Communication
& Methods

The MIME Methodology and the Moral Foundations Theory for Studying Climate Change in Three Approaches

La metodología MIME y la teoría de los atributos morales (MTF) para el estudio del cambio climático en tres enfoques

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Abstract:
The Model of Intuitive Morality and Exemplars – MIME will be presented as a psychometric method applied in our research work on digital journalism. MIME combines moral psychology theory with media influence theories to describe how individual moral insights intertwine with media moral narratives. For this, 60 news on climate change has been collected and classified from digital newspapers with the most readers in Portugal. The sample has been selected from news from 2017 to 2021 when there have been extreme weather events in Portugal. This methodology has allowed us to identify articles with more than one moral value, which has generated a list among

the most outstanding, according to length, lexical diversity, and number of information sources.

Keywords:
Climate Change; Methodology; MIME; Moral Domains; News.

Resumen:
En este artículo se presenta la aplicación de un método psicométrico, el Modelo de Moralidad Intuitiva y Ejemplares – MIME, sobre una investigación en periodismo digital. El MIME combina la teoría de la psicología moral con teorías de influencia de los medios, para describir cómo las intuiciones morales del individuo se entrelazan con las narrativas morales de los medios. Para ello, han sido recopiladas y clasificadas 60 noticias sobre cambio climático de los diarios digitales con más lectores de Portugal. La muestra ha sido seleccionada entre noticias de 2017 a 2021, cuando ha habido eventos climáticos extremos en Portugal. Dicha metodología nos ha permitido identificar artículos con más de un valor moral, lo que ha generado una lista entre los más destacados, según extensión, diversidad léxica y cantidad de fuentes de información.

Palabras clave:
Cambio climático; Metodología; MIME; Domínios Morales; Noticias

Introduction

The scientific consensus on the existence of climate change, its effects, and the need to mitigate it is well established. However, the complexity of the phenomenon leads individuals to have different understandings of it and varied opinions on how to combat the problem. The fact that the climate crisis is generated today but its impact is felt over decades makes the issue less tangible, and people may not feel capable of easily changing their behavior (Giddens, 2010).

According to the Copernicus Atmosphere Monitoring Service (Granier, 2019), it is already known that high-intensity fires have been increasing in frequency in some parts of the world. However, the connection between climate change and these and other extreme weather phenomena is not clear to the general public, as the phenomenon generates long-term consequences. Thus, the perception of these climate change relationships may not necessarily align with the current state of the environment, creating space for alternative narratives. One such narrative is the proliferation of fake news on the subject (Lutzke et al., 2019; Pennycook, 2022).

In this context, the media plays a crucial role in the social construction of climate change (Carvalho, 2010). In fact, public engagement with the issue involves a variety of discourses and encompasses what people think, feel, and how they react to climate change (Whitmarsh, O'Neill & Lorenzoni, 2013).

The discourse of alternative media can offer a different system of understanding climate change and promote different political subjectivities (Carvalho, 2010, p. 6). In an initial study on climate change in the Portuguese cyberspace, for example, Carvalho (2007) found that there was not much information available for laypeople, which is a fundamental condition for decision-making by collective and individual actors (2007, p. 9).

Social media platforms have also shown potential influence on the issue, thanks to the human tendency to attribute credibility to known individuals such as family and friends (Auer, Zhang, & Lee, 2014; Lai & Turban, 2008; Recuero & Zago, 2009), or when they amplify the effects of bubbles or echo chambers (Recuero, Zago, & Soares, 2017). In Portuguese and Spanish Twitter posts about climate change, there were no climate change denial references, but few reports presented climate change as a hypothesis, with more posts focusing on future consequences (Balbé & Carvalho, 2017). An analysis of engagement with climate change on Facebook suggested the existence of several limiting factors and barriers (Balbé & Carvalho, 2016).

As a contribution to this debate, we propose to understand how personal moral domains influence the consumption of environmental news and whether they generate engagement with the climate issue. This article outlines part of that study, presenting how the Model of Intuitive Morality and Exemplars (MIME) (Tamborini, 2012) can be used for news analysis, and it intersects with the Moral Foundations Theory (MFT) (Graham et al., 2013; 2018) to examine how these factors influence decision-making regarding environmental news consumption.

