be unlikely to have extremely inflammatory or polarized language. 6.06% of tweets present mildly positive and mildly negative sentiment, while 2.5% present both positive and negative sentiment. These percentages could indicate scores of sarcasm. Yet, they could also relate to the aforementioned frames of the fight and the support, which are often mentioned within the same tweet, bringing about both negative sentiment towards oil companies and positive sentiment towards advocates of environmental causes. Tweets with mildly positive, positive, and highly positive sentiment registered consistently higher numbers than tweets with varying degrees of negative sentiment. However, while extremely negative sentiment was detected, no extremely positive sentiment was detected. Hence, negative feelings are expressed with a wider range of intensity than positive feelings.

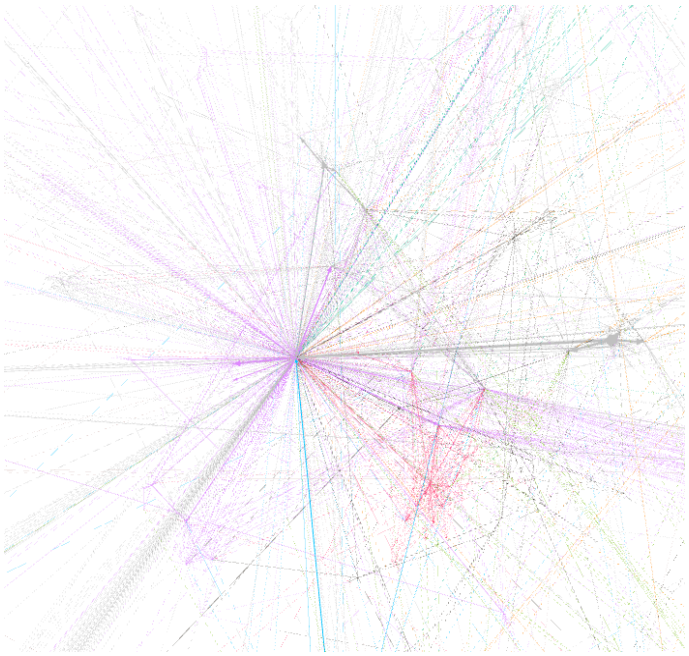
Notably, the quantity of tweets detected seems to decrease exponentially as sentiment intensity increases. In fact, there are big gaps between the percentages of tweets with negative sentiments, which go from 10.56% to 5.77%, 1.76%, and 0.2%. Furthermore, a similar pattern is found in positive sentiments (from 12.9% to 7.53% and 0.39%). This could indicate a pattern whereby 350's communication mirrors a majority of its audience who feels moderately about the topics touched upon, while a minority of users may feel strongly about them. This observation points to the difference between sub-communities of users present in the dataset, as well as different ways of engaging with 350 and vice-versa. The next section delves deeper into the exploration of the communities found within the dataset, and the connections between them. This is done by applying network analysis to 350's communications. The reporting starts from the extraction of mentions from the dataset, it

proceeds by illustrating the elaboration process using Gephi, and it concludes by analysing the network analysis findings.

4.5 Mention Network Analysis with Gephi

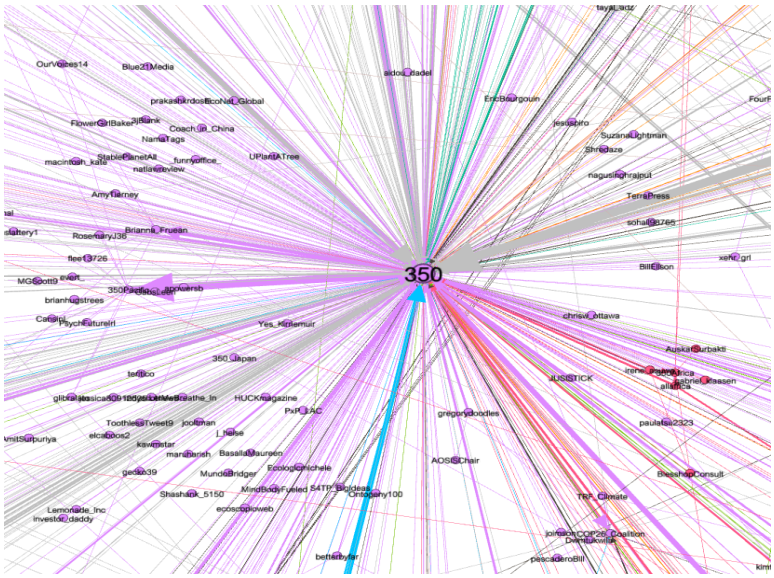
A network of mentions was extracted from the data scraped with SNScrape, using the program Metions_Network. Results show 1.805 nodes, and 4136 edges, which were filtered to exclude so-called self-loops (edges which start and end at the same node, indicating cases where users retweeted their own previous tweets). After running network overview statistics, 45 sub-communities were found within the network, and the average degree centrality (how often nodes connect to each other) was found to be 2,289. The algorithmic visualisation Force Atlas 2 was run with 7 threads, tolerance speed set to 1.0, approximate repulsion applied, an approximation of 1.2, scaling set to 2.0 and gravity to 1.0. Hubs were dissuaded, LinLog mode was activated, overlap was prevented, and Edge Weight Influence was set to 1.0. After this, the visualisation of the network was adapted to present nodes of varying sizes depending on their degree centrality, and of different colours based on the subgroup they belong to (or modularity degree). The summary and result of these actions can be observed in figure II below.

