

Article

The Social Representation of Sustainable Mobility: An Exploratory Investigation on Social Media Networks

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Abstract: This paper analyzes the social representation (SR) of sustainable mobility as it emerges from social media networks. The role of social media (SM) as contexts of creation, negotiation, and diffusion of a mobility culture worldwide is discussed, together with the results of an empirical investigation that explored the contents and structure of the discourse on “sustainable mobility” as it emerges from the posts published (in English) on two highly used social media (Facebook and TikTok) platforms during the years 2022 and 2023. First of all, the results confirm the relevance of social media as an indicator of ongoing trends in the evolution of mobility culture and the usefulness of S. Moscovici’s theory of social representations as a theoretical framework for analyzing such trends. In particular, several new trends in the SRs of sustainable mobility were identified. These include, for example, the decline in skeptical views and the rise of more optimistic ones, regarding the feasibility of changing people’s mobility styles worldwide. Such views appear to be fostered by the positive perception of new technological innovations (electric vehicles), as well as by their endorsement by both the business sector and governmental institutions. Practical implications and theoretical indications for future research are also outlined.

Keywords: sustainable mobility; social representations; social media; social networks; Facebook; TikTok



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1. Introduction

Transport can be considered as important and strategic for political, economic, and social development as it is problematic because of the many challenges it poses to a number of social and environmental issues. These include health, safety, peace, social inclusion, and well-being, as well as energy consumption, land use, and pollution [1–5]. A need to mobilize the transport sector for addressing sustainability at all levels and for reducing transport’s impact on climate changing emissions has thus been avowed by the United Nations on several occasions [6–9]. A prerequisite for achieving such goals is to involve people and change transport culture [2,10]. However, little is known about the extent to which the many initiatives so far implemented, at both the local and international levels, have succeeded in promoting a new sustainability culture in transport, worldwide. Most of the scientific studies on mobility culture have reconstructed it indirectly from transport behavior and practices [11,12], but very few authors have attempted to discuss the nature and structure of its conceptual contents: the shared beliefs, representations, emotions, and values upon which they are based [13–17]. Moreover, most investigations have focused on very circumscribed geographical territories or have referred to particular means of transportations, with little effort made to reconstruct such socio-cultural trends across boundaries and transport means [18–23]. One reason is that, so far, studying these aspects required interviewing a large number of people worldwide. However, the advent of social media networks has opened up new possibilities for investigating important socio-cultural changes in beliefs, values, representations, and practices across boundaries, thanks to the analysis of social media communications and interactions.

The present paper aims, thus, to address this issue by (1) offering a theoretical reflection on the potential role of social media networks (SM) as indicators of the ongoing cultural trends regarding sustainable mobility, and by (2) reporting the results of an exploratory empirical investigation that analyzed the content and structure of the communication about sustainable mobility in the social media networks. The latter was carried out using a particular social psychological model (Serge Moscovici's theory of social representations; SRT) as a theoretical framework, which utility for investigating cultural trends in mobility is also further explored.

2. Personal and Socio-Structural Characteristics of Transport and Mobility Culture

Various authors have supported the importance of analyzing transport-related behaviors and mobility culture as social practices, resulting from the combination of factors that act at various societal levels. So far, factors at the individual level have received the greatest empirical attention in the literature, as several investigations testified to the influence of personal beliefs, values, attitudes, norms, identity, and emotions on individual actions and mobility choices [24–29]. However, other authors have highlighted the importance of also considering the role of constraints at the broader meso- and macro-societal levels. Such factors include laws, regulations, policies, as well as the “material” (i.e., technological and infrastructural) determinants that shape the physical environment and the means of transportation [30–35]. For this reason, some authors [36] have proposed theoretical approaches (like, for example, the social practice theory, SPT; [37]) that focus on the analysis of what people do (in terms of common behavioral choices), build (as supporting artifacts and technologies), acquire (as skills, competences, and know-how), and co-create (as images and meanings associated with particular practices and performances) regarding transport [11]. The suggestion is to privilege the observation of behaviors recurrently performed by a multitude of actors (“enough people doing enough things”; [36]), as taken together, these can reveal common trends and mobility cultures, as well as their relationship with tangible structural and technological changes in the observed contexts.