2. Theoretical Framework

For the understanding of the methodology presented in this article, it is necessary to introduce the theoretical concepts on which it is based, as these topics sometimes interact together.

The Moral Foundations Theory (Graham et al., 2013; 2018), addresses the origins and variations of human moral reasoning based on innate and modular foundations, and how they influence human decision-making. To understand the relationship between morality and the consumption of climate news, our study has utilized the five moral identity scale by Graham et al. (2013): (1) care/harm (concern for the suffering of others); (2) fairness/cheating (preference for reciprocity and justice); (3) loyalty/betrayal (concern for the common good and prejudice against strangers); (4) authority/subversion (respect for authority and hierarchy); and (5) sanctity/degradation (concern for purity).

The other concept and methodology for our study has been the Model of Intuitive Morality and Exemplars, known as MIME (Tamborini, 2012; Tamborini & Weber, 2020; Eden et al., 2021), a protocol for selecting narratives in texts and their moral

evaluation. MIME combines the Moral Foundations Theory with media influence theories to describe how individuals' moral intuitions intertwine with moral narratives in the media.

The hypothesis of MIME is that media content can influence an individual's perception and behavior through a priming mechanism (Tamborini, 2012) of the consumed content. Moral narratives, which may align with or go against the receiver's bias, can activate individuals' salient, collective moral intuitions. This can lead to an automatic response to either reinforce or reduce exposure to the narrative, resulting in a positive or negative reaction to the media content in our case.

The first stage of MIME considers how media content and the cultural environment can affect both domain and exemplar prominence. Thus, morally relevant exemplars within an individual's context can make moral domains prominent in the narratives. Furthermore, such exemplars emphasize the importance of individuals' moral domain that they consume, stimulating the relevance of narrative exemplars and individual domains (Graham et al., 2013, n.d.).

The second stage of the model describes the paths of exemplar and domain prominence for automatic evaluation. In this stage, individuals pay attention to content in the media with emphasized moral implications, such as copies of domains that are chronically accessible or temporarily available. This allows us to observe which processes generate evaluations consistent with the valence of moral domains highlighted by environmental cues. In the case of media content, the evaluation is an affective response represented as the appeal of specific content. This stage describes automatic processes that deal with the narrative as a whole (Graham et al., 2013, n.d.).

The third stage of the model includes the pathways from exemplar and domain prominence to controlled reevaluation. This stage describes rational processes that deal with cases in which individuals decide whether the content is consistent with their general moral domain system, even if it is not completely consistent with all parts of the system (Graham et al., 2013, n.d.).

The fourth stage of the model describes the pathways from automatic evaluation and controlled reevaluation to selective exposure. The aim is to perceive the selection of moral narratives with activated individual domains by selecting materials that present all domains or at least support those domains that are salient. Research on political media, for example, shows that users have preferences for content and media that align with their attitudes and tend to avoid content that is inconsistent with their attitudes (Mastro et al., 2012).

In the case of our study, we have used the simplified version of MIME (Weber et al., 2018), where meanings have been considered and classified into periods, sentences, and narratives that encompass subjective moral intuitions. The following criteria have been taken into account for the selected articles:

• Text length: Shorter articles can facilitate the identification of moral attributes. In the case of longer articles, they may contain more than one moral value, requiring identification of the predominant moral based on the narrative construction.

• Lexical diversity: Texts with grammatical, semantic, and lexical richness can make it more challenging to identify the primary moral attribute contained in the narrative.