Figure II. First Step in Gephi visualisation.



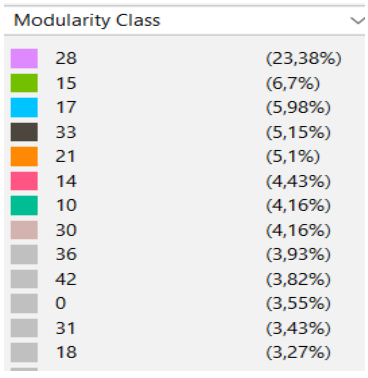
The following step was to make the nodes recognizable by displaying their relative username (called label) and scaling that label to match the size of each node. As shown below in figure III, 350 appears to be the biggest and the most relevant node, around which all edges seem to converge.

Figure III. 350 Network Centre Zoom.



As can be noted in the modularity class colour palette below (figure IV), only a few of the 45 communities compose more than 4% of the graph.

Figure IV. Modularity Class Palette

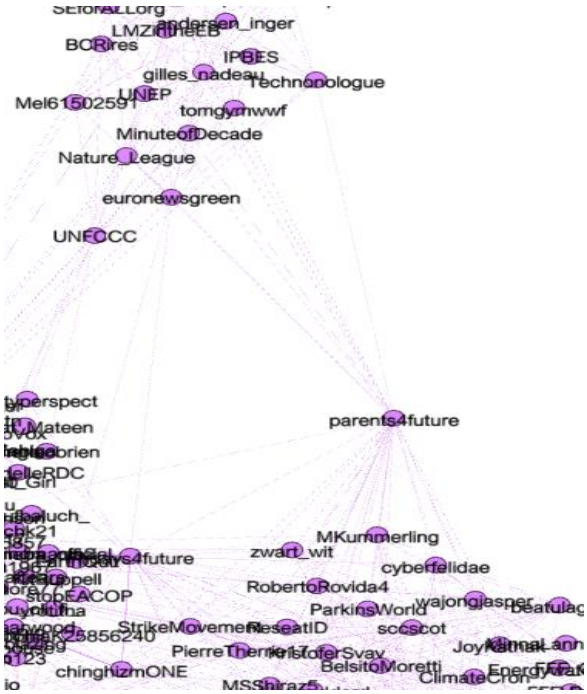


To delve deeper into the exploration of the biggest sub-group, the network visualisation was filtered to show only nodes and edges belonging to the modularity class 28. The resulting network is illustrated below (illustration V).

Figure V. Modularity Network 28.

This network is composed of a central circle and several peripheral hubs. The upper left part of the network may look like a hub at a first glance, but it is actually not a group of connected users. These users are in fact all connected with 350, but not to each other. Instead, what we see in the other peripheral clusters is groups of users connected to each other, to other subgroups, and to the centre via common contacts. Such a user connecting two different groups can be a powerful gatekeeper, a bridge of information, a middleman, or a crossroad deciding where information spreads to and possibly imposing their own narratives on the tweets or messages which -after being filtered by them- are spread to subgroups. This is measured in network analysis with the criteria of betweenness centrality and is usually a relevant point of inquiry. In the example below, the user @ParentsforFuture is such a bridge between different groups (figure VI). Users with the highest betweenness centrality are relevant information spreaders for 350's communication strategies. In fact, knowing gatekeepers and bridges can be useful to consolidate presence within a certain community, or explore new communities not yet reached.