However, this approach presents some limitations as well, including the scarce consideration of particular types of collective actions, such as, for example, the discursive ones. These represent the basis for the collective constructions of images and beliefs related to a topic of social relevance [38] and may, directly or indirectly, lead to the endorsement of particular concrete actions and mobility choices. It is, thus, not surprising that Haustein and Nielsen [12] defined mobility culture as “specific socio-cultural settings consisting of travel patterns, the built environment and mobility related discourses”. The identification of appropriate contexts and theoretical frameworks for investigating mobility-related discourse thus becomes a necessary step towards a comprehensive analysis of transport and mobility cultures. In the next paragraphs, we will thus show how the study of social representations of sustainable mobility within social media networks could represent such an appropriate context and framework.

3. Sustainability Communication and the Social Media Advent

In one of the very first contributions to the analysis of ecological issues in social sciences, [39] recognized how education and mass communication campaigns could play a very important role in addressing ecological issues. Fifty years later, such importance has become even more evident, while social communication has become much more complex. Over this period, a shift has occurred from the unidirectional communication of traditional mass media (radio, TV, and printed paper) to the planetary interconnection (bidirectional and multidirectional) guaranteed by digital media and social media based on Web 2.0 technology. The impact of the latter has increased exponentially in just a few years [40,41]. The scientific research on them, however, is still in its infancy, and this is especially so when it comes to environmental issues.

Fisher and colleagues [42] identified various types of communication related to sustainability, among which there are the communications of and about sustainability. The

communication of sustainability corresponds to a predominantly transmissive, informative, and mono-directional form of communication (of the “one to many” type), with limited possibilities for feedback and circular discussions, and the examples of which are radio, TV, and newspaper communications. The communication about sustainability, instead, corresponds to a horizontal type of communication (of the “many to many” type), which is deliberate, spontaneous, and multimodal, and it leads to the negotiation of concepts and meanings regarding a theme or topic of social relevance, within a community. This type of communication, once only possible through meetings, assemblies, symposia, other forms of face-to-face, or written (e.g., exchange of correspondence) direct interactions (which were limited by concrete space–time boundaries), today has taken on forms that have expanded both their scope and diffusion, allowing thousands or even millions of interactions at the same time. Social media communication is the most emblematic example of this type of communication [43–45].

Launched in the early 1990s, SM rapidly became one of the most successful applications of the Internet [43]. No univocal definition of SM has been reached so far, but, taken together, the many existing ones highlight the key characteristics of these platforms such as being able to connect people with common interests and allowing them to create and share their own (multimodal) content [43,44]. Over the years, the type of content exchanged has shifted from the monomodality (for e.g., only text or only images) of the initial SM channels to the multimodality (text, photo images, video images, and audio segments) of the latest SM channels [46]. Different types of SM platforms exist, ranging from blogs, to business networks, to forums, and to social gaming and photo/video sharing channels (and many other types as well), and they are used for various purposes: from socializing with friends and family to finding romance and flirting; from interacting with companies and brands to seeking jobs and professional networking; doing business; engaging in corporate and political communication; and so forth [43,44]. This has led social scientists to consider SM as a particular type of “social arena” through which relevant social processes can be explored [47,48].