• Number of sources: In journalistic texts, a low quantity and variety of sources can determine lack of information. In the case of articles selected for MIME, they can generate latent moral narratives that are more complex and difficult to identify.
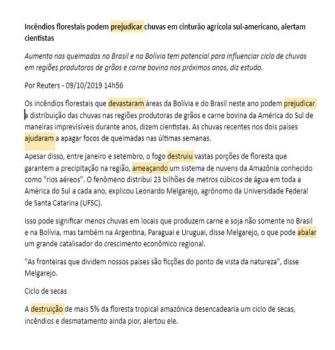
The difficulty in analyzing news narratives lies in the predisposition of hard news texts to not contain clear moral narrative structures (as they lack moral classification words, such as adjectives), which makes it challenging to identify salient morals. Nevertheless, it has been possible to collect articles with at least 500 words that included some moral content, either in the text's meaning or in the headlines and subtitles. According to Tamborini (2012), the more challenging the text and the less confident the coders are in their coding, the lower the reliability of their results. Conversely, the more similar the coders' responses are, the higher the reliability of the chosen sample for obtaining reliable results.

2. Methodology

A total of 60 journalistic news texts were collected for this study, produced between 2017 and 2021, from the Portuguese news websites CM Jornal (www.cmjornal.pt) and Jornal de Notícias (www.jn.pt). The collection method involved using the search function on the websites of the newspapers, applying the terms "mudanças climáticas" (climate change), "alterações climáticas" (climate alterations), "clima" (climate), and "aquecimento global" (global warming). The Intuitive Moral Exemplars Model, described earlier, was utilized for this purpose.

Figure 1

Example of a news article classified with the prominent moral attribute of care/harm (in Portuguese)

For each article, the most prominent moral foundation was sought among (1) harm/care, (2) fairness/reciprocity, (3) ingroup/loyalty, (4) authority/respect, and (5) purity/sanctity, according to the MFT. Using the simplified MIME, articles with at least 500 words were selected, which included some moral content registered in sentences, words, or the overall sense of the text, related to the MFT terms. As the texts were news articles, headlines, subheadings, and leads were also considered.

After selecting texts with the aforementioned topics and a much smaller number of cases to evaluate, they were reevaluated by the group of coders to generate relatively high levels of agreement on the previous coding task, with an equal number of articles for each moral foundation.

To reduce the margin of error, the correction method suggested by MIME was adopted. In this case, the collection was reevaluated, and one coder was selected by the other two coders. The selection of coder 1 was confirmed by coders 2 and 3; the selection of coder 2 was confirmed by coders 1 and 3; and the selection of coder 3 was confirmed by coders 1 and 2. This was done using a calculation of three variables: the primary moral foundation alone throughout the article, the combined primary and secondary moral foundations throughout the article (e.g., harm and justice, or authority and sanctity, etc.), and the moral foundation attributed to the entities selected by both coders (in the case of news texts, it was conventionally understood that the entities referred to the sources in the text).
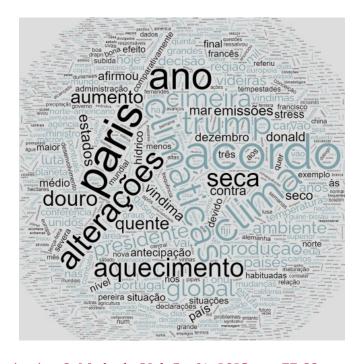
In the end, at least one article with more than one moral value was retained in a list from which the coders could select up to four entities, as required by the MIME protocol. This way, at least five news articles per country were obtained from the initially collected 500. To do this, a table was created with the coders' classification of the existence or non-existence of the aforementioned variables. News articles that had the majority of variables were selected.

3. Results

The initial analysis of the collection has shown that the texts from that period give a lot of emphasis to the developments of the Paris Agreement, a treaty that governs measures to reduce greenhouse gas emissions from 2020 onwards, carried out during the United Nations Framework Convention on Climate Change. Specifically, the focus has been on the withdrawal of the United States from the agreement during the presidency of Donald Trump (2018-2021) and the repercussions on global actors dealing with the environment, such as politicians from signatory countries, the UN, and environmental experts. Additionally, emphasis has been placed on the likely relationship between climate change and the climate events covered in the news, such as global average temperature rise, droughts in specific regions, and the consequences for agriculture, especially in Portugal.