Figure VI. @ParentsforFuture betweenness centrality.



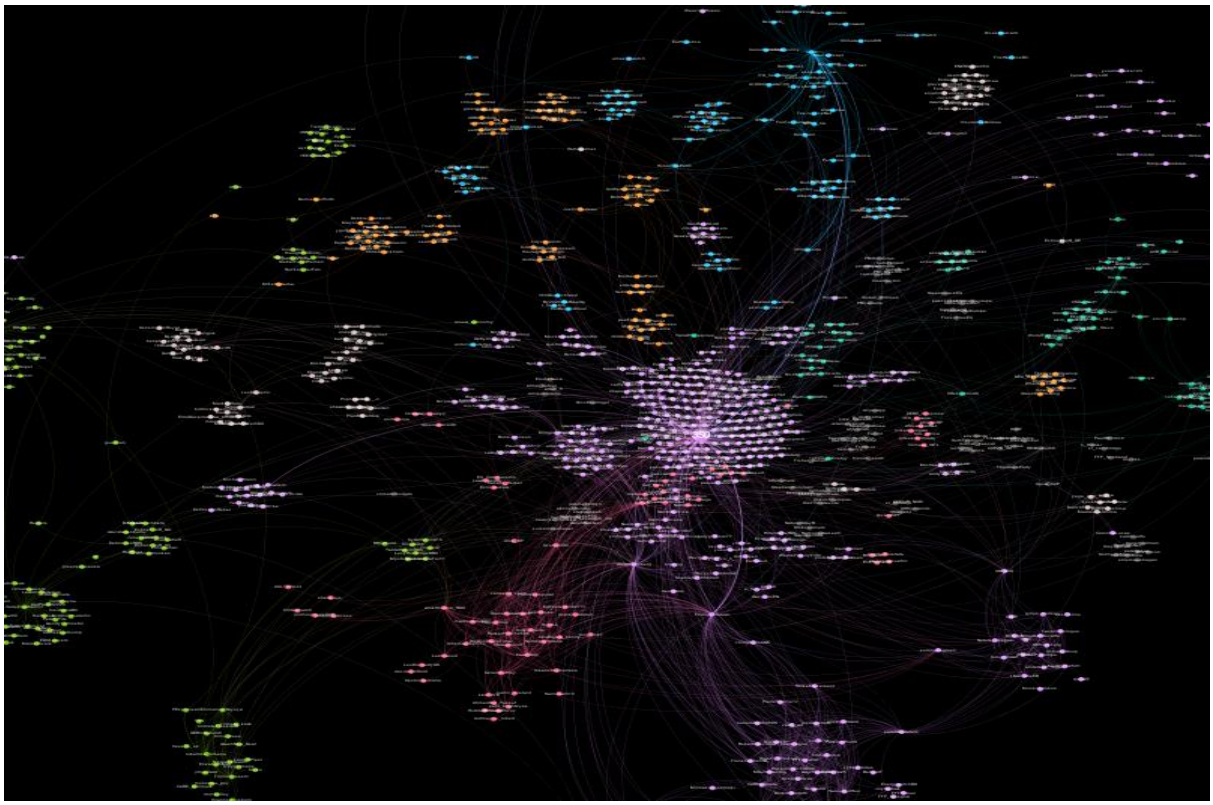
Following this in-depth analysis, the network was filtered to include modularity class groups with more than 4% relevance to the dataset. For a better representation the algorithmic visualisation NoOverlap was run with a speed of 3.0, ratio of 1.2, and a margin of 5.0. The data laboratory was set to show details relative to labels (or usernames), the popularity of users (or Page Rank), the betweenness centrality of gatekeepers and bridges as mentioned above, the extent to which each user tags and is tagged by others (weighted out-degree and in-degree), followed by the number of retweets, replies, and likes (or favourites) received by a user. 350 consistently scores highest in all these measurements, meaning that the account is not only very popular, but also very active, and obviously, a connection point for many different communities.