4. Social Media-Based Research on Sustainable Mobility Issues

So far, the social media platforms that received the greatest scientific attention are Twitter (renamed as “X” after its acquisition by X-Corp, in 2023), Instagram, and Facebook. For example, Karami and colleagues [49] found over 18,000 scientific contributions published between 2006 and 2019, featuring the term “Twitter” in the title and/or abstract. Many of these studies aimed at identifying ongoing socio-cultural trends in societies and target communities through the analysis of its “unstructured” contents [50]. Twitter was revealed to be a particularly useful platform for identifying public opinion trends regarding climate change and sustainability issues as well [51,52]. Some of these contributions concerned sustainable transport-related practices. For example, Sdoukopoulos and colleagues [53] analyzed 17,233 “tweets”, from 11,926 users, containing the words “London transport” (posted from 1 March to 15 March 2017), to identify “sustainable urban mobility indicators” referring to the perceived level of satisfaction regarding different modes or transport-related aspects. Rahman and colleagues [54] compared six different classification models to identify the one that best allowed to determine people’s perception of walking and biking facilities and safety concerns out of a dataset containing 35,333 geolocalized “tweets” posted from October to November 2019. Balla and colleagues [55] documented the progressive increase in social awareness regarding the importance of shifting toward electric transport in a dataset of 5,118,117 “tweets” containing “electric car Or e-bike OR electric vehicle” words, posted during the decade 2012–2022, also recording the alternate trending directions (i.e., sometimes positive and sometimes negative) in opinions’ evolution over time. The authors then related such alternating trends to particular global events that occasionally occurred in the social, political, or industrial environment (e.g., communication campaigns, new regulations, advent of better performing vehicles, controversial decisions by firms, government, associations, the COVID-19 pandemic, and so forth). They concluded that “a variety of

topics which were discussed by Twitter users regarding EVs provide an acumen about what the public knows, thinks and wants from vehicle electrification as time progresses” [55] p. 17. However, Twitter only represents one of the many social media platforms currently used by people, and, in any case, it is not the most used. For example, it seems that the lead in this sense has always belonged to Facebook [56], a notion confirmed by recent investigations carried out in the USA [57,58]. Nevertheless, Facebook has received comparatively less scientific attention in studies about environmental issues in general and sustainable mobility in particular. Similarly, little attention was also dedicated to analyzing the contribution of emerging social media networks, such as, for example, TikTok, to understanding environmental discourse. Moreover, various authors have warned about the risk of relying on a single SM platform when investigating social trends [56]. This is because various SM platforms may be used differently by people as a function of age, gender, personality, and cultural differences [56]. Furthermore, differences in the use of particular SM platforms may increase or reduce over time due to several contextual factors [59]. Hence, taken together, the scientific literature supports the utility of social media networks as indicators of cultural and lifestyle trends regarding sustainable mobility practices but also encourages researchers to broaden the type of SM investigated by possibly engaging in comparative analysis across multiple SM channels.

The identification of an appropriate theoretical framework to support such comparison emerges as another necessity, in this sense, because most of the investigations so far carried out appear to be of a descriptive nature. The theory of social representation seems particularly suitable to this scope.

5. The Theory of Social Representation (SRT) as a Framework for Investigating Sustainable Mobility Culture on SM

Social representations (SRs) can be defined as “systems of knowledge, or forms of common sense, that human subjects draw upon in order to make sense of the world around them and to act towards it in meaningful ways” [60], p. 1. The SR construct differs substantially from other individually centered psycho-social constructs, such as, for example, that of “attitudes”, because theories of attitudes explain collective actions in terms of the sum of decisions made at the individual level (i.e., the focus is on the individual cognitive processes, personal perceptions, and evaluations; [61–63]), while the SRT [64,65] explains how social behavior emerges from collectively constructed knowledge, representations, and practices. For this reason, while attitude studies basically aim at detecting group differences in attitudes which may influence individual behavioral decisions, SRT studies consider both differences and similarities in shared beliefs, as a matrix able to explain stability and change in group relationships [63,66]. In this way, the SRT approach broadens the focus on the self-object/other dyad (typical of the stimulus-response approach characterizing attitude research) and switches the attention from the self (and its processes) to the relational and communicative dynamics that involve the triad self–other–object [65,67].