Figure 2

Word cloud of news texts in Portuguese (prepositions, pronouns, and connecting verbs subtracted from the sample)

Figure 3

List of the most frequently used words in the collected texts (in Portuguese)

Cantidad de veces que se utilizó	Palabra utilizada en los textos recopilados
52	acordo
48	paris
44	clima
41	ano
40	climáticas
34	alterações
34	trump
28	aquecimento
27	cimeira
27	seca
25	global
23	douro
21	presidente
20	aumento
20	produção
19	quente
18	ambiente
16	estados
16	países
15	emissões

15	videiras
15	vindima
14	anos
14	contra
14	decisão
14	donald
14	luta
14	mar
14	portugal
14	seco
14	vai
13	afirmou
13	carvão
13	dezembro
13	hoje
13	país
13	região
12	antecipação
12	fiji
12	hídrico
12	mil
12	médio
12	nas
12	stress

12	unidos
11	devido
11	eua
11	final
11	gases
11	nível
11	onu
11	situação
11	temperaturas
11	três
11	vindimas
11	às
10	conferência
10	efeito
10	estufa
10	francês
10	grandes
10	maior
10	ministro
10	nos
10	planeta
10	situações
10	área

After collecting the 60 news articles (30 from CM and 30 from JN), the simplified MIME methodology was applied, considering the meaning in points, sentences, and narratives that trigger subjective, rapid, and spontaneous moral intuitions by the coders.

It was considered that there were relatively similar news articles, which allowed selecting only one among several samples. Additionally, more consideration was given to the perception of the moral attribute in the title, subtitle, and first paragraph since these parts of the text are edited using a technique called clickbait to engage the online audience and to understand the focus of the news article in the first part of the news (inverted pyramid technique).

Finally, the MFT classification - (1) harm/care, (2) fairness/reciprocity, (3) ingroup/loyalty, (4) authority/respect, and (5) purity/sanctity - was used for the final selection of news articles. Five news articles were selected:

1) "Climate change forces 20 million people to abandon their homes each year" (Jornal de Notícias, 02/12/19) with the predominant moral theme of the text: harm; Entity/source: Oxfam; and salient moral: harm and oppression.

2) "Hundreds of people participate in the Climate March in Lisbon" (CM Jornal, 29/04/17) with the predominant moral theme of the text: fairness; Entity/source: population; and salient moral: fairness, freedom, and care.

3) "Pope calls for responsibility for the 'collective good' of the environment" (CM Jornal, 05/06/2017) with the predominant moral theme of the text: authority; Entity/source: Pope Francis; and salient moral: authority and loyalty.

4) "Greenpeace activists scale 180-meter chimney in protest against global warming" (CM Jornal, 27/11/2017) with the predominant moral theme of the text: loyalty; Entity/source: Greenpeace; and salient moral: loyalty, freedom, and care.

5) "Fires: Over 6,700 hectares of protected areas burned this year" (Jornal de Notícias, 04/08/17) with the predominant moral theme of the text: desecration; Entity/source: ICNF; and salient moral: desecration and harm.

4. Discussion

It seems to be a consensus that moral representations in media content can activate related moral intuitions in audiences (Prabhu et al., 2020). However, it is also necessary to understand variations in moral attributes in media appeal, as Bowman et al. (2012) have done in relation to various forms of entertainment in the media. Similarly, as previously emphasized, the news genre can hinder the accuracy of the results obtained by MIME.

Nevertheless, it can be said that evaluations in the format of moral domains can predict individuals' preferences for the media they choose to consume. The scientific literature reveals that the relevance of the domain predicts the extent to which people have thought the news was good or bad (Lewis et al., 2014); that the relevance of loyalty has predicted more positive reactions, as seen with the news of Osama Bin Laden's death

(Tamborini et al., 2011); and that the relevance of harm and justice in moral domains has predicted subsequent movie preferences represented in trailers (Tamborini et al., 2013).

Since these moral intuitions are unable to produce an automatic response to narratives, there are stages that represent how to stimulate these short-term intuition systems. Through continuous exposure to moral examples and controlled reevaluation of responses, it is possible to measure responses to such moral narrative stimuli.