Upon a closer look at betweenness centrality, 350 (with a betweenness centrality score of 73.303,5) is followed by Fridays For Future Bangladesh (@FFFinBD; 9.913,5 betweenness centrality) and Sohanur Rahman (@SohanBMYP; 1.764 betweenness centrality), a Chief Executive of Bangladesh Model Youth Parliament, and Co-founder and Coordinator at YouthNet for Climate Justice. These two bridges seem to powerfully connect 350 with South East Asian audiences. The Scottish chapter of Extinction Rebellion then connects 350 with Scottish activists and environmentalists, but from there on, betweenness centrality seems to decrease exponentially.

As a final step, the network visualisation was regulated to show Node Border Width of 1.0 and Opacity of 100.0. Node labels were set to appear with a proportional size, and the

outline opacity was set at 80.0. Edges were then regulated with a thickness of 1.0, mixed colours to reflect their modularity class, opacity of 70.0, curved lines, and a radius of 0.0. In the final steps of this investigation, edge arrows were set to a size of 3.0, and edge labels were set not to show, resulting in the network visualisation below (figure VII, VIII, and IX).

Figure VII. 350's Twitter Mention Network.



It seems that 350 is adopting a funnel model to its strategy to reach users around the globe: by talking about the big themes of the COP26 and connecting with regional personalities more than global organisations, it seems to indirectly reach grassroots communities of environmentalists with content that has to do with their niche of interest and that -being elaborated by the gatekeepers/bridges/middleman- is close to their preferred narrative.

Figure VIII. 350 Network Upper Half.

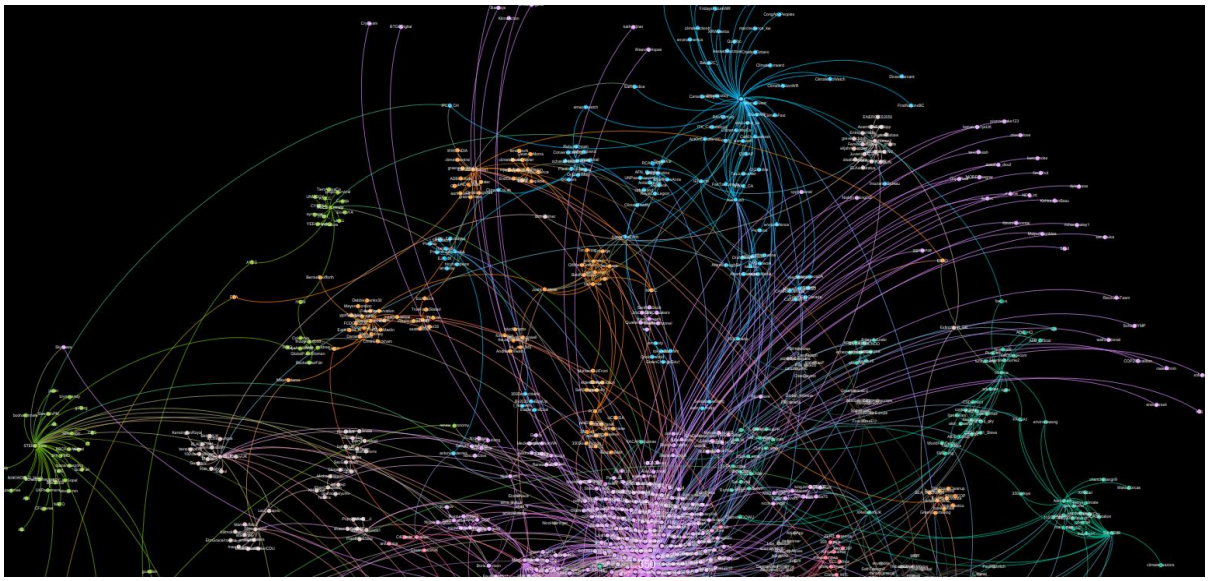


Figure IX. 350 Network Lower Half.

5. Discussion & Conclusion

This thesis examined 1.000 tweets and retweets by the international ENGO 350 between October 31st 2021 and November 12th 2021, to gain insights into the organization's Twitter communication of environmental themes around and about the COP26, held in Glasgow during those dates. The research question guiding this thesis is "how did ENGO 350 make use of persuasive digital marketing to communicate environmental causes on Twitter during the COP26 of 2021?" To elaborate a thorough answer to this question, this thesis is structured around four sub-questions: (I) "what frames can be found in 350's communication of the COP26 events?" (II) "How did 350 use heuristic and systematic persuasion routes during COP26?" (III) "Can 350's communication during the COP26 be categorized as social marketing?" (IV) "How can 350's network of interactions be described?"