Typically, the goals of SR-based studies are, thus, to identify content and structure of SRs (i.e., their nucleus and peripheral elements; [68–71]), to observe the ways through which SRs are constructed within particular social and group relations (for example, through conceptual anchoring and objectification processes; [72]), and to identify and understand the sharing and positioning practices that characterize groups’ dynamics [73,74]. Typical of studies based on the SR approach is also the analysis of how SRs differ across contexts (i.e., social groups) and over time, due to relational exchanges and the negotiations of meanings [75]. Differences among and across the cognitive, emotional, and normative components of SRs are typically taken into account by these investigations, as they offer insights into existing conflicts among hegemonic (dominant SRs rooted in systems of power), emancipated (SRs including some new ideas into the dominant ones), and polemic (radically oppositional) views of a social phenomenon within different social groups and categories [76]. From a methodological point of view, SRT studies expand on those attitudes in at least two ways. First, they focus on both highly consensual and conflictual

beliefs, while those on attitudes mostly focus on the latter only. Second, they assume that consensual and conflictual beliefs can be investigated through a broad variety of expressive forms. As Fraser [63] p. 4 put it, SRs “are most commonly studied by interviewing individuals and searching for the consensual, but they can also be investigated through artifacts, photographs, newspapers, books, the mass media and through institutionalized social, legal and religious practices and codifications. Attitude researchers rarely make use of such resources”.

The analysis of communication processes at the societal level is, thus, another key theme of SR studies, and this has made the SR approach particularly suitable to reconstruct both the stability and dynamism of cultural trends within modern societies [47,77–79].

The SRT was revealed to be particularly effective in unearthing the collective understanding of issues related to sustainability and for identifying the symbolic processes that may foster or limit the emergence of new sustainable practices [80–85]. The SRT has already been applied to the analysis of the conflictual views and resistance processes that may influence transport behavior and mobility choices, as they emerged from people’s discourses at various societal levels [16,20,21,23]. For example, a study by Dickinson and Robbins [22] found cycling to be seen (by a UK sample) as a marginalized practice, detached from everyday life (and places), to be performed during fun and leisure time moments only. This representation was particularly widespread among those who were not familiar with the use of this means of transport. Rimano and colleagues [15] found stereotypic beliefs about cycling (in an Italian sample of respondents) to match the representation of the bike in traditional media in Italy, and they hypothesized that media could represent a source of information for those uninterested in bike use [16]. Sarrica and colleagues [17] have thus attempted to deepen this view by applying the SR theory to the analysis of media communication. The authors performed a lexicometric analysis on the content of 3239 articles dealing with the use of bikes, published on Italian online websites. In this way, they noticed that e-bikes had introduced novelties in the SRs of cycling that deserved greater attention by both researchers and practitioners.

However, all these investigations were focused on traditional web site communications and did not take into account social media channels. Moreover, they were all focused on particular means of transportation and referred to circumscribed geographical contexts. In fact, we have no knowledge of studies that have applied the SRT to analyzing the representations of sustainable mobility (in general) as they emerge from broader (potentially boundless) social environments, like those offered by the social media networks. Previous survey studies by Passafaro and colleagues [86] had signaled the informative value of analyzing the beliefs freely associated, by residents of various Italian cities, with the concepts of “urban mobility” and “sustainable urban mobility”. This study revealed the negative conceptual and emotional connotations associated with the former term (i.e., urban mobility) and the positive conceptual and emotional connotations associated with the latter (i.e., sustainable urban mobility). However, the latter was also accompanied by pessimistic views of the possibility that sustainable mobility systems could be actually implemented in the future, that is, as a pipe dream. Given the limited sample and the circumscribed geographical area investigated, this study was, nevertheless, unable to tell much about the extent to which such pessimistic views were shared across national boundaries.

The analysis of social media communication could be of help in overcoming such limits as well. More in general, the application of the SRT to the study of the SRs of sustainable mobility could represent a starting point for a deeper understanding of the overall contribution that such media channels may provide to addressing the complex issue of changing mobility styles and culture.

6. Goals of the Study

The goal of the study reported in this paper was to analyze the social representations (SRs) of sustainable mobility as they emerge from social media networks. In particular, we aimed at answering the following queries:

Q1—What were the main dimensions characterizing the SRs of sustainable mobility and their content?

Q2—How are the SRs of sustainable mobility cognitively, affectively, and normatively oriented?