Given that the objective of this article is not the study's results but the application of the presented methodology, more emphasis has been placed on the methodological procedure throughout the text rather than the collection of news articles. In these considerations, we aimed to present the potential and limitations in the development and application of this methodology, as well as to understand how it can be used in other subjects and corpora in the field of communication.

We believe that the methodological combination derived from the MFT concepts and applied by MIME allows for an alternative approach to engagement studies on digital social platforms. It offers a tool for analyzing informative content related to individuals' consumption tendencies, influenced by their rational, emotional, and moral concerns. This psychometric methodology, applied to informative content, enables an approximation of internet users' consumption profiles by comparing individuals' moral profiles with news narratives.

Personalization of terms, narratives, and content collection tools in digital networks can enhance the ability to generate specific data and more reliable results from the vast amount of data available on platforms. Individualized methodologies, such as the psychometric procedure we applied to news articles for their selection, can predict respondents' engagement, testing hypotheses at the time of text collection.

In the case of our research, we already have data collected through an individual psychometric questionnaire and analysis of comments on news published on Twitter, which allows us to assert that there is a relationship between the first and second methods. The last stage of our research will involve presenting the news articles collected using the method presented in this article to young individuals through focus groups. With this, we intend to verify not only if there is engagement with moral narratives but also to find out if the MIME methodology can predict consumers' reactions to texts by identifying moral attributes in news narratives.

As for the limitations of the method, informative texts seek to refrain from qualifying events based on morals, which diminishes the efficiency of MIME in journalism studies. Additionally, when considering hard news, it is possible for texts to contain contradictory moral attributes due to sources, which can also hinder the identification of salient morals in the narrative. Lastly, as the MFT suggests a model of antagonisms

between moral attributes (such as care vs. harm) or combinations of different attributes, it becomes more challenging to accurately identify the salient morals in the texts.

In that context, based on the simplified MIME, our results may have become imprecise, as a more rigorous protocol of the method was not applied. Nevertheless, we hope to have contributed to the debate on web research methodologies by presenting a protocol for narrative evaluation, applied in our case to environmental news texts.

6. References

Auer, M. R., Zhang, Y., & Lee, P. (2014). The potential of microblogs for the study of public perceptions of climate change. *Wiley Interdisciplinary Reviews: Climate Change, 5,* 291–296.

Balbé, A., & Carvalho, A. (2017). As mudanças climáticas no Twitter: a ascendência da mídia e da política. *Desenvolvimento e Meio Ambiente, 40*.

Balbé, A., & Carvalho, A. (2016). Mudanças climáticas em redes sociais: um estudo de caso do Facebook no contexto ibero latino-americano. In M. A. Blanco, M. B. Núñez, F. M. R. de Andrade, & P. Meira-Cartea (Eds.), *I seminário internacional resclima – investigar o cambio climático na interface entre a cultura científica e a cultura común* (pp. 73–86). Universidade de Santiago de Compostela Publicacións.

Bowman, N. D., Jöckel, S., & Dogruel, L. (2012). A question of morality? The influence of moral salience and nationality on media preferences. *Communications-The European Journal of Communication Research, 37*(4), 345-369. http://doi.org/10.1080/15205436.2013.822518

Carvalho, A. (2007). Ideological cultures and media discourses on scientific knowledge: re-reading news on climate change. *Public Understanding of Science, 16*(2), 223-243.

Carvalho, A. (2010). Media(ted) discourses and climate change: A focus on poli- tical subjectivity and (dis)engagement. *Wiley Interdisciplinary Reviews: Climate Change, 1*(2), 172–179.

Carvalho, F., Okuno, H. Y., Baroni, L., & Guedes, G. (2020). A brazilian portuguese moral foundations dictionary for fake news classification. In *2020 39th International Conference of the Chilean Computer Science Society (SCCC)* (pp. 1-5). IEEE. http://doi.org/10.1109/SCCC51225.2020.9281258

Eden, A., Tamborini, R., Aley, M., & Goble, H. (2021). Advances in research on the model of intuitive morality and exemplars (MIME). *The Oxford handbook of entertainment theory*, 230-249.