The research question is answered as follows. Results show that Twitter is used specifically for commentary with fellow environmental organizations about the happenings of the COP26, rather than to raise awareness, call users to act, or address and confront policymakers on environmental issues. In this way, as predicted by Stolle & Hooghe (2005), social media communication is used to complement offline action rather than to replace it. In fact, not only did 350 extensively cover the COP36, but it also sent a representative of its Pacific region branch: Joseph Sikulu, Pacific Regional Director at 350. Sikulu represented the interests of communities of the Pacific region not just at the COP26, but also at the BBC Debate Nights about the conference, hence 350's Twitter profile paid extensive attention to his statements as well as to the themes that he brought forward. 350 used a variety of frames, including the "travel frame," the "future frame", the "hero frame", and the "support frame." The organization, moreover, leveraged predominantly on heuristic rather than systematic persuasion. 350's communications, can only partially be regarded as social marketing, yet they can be considered as part of a bigger communication strategy which involves marketing to some degree. 350 mostly communicated with issue publics, fellow ENGOs, and public personas. However, the data shows that 350 has indirectly reached communities all over the world -especially in the U.S., Canada, Scotland, Bangladesh, and the Pacific region.

In 2019, Evans Comfort and Hester assessed 350's Twitter communication patterns during the COP21 conference, which took place in 2015. They measured the volume (or amount) of tweets, the topic valence of the tweets (to understand whether tweets remained on-topic and favourable to 350's statements), and, lastly, the demographic composition of participants in the communications. Thus, they did not examine in-depth the topics discussed

in the tweets and the frames used, which on the other hand, is done in the present thesis. They found that the volume of engagements was high because 350 was commenting on current events relevant to their audiences, however, digital conversations kept taking place even though at a low intensity, long after the civil society events had taken place. Furthermore, they found that while the conversations stayed on topic throughout the COP21, sceptic voices doubled as time passed, indicating the physiological debate and message appropriation that takes place on social media and that cannot be avoided by organizations. Moreover, they found that 350 had mostly engaged with activists during the COP21. On the contrary, in 2021, 350 engaged mostly with ENGOs instead of individual activists during COP26. One further difference between the study by Envans Comfort and Hester and the present thesis is the fact that while the former looked into tweets related to a hashtag promoted by 350 (#climatemarch), the latter is an exploration of the tweets and retweets published directly by the organization. Results show that, in 2015, 350 had been promoting the hashtag #climatemarch, in combination with offline events such as marches and strikes. In 2021, 350 replicated and updated this, by promoting the hashtag #PeopleToTheFront (see for example 350 dot org, 2021n) while organising actions with other civil society groups and supporting the actions of other NGOs. However, the diversity of topics touched upon changed across the two conferences, In 2015, 350's communication remained virtually completely focused on the theme of climate change, while in 2021, the organization adopted a variation of topics within the wider environmental theme such as the topics of inequality, sustainable investments, net-zero emission policies, and the representation of grassroots communities from the peripheries of the global south. Furthermore, in 2015, 350 had been mostly tagging individual activists, while, in 2021, it targeted organisations, which then spread information to activists, who in turn, pushed information to their own audiences.

In 2019, Evans Comfort and Hester had suggested that environmental campaigns shall target decision makers and news media, aiming for specific goals and using specific calls to action, instead of simply commenting on the events with already converted followers. This remark remains valid today, considering that during COP26, 350 was mostly talking to its own already interested issue public rather than talking to new audiences via news, or confronting decision-makers directly. As concluded in 2019, 350 continues to use Twitter to communicate with its issue public, who likely won't appropriate the organization's content to use it against it but rather in its support. It is fair to consider, however, that if 350 did otherwise, it could incur reputational risks, as well as the risk of compromising its position by

antagonising policy-makers. The following sections offer more in-depth discussions and summaries of the results found, each divided according to the four sub-questions.

5.1 Frames, Sentiment, & Sub-Question I: "What Frames Can be Found in the Dataset?"

Sentiment analysis revealed that the sentiment recorded most often was neutral. Varying degrees of positive sentiment were found consistently more often than degrees of negative sentiment, while negative sentiment was expressed in a wider variety of intensities than positive sentiment. Moreover, sentiment findings suggested the presence of a majority of the audience of 350 who seems to feel less strongly about the topics discussed in the tweets, while a minority of the audience seemed to feel more strongly about them.