Q3—What similarities and/or differences can be observed in the SRs of sustainable mobility in different social media?

Q4—How do the SRs of sustainable mobility vary over time?

7. Method

The investigation was carried out through the analysis of posts published in English on Facebook and TikTok users' public pages. We decided to focus our attention on these particular social networks for two main reasons. First of all, recent investigations confirmed that Facebook is one of the most popular social networks in several countries, including English-speaking ones, where millions of people use it every day for a variety of purposes. Moreover, the literature suggests Facebook to be universally used by people of all ages, although slightly less by the youngest generations. TikTok, instead, still represents an emerging SM platform and has so far mostly attracted the interest of the youngest generations. Hence, we expected that confronting these two SM platforms could have offered us the possibility of assessing whether a different typology of users could translate into different SRs of sustainable mobility. Moreover, although both SM platforms had been extensively investigated in social sciences, we have no knowledge of investigations that focused on them to respond to our particular queries.

7.1. Dataset Building Procedure

The datasets were built by retrieving the posts (text comments) and related hashtags published on Facebook and TikTok thanks to a 2-phase process which required about 1 month per social network, and it was carried out through a synergic work performed by 4 of the authors of the present paper (for discussions on the techniques of web-based investigations, see, [87–89]). During phase 1, a joint decision was made, first, about the hashtags to be used as keywords for automatically retrieving the posts using the retrieval functions available in the two SM platforms. The keywords eventually selected for our purposes were the following: #sustainablemobility, #alternativemobility, #greenmobility, and #urbanmobility; afterwards, the criteria for manually selecting the pertinent posts were also jointly discussed, and, finally, each author casually picked up one hashtag to autonomously start the retrieval procedure. Phase 2 was dedicated to identifying the time lapse to focus on in our investigation and to define our final dataset size. Since we had no a priori information about the extent of the discussions about sustainable mobility on social media networks, we opted for a step by step procedure, which started by launching a first exploratory retrospective search on a three-month time lapse. Subsequently, the posts eventually retrieved were manually scrutinized to identify the pertinent ones according to the criteria previously defined. This procedure (that we could call here “manual scraping”) was first applied to TikTok and started on July 2023. Since we found only 232 posts published during March–July 2023 on this social media channel, we decided, as a second step, to extend the time lapse to January 2023 and, as a third step, to further expand the search process to January 2022 or until at least 1000–1200 posts were retrieved. For TikTok, the procedure ended when 1200 posts were retrieved overall (by the four authors). The overall corpus eventually included posts published between 12 January 2022 and 10 July 2023.

The same procedure was implemented to search for Facebook posts, which led to eventually retrieve 1212 posts published between 7 January 2022 and 3 September 2023.

An additional pertinence check was reiterated at the end of phase 2 and before starting to extract the relevant information from the posts, in order to exclude non interesting material. This led to eventually retaining 1046 posts for TikTok and 1135 for Facebook, which then composed the data corpus for our analyses.

7.2. Information Extraction

The two data corpuses (from Facebook and TikTok) were then separately inspected with the aim of manually extracting the information relevant to our investigation and subsequently imported into an Excel format file. In particular, for each post retrieved from TikTok, a line was created on the Excel file, on which we annotated the text content, n° of comments, n° of likes, and date of publication on separate columns. As a second step of this process, two additional variables were created by recoding the n° of comments and likes into discrete categories (i.e., “low”, “medium”, and “high” comments/likes received), based on tertile intervals’ computation (see Table 1).

Table 1. Tertile distribution thresholds for the n° of likes and comments associated with posts published on TikTok and Facebook in the period considered.

	TikTok		Facebook	
	Likes	Comments *	Likes	Comments
low	up to 7	no comments	up to 3	no comments
medium	8 to 21	---	4 to 47	1 to 2
high	more than 21	yes comments	more than 47	more than 2

* Since the number of posts without comments on TikTok was higher than 50%, n° of comments for this class was dichotomously recoded as “no comments/yes comments”.

All information gathered for our investigation consisted of publicly available data (see Ethical statement for further details).