Giddens, A. (2010). *A política da mudança climática*. Zahar.

Graham, J., Haidt, J., Koleva, S., Motyl, M., Iyer, R., Wojcik, S. P., & Ditto, P. H. (2013). Moral foundations theory: The pragmatic validity of moral pluralism. In *Advances in experimental social psychology* (pp. 55-130). Academic Press. http://doi.org/10.1016/B978-0-12-407236-7.00002-4

Graham, J., Haidt, J., Motyl, M., Meindl, P., Iskiwitch, C., & Mooijman, M. (2018). Moral foundations theory. *Atlas of moral psychology*, *211*.

Granier, C., Darras, S., van der Gon, H. D., Jana, D., Elguindi, N., Bo, G., ... & Sindelarova, K. (2019). *The Copernicus atmosphere monitoring service global and regional emissions (April 2019 version)* (Doctoral dissertation, Copernicus Atmosphere Monitoring Service).

Lai, L. S. L., & Turban, E. (2008). Groups Formation and Operations in the Web 2.0 Environment and Social Networks. *Group Decision and Negotiation*, *17*(5), 387–402.

Lewis, R. J., Tamborini, R., & Weber, R. (2014). Testing a dual-process model of media enjoyment and appreciation. *Journal of Communication*, *64*(3), 397-416.

Lutzke, L., Drummond, C., Slovic, P., & Árvai, J. (2019). Priming critical thinking: Simple interventions limit the influence of fake news about climate change on Facebook. *Global environmental change*, *58*, 101964.

Mastro, D., Enriquez, M., Bowman, N. D., Prabhu, S., & Tamborini, R. (2012). Morality subcultures and media production: How Hollywood minds the morals of its audience. In *Media and the moral mind*, (pp. 75-92). Routledge.

Pennycook, G. (2022). A framework for understanding reasoning errors: From fake news to climate change and beyond.

Prabhu, S., Hahn, L., Tamborini, R., & Grizzard, M. (2020). Do morals featured in media content correspond with moral intuitions in media users?: A test of the MIME in two cultures. *Journal of Broadcasting & Electronic Media*, *64*(2), 255-276.

Recuero, R.., Zago, G., & Soares, F. B. (2017). Mídia social e filtros-bolha nas conversações políticas no Twitter. *Associação Nacional de Programas de Pós-*

Graduação em Comunicação. Encontro Anual (COMPÓS).[Anais], 1-27. Faculdade Cásper Líbero.

Recuero, R., & Zago, G. (2009). Em busca das "redes que importam": redes sociais e capital social no Twitter. *Líbero, 12*(24), 81–94.

Tamborini, R. (2012). A model of intuitive morality and exemplars. In *Media and the moral mind* (pp. 67-98). Routledge.

Tamborini, R., Grizzard, M., Bowman, N. D., Reinecke, L., Lewis, R. J., & Eden, A. (2011). Media enjoyment as need satisfaction: The contribution of hedonic and non hedonic needs. *Journal of Communication, 61*(6), 1025-1042.

Tamborini, R., Eden, A., Bowman, N. D., Grizzard, M., Weber, R., & Lewis, R. J. (2013). Predicting media appeal from instinctive moral values. *Mass Communication and Society, 16*(3), 325-346. http://doi.org/10.1080/15205436.2012.703285

Tamborini, R., & Weber, R. (2020). Advancing the model of intuitive morality and exemplars. In *The handbook of communication science and biology* (pp. 456-469). Routledge.

Weber, R., Mangus, J. M., Huskey, R., Hopp, F. R., Amir, O., Swanson, R., ... & Tamborini, R. (2018). Extracting latent moral information from text narratives: Relevance, challenges, and solutions. *Communication Methods and Measures, 12*(2-3), 119-139. http://doi.org/10.1080/19312458.2018.1447656

Whitmarsh, L., O'Neill, S., & Lorenzoni, I. (2013). Public engagement with climate change: what do we know, and where do we go from here? *International Journal of Media & Cultural Politics, 9*(1), 1–23.

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