Topics found through topic modelling were coupled with frame analysis based on van Gorp's (2007) framework. Topic 1 "Community representatives travel to Glasgow for world climate action" covered 15% of the dataset and revealed a first "travel frame". This frame does not assign readings of protagonists and antagonists, but rather shines a light on the theme of the representation of communities from developing countries in international mediations and regulation efforts on climate change mitigation. Topic 2, accounts for 6% of the dataset and is named "Countries and finance end fossil fuel investments at COP26." This topic does not lead to the detection of any frame, but rather, it highlights 350's position on sub-topics such as climate finance, net-zero emission policies, and inequality. Topic 3 is centred on the urgency of acting now to prevent future damage, and it is operationalised into a second frame, called "future frame". Topics 4 to 7 encompassed European institutions, speakers of the BBC Debate Night, and American networks of environmentalist public persona, but they do not lead to the detection of any further frames. However, these topics cover 10% of the dataset, highlighting the great relevance and quantity of mentions in it. Nevertheless, mentions are generally not coupled with calls to action, indicating the use of Twitter for commentary rather than mobilization.

All topics seem to be permeated by narratives of solidarity with fellow ENGOs and grassroots advocacy groups, as well as themes of rejection of powerlessness and victimisation, bold rebellion, struggle, and even fight for self-determination and environmental preservation, against policymakers and anyone who invests in non-renewable energy. Upon further reading and application of van Gorp's model, this insight led to the detection of two further frames, called "the hero's fight frame" and "the support frame",

which highlight themes of resistance and solidarity. Furthermore, insights from the personas of Joseph Sikulu and Leilani Münter show an emerging diversity of narratives used to communicate environmental causes, from emotional narratives of self-determination and group belonging, to empowering and entertaining narratives of empowerment.

5.2 Persuasion & Sub-Question II: "How Did 350 Use Heuristic and Systematic Persuasion Routes During COP26?"

Systematic routes to persuasion can be thought of as trying to convince readers through argumentative strength, facts, number of claims and objections brought forward. Heuristic routes to persuasion, instead, leverage things such as group association, credibility, and tone. Heuristic and systematic argumentations can be and often are used simultaneously with varying proportions, yet in the case of 350, the heuristic route to persuasion was more prevalent. In 350's communication, it has been observed that claims are generally not followed by any argumentation (likely in part due to Twitter's restrictions to 140 characters). For instance, arguments are brought forwards against net-zero emission policies and against financial investments in non-renewable energy resources, as well as claims on the responsibility of rich countries to invest more in solutions and regulations to tackle climate change. Yet, these claims are not substantiated with further arguments or evidence. Moreover, explicit claims are not prevalent in the corpus. Instead, things like assignments of responsibility, urgency of action, and group association are mostly communicated via frames. For example, 350's allyship with disadvantaged communities is signified via the association with Sikulu and the communities of the Pacific, and the "support frame." Furthermore, 350's communication seems to leverage the HSM principle of defence motivation, according to which ego-involvement and confirmation biases play an important role in persuasion processes (Chaiken, & Ledgerwood, 2011). Accordingly, 350's arguments are mostly confirmatory of the beliefs already held by the organization's audiences.

The aforementioned conclusions are also verified against the results by Evans Comfort and Hester (2019): both in 2015 and in 2021, 350 mostly addressed followers and fellow activists, rather than directly politicians, industry representatives, and decision-makers present at the conference. Moreover, 350 made extensive use of rhetorics while limitedly leveraging argumentative elaboration. As illustrated previously, the use of rhetoric devices is tightly interlinked with heuristic persuasion processes, while argumentative strength is tied to

systematic persuasion processes. Thus, 350's Twitter communications during the COP26 leveraged more on heuristic rather than systematic principles of persuasion.