7.3. Data Analysis

A lexicometric analysis [90] was performed on the comments of the posts from the two social networks, using IRAMUTEQ (version 0.7 alpha 2), [91,92], an R-based software written in the Python programming language that carries out the quali-quantitative processing of big corpuses of textual data. In particular, this software applies the Reinert method for lexical analysis [93,94] to identify the internal structure of a set of textual units. The software proceeds through three main steps of analysis: (1) the text is initially fragmented into context units (e.g., separated by punctuation), (2) a correspondence analysis is then performed on the matrix of context units to identify characteristic words and recurring discursive forms, and (3) an iterative algorithm (Descending Hierarchical Analysis, DHA) is applied for partitioning the entire text into different thematic classes, called clusters, each of which represents a distinct lexical world and, consequently, a different domain of social representations. For each thematic class, a list of text units (words or short segments) is generated in descending order, based on Chi Square values, which can be interpreted as indicating the extent of the contribution of each word to that particular class. The inspection of the relative contribution of each text unit to the various classes allows experts to identify the universe of meanings associated with that class, which can be, then, conceptually synthesized by also assigning a specific “label” to the class. A visual dendrogram is produced by the program as an output to facilitate cluster interpretation and to evaluate their level of interconnection, together with a graphical representation, in the cartesian space, of the associations among the short text units. This allows us to immediately visualize the composition of the lexical nucleus and, consequently, to facilitate the inspection of the arrangement of the text units within each class. Data from numerical variables can be included in this analysis from the beginning to explore associations with potential intervening factors. In our case, since we were interested in exploring variability across time (i.e., differences in the SR content in the two-year lapse considered), interest aroused in the public, and overall affective polarization of the SRs, the variables regarding post dates, n° of comments, and n° of likes were also introduced in the analyses.

8. Results

8.1. Data Check

The two data corpuses respected the conventional expectations for richness and variety: hapax (words appearing one time only) accounted for 47.52% of all occurrences/words (54,969) in the TikTok total corpus and 46.94% of all occurrences (74,195) in the Facebook corpus. The type/token ratio (corresponding to the total number of distinct word forms divided by the total number of word occurrences) resulted as sufficiently low for both corpuses also (4.86% for TikTok; 4.14% for Facebook). Since data analyses were performed separately for each data corpus, results will be separately discussed in the next paragraphs accordingly.

8.2. Social Representations of Sustainable Mobility on Facebook

The application of the Reinert method to the analysis of the Facebook corpus allowed for identifying three main thematic classes gathering 100% of the posts collected for this social media channel (see Figure 1).

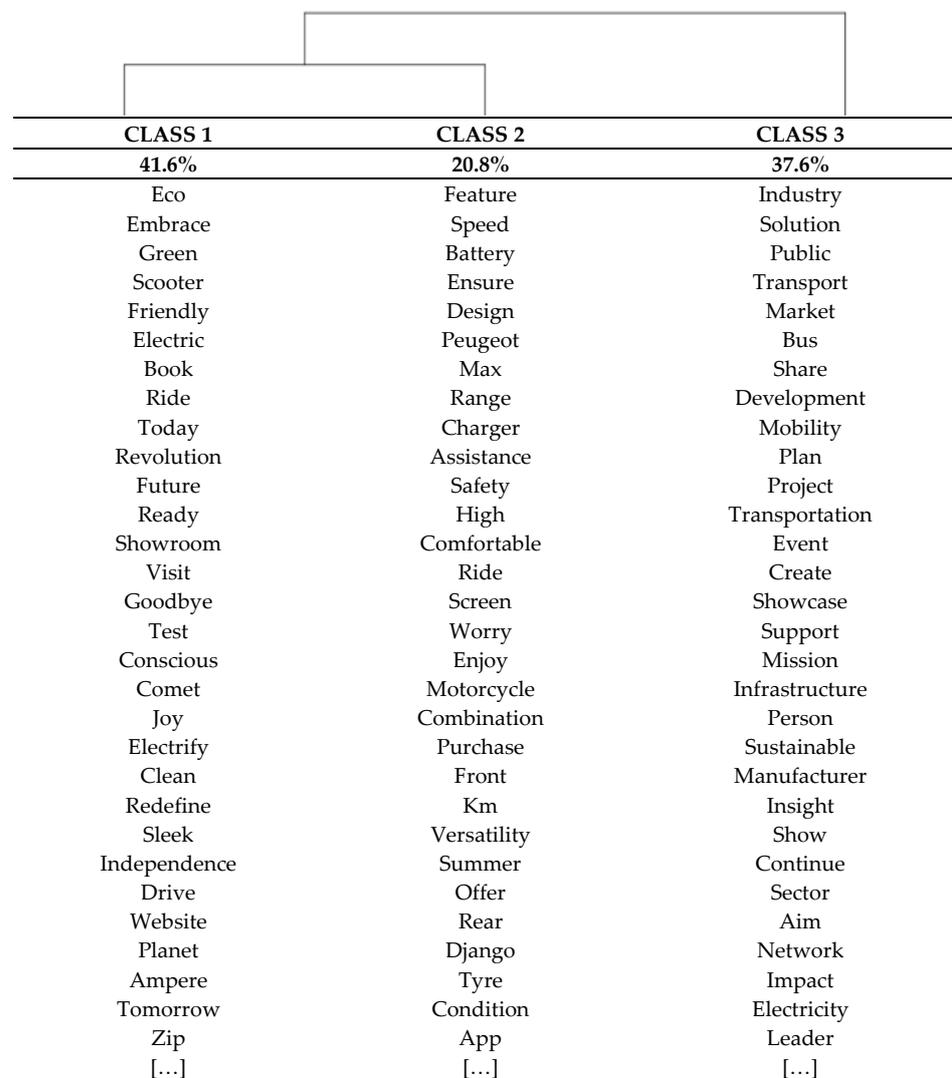


Figure 1. Dendrogram of the classes identified in the textual corpus of Facebook posts in the years 2022 and 2023. Note: words in columns are hierarchically ordered based on their contribution to their class; for each class, only the first 30 words are displayed in each column.

- Class 1 gathered 41.60% of the segments classified and contained words referring to the eco-centric dimension of sustainable mobility. In this view, sustainable mo-

bility was seen as ecological/green (e.g., “eco”, “green”, “planet”, and “friendly”), revolutionary (“embrace”, “revolution”, “goodbye”, “welcome”, “conversion”, “upgrade”, “chance”, and “redefine”), and future-oriented (“future”). However, contrary to findings of previous studies, it was also seen as a reality of present times (“today”, “ready”, and “test”) and was associated with positive emotions (“joy”, “fun”, “happy”, and “freedom”), as well as with the possibility to obtain personal desirable statuses (“elegance”, “excellence”, “empower”, “powerful”, “independence”, “dream”, and “incredible”). In sum, this view prospected sustainable mobility as able to potentially contribute to the improvement of both the environmental conditions of the planet and personal quality of life. This SR also clearly saw two-wheeled (“scooter” and “ride”) electric (“electrify” and “ampere”) mobility as the emblem (i.e., concrete and tangible objectification) of sustainability in the mobility sector. A reference to “luxury” was also present in this view, which conveyed the idea that sustainable mobility was not an option for everyone, while confirming an evolution of eco-centric views towards more standardized norms. This class seemed not to be associated with a particular temporal period, suggesting its contents not to have changed much in the two-year period considered. The posts of this class were also associated with a substantial n° of likes (i.e., medium level), while the n° of comments did not contribute to the construction of this class.