5.3 Social Marketing & Sub-Question III: "Can 350's Communication During the COP26 be Categorized as Social Marketing?"

Social Marketing was operationalized as having (1) the goal of influencing behaviour for social good; (2) ethical principles; (3) integration of data and theory in the strategy and the content; and (4) interaction with audiences (Akbar et al., 2013). Firstly, as observed in the analysis, 350 clearly has the goal of steering citizens and policymakers towards supporting environmental initiatives. (1) However, clear calls to action are not common in the dataset, making it hard to understand whose behaviour 350 would like to influence in the short term, and how that behaviour should change. 350's communication is in fact mostly addressed to issue publics that are already interested in and committed to environmental causes. Secondly, (2) 350's communication does indeed comply with the second principle of adherence to ethical standards. In fact, the organization's claims of support to indigenous activists are backed by effective support through its Pacific branch. Thirdly, (3) the integration of factual data in 350's communication is not registered in the corpus inspected. Yet, to find out whether data and theory have been integrated into the design of 350's communication strategy the research should include interviews with the professionals that drafted the strategy. Lastly, (4) the interaction with audiences and the delivery of segmented social change is partly present in 350's communication, since the organization interacts with audiences mostly via other organizations and public figures. In fact, while 350 posts global and general messages, these are appropriated by local NGOs and activists, who act as middlemen between 350 and a variety of geographically and thematically bound audiences. In doing so, these middlemen adjust 350's narrative to mirror what these more niched audiences align with. In this way, they indirectly deliver a segmented and targeted communication which aims at social change and which include not just two interlocutors, but also a variety of middlemen. Finally, 350's communication seems to be concerned with offering value, which ranges from informational value on the happenings of the COP26, to emotional value of, for example, group belonging and minority support. This step of value offering is generally seen as a stage of marketing strategies- which for instance can encompass raising awareness, identifying problems, offering value or solutions, and finally,

motivating users to take action (Snow & Benford, 1988; Gonzalez et al., 2002; Andreasen and Kotler, 2003; Kara et al., 2004; Macedo and Pinho, 2006; Padanyi and Gainer, 2004; Sargeant et al., 2002). 350's communication seems to fit within a marketing strategy at the step of awareness and value offering aimed at gathering support for the organization rather than changing behaviours

In conclusion, 350's Twitter communication during the COP26 can only partially be regarded as social marketing, but rather as a part of a wider communication strategy. These considerations point to the need for the development of a more complete framework to analyse social marketing strategies. In fact, as demonstrated, the framework used here is not fit to encompass all stages of social marketing strategies. This take is discussed in further depth in the section on the theoretical and practical implications of this thesis. The next section, instead, explores the answer to the fourth and last sub-question of this thesis, through the discussion of the findings of the network analysis carried out.

5.4 Network Analysis & Sub-Question IV: "How Can 350's Network of Interactions be Described?"

The network of mentions in the dataset also signals that 350 seems to be using Twitter to associate itself with smaller, more geographically grounded organizations, in order to indirectly make people aware of the fact that it supports the activists that they follow. The corpus investigated presents four main geographical dimensions: firstly, the U.S. and the Pacific region, and secondly, Canada and Scotland. 350 holds a central place within the network, both figuratively and literally: the organization has the most statuses, followers, retweets, and likes across its whole network, representing a popular connection point for different communities. Moreover, the most frequently used terms are often mentions, indicating a special attention to environmental organizations either as interlocutors in conversations or topics thereof. 350 seems to connect with users and profiles that may have fewer followers yet a more geographically-bound relevance in order to indirectly reach users around the world in targeted ways. By going through middlemen such as local NGOs and activists, 350 tends to target its communications to fellow organisations or influential personalities who then spread re-appropriated messages to their own communities. Examples are connections to South East Asian audiences via the Bangladeshi chapter of Fridays for Future and Sohanur Rahman (of Bangladesh Model Youth Parliament), or the connection to Scottish audiences via the Scottish chapter of Extinction Rebellion. Current literature seems

to see only two possible interlocutors in online environmental conversations, namely environmental organizations and audiences (Arora, 2012; Katz-Kimchi & Manosevitch, 2015; Brulle, 2010; Evans Comfort & Hester, 2019; Brulle, 2012; Lovejoy et al., 2012). Yet, the network analysis brings to the surface the fact that dialogues are actually punctuated by middle man, gate-keepers, and information-spreaders. This calls for the update of currently used theories so as to incorporate the new, manyfold roles that individuals can take as spectators, protagonists, and representatives of environmental causes (Katz-Kimchi & Manosevitch, 2015). In analogic realities, roles within communication are relatively straightforward, but with social media more dimensions of communication come into the picture. Firstly, organizations may address messages to fellow organizations to signal their active or desired audiences with a variety of group associations based on similar values. For instance, 350 signalled its support of grassroots environmental activists and disadvantaged communities through its group affiliation as noted above. Secondly, organizations can filter and adjust messages to a variety of audiences through the appropriation of narratives carried out by grassroots organizations. For example, the message of 350 representative Joseph Sikulu on climate change as a matter of self-determination was addressed to decision makers, however, it was reappropriated by @OneMoreYesScot to appeal to pro-independence Scottish audiences. Thirdly, organizations may position themselves strategically in face of decision-makers by contributing to networked messages which then come across to policy-makers and the general public as representative of the stance of not just one organization but a whole group of organizations, movements, and individuals. For instance, by joining the public debate on climate finance, 350 positioned itself within the societal group of those opposing net-zero emission policies, contributing to the volume of voices that share this stance and its perception by policy-makers and the wider public. Because of these insights, it is argued that new models of networked communications should incorporate the idea that networked communications are multi-dimensional. In the next section, this and further implications for researchers and practitioners are discussed.