- Class 2 gathered 20.8% of all segments classified and referred to the practical/technological dimension of sustainable mobility intended as a mere personal/individual choice (egocentric SR). This SR was grounded on the pros and cons (in terms of comfort, safety, and freedom) of sustainable mobility, linked to the innovations introduced. For this reason, words highlighting the digital (e.g., “platform”, “connectivity”, “screen”, “device”, and “downloads”) and technical attributes (“feature”, “combination”, “battery”, “charger”, “rear”, “front”, “max range”, “km”, “design”, “versatility”, “speed”, and “destination”) of individual means of transportation (“motorcycle”, “ride”, and “summer”) appeared to be associated with words recalling personal comfort (“comfort”, “comfortable”, “effortless”, “peace”, and “assistance”) on the one hand and safety (“safe”, “safety”, “trust”, and “worry”) on the other hand. This class also included words that prospected sustainable mobility as a winning personal lifestyle (“lifestyle”, “win”, “perfect”, “enjoy”, and “high”) and consumer choice (“purchase”, “offer”, and “Peugeot”). This class referred to posts published most recently (during 2023) and, thus, likely referred to emerging topics of interest and discussion. This class also referred to posts with a substantial n° of likes (i.e., medium level), while the n° of comments did not contribute to the construction of this class.
- Class 3 gathered 37.6% of all segments classified and referred to the collective and global dimension of sustainable mobility, which was seen as a common endeavor, combining the synergic effort of people, public institutions, and the industrial sectors across boundaries. Public transportation (“public”, “transport”, “transportation”, “bus”, “share”, and “mobility”) as well as the industrial infrastructures (“industry”, “manufacturer”, “infrastructure”, and “sector”) were the emblem (concrete object of incarnation) of this joint (“network”) effort (“support”), linking people worldwide (“Europe”, “Indian”, “Asia”, “international”, “global”, “region”, “country”, “rural”, and “local”) in a joint pioneering mission (“project”, “mission”, “aim”, “vision”, “pioneer”, and “leader”). Transformation (“transform”), transition (“transit”, “forward”, and “accelerate”), development (“create”, “development”, and “develop”), improvement (“improve” and “progress”), strength (“strong” and “potential”), and exceptionality (“exceptional”) were the guiding ideas also associated with this view. The associated emotion was thus pride (“proud”). This class referred to posts published in 2022, likely indicating a declining set of discussion topics. The n° of likes associated with this class was high, while comments were absent.

8.3. Social Representations of Sustainable Mobility on TikTok

The analysis of the TikTok corpus led to the identification of two main thematic classes gathering 100% of the posts collected for this social media channel (see Figure 2). A first result emerging from this analysis concerned a lower variability in the discourse regarding the SRs of sustainable mobility, compared with the Facebook dataset. Indeed, in this case, the discussions tended to revolve around fewer conceptual nuclei, which overlapped with many of those that emerged from Facebook; although, in this case, they appeared to be more pronouncedly anchored to particular means of transportation, such as two-wheel modes and mini-cars. More specifically, the following was observed:

- Class 1 gathered 81.8% of the segments in this corpus and contained words referring to the sustainable and collective dimension of mobility (“sustainable” and “sustainability”). The transport means emblem in this case was represented by electric vehicles (“electrical”, “electricity”, “electrify”, and “charge”) in general and cars in particular (“car” and “drive”), which could also be energy efficient and/or use low-impact fuels (“energy”, “efficiency”, “clean”, “renewable”, “emission”, and “performance”). The collective (“we”, “community”, “make”, “share”, and “join”) and future-oriented perspective (“future” and “next”) were predominant, but they were combined with an even stronger (“strong”) strive for technological innovation (“tech”, “technology”, “solution”, “innovation”, “innovative”, “revolution”, and “smart”) able to offer new travel (“travel”, “journey”, and “commute”) experiences (“explore”, “adventure”, and “discover”). Luxury and style (“Luxury”, “design”, “style”, and “lifestyle”) were also frequently associated with the discourse on sustainable mobility on this SM as an added value, which unequivocally marked a change in the views of sustainability compared to the past. This class referred to posts published in 2023 (most recent posts), suggesting that it included emerging topics of discussion. This class was associated with a low number of likes and the presence of comments.
- Class 2 gathered 18.2% of the segments classified and contained words mostly referring to urban micro-mobility. Discussions mostly revolved around particular transport means (“scooter”