5.5 Theoretical and Practical Implications

The findings and discussion above highlight some contributions brought by this study to the research field of environmental communications. One observation is that a new and more flexible framework for the identification and conceptualization of social marketing is needed in order to properly account for the complex structure of communication strategies

employed by ENGOs. Frameworks, would in fact be more practically implementable if they incorporated definitions of social marketing such as Akbar et al.'s (2013) with a wider variety of insights from the marketing field, such as Snow and Benford's (1988), Karpf's (2012), Kotlter and Zaltman's (1971), Morgan et.al's (2019, and Hestres (2014). For instance, Hestres' hybrid mobilization model (2014) would be useful to allow flexibility and acknowledge that the strategies implemented by organizations can change according to current affairs, conferences such as the COP26, and the needs of the cause supported.

Another consideration is that it may be useful for studies to more often implement network research, so as to test and exploit the insight that organizations often do not engage in one-dimensional conversations on social media like a person would offline when talking to an interlocutor. Instead, on social media, organizations can leverage network dynamics to simultaneously communicate to other NGOs, issue publics, gate keepers, bridges, information spreaders, policymakers, and the general public. Frameworks for the study of organizational communications should thus take into account the multidimensional and complicated nature of networked communications.

5.6 Limitations

This research presents a number of limitations. First, the validity of topic modelling is hard to measure: this is usually done in bigger studies by using second human coders. This goes beyond the possibilities of the current thesis. However, this limitation was tackled by going beyond the face validity of the topic models and applying van Gorp's (2007) model of framing packages.

Furthermore, while replicability and generalizability, are commonly ensured by the use of strongly representative samples, the current sample is tied to a specific NGO during a specific time frame. As shown in the comparison with the study by Evans Comfort and Hester (2019) of the 2015 COP21, there are many relevant differences even between how the same event is covered during different years.

Additionally, SNScrape allows the mining of data from back in time, but it does not allow for the randomization of the sampling, which is necessarily gathered in chronological order. Moreover, restrictions and privacy regulations may impose a bias on the dataset. This however did not seem to have relevant impacts on the current research.

5.7 Future Research

This thesis highlights many useful avenues for future research. First, to complement and complete the assessment of 350's strategy, it would be interesting to implement expert interviews with managers and executives or to access planning documents. A consideration that emerged several times during the research is the idea that 350's communication strategy may vary greatly outside of the COP26. Hence, a possibility of research is in the chronological comparison of measurements, which on the other hand would also allow testing Hesters' 2014 hybrid mobilization model. Finally, studies with greater datasets (which would require more powerful computational tools) could yield more topic modelling and frame results.

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Appendix A

A1. *Python 3.6 code written into the SNScrape36 to assign the scraping Twitter information used in this Thesis.*

```
C:\Users\vmalgioglio\Downloads\snscrape36>
C:\Users\vmalgioglio\Downloads\snscrape36>snscrape36.exe --sleep 0 --max-results 1000 --format "{date};{username};
\"{user.location}\";{user.followersCount};{user.friendsCount};{user.statusesCount};{user.favouritesCount};{user.ve
rified};{lang};{source};{replyCount};{retweetCount};{likeCount};{quoteCount};\"{content}\";{url}" twitter-search "
@350 since:2021-10-31 until:2021-11-12" > output.txt
query = @350 since:2021-10-31 until:2021-11-12
Current encoding: cp1252
New encoding: utf-8
100 200 300 400 500 600 700 800 900 1000


C:\Users\vmalgioglio\Downloads\snscrape36>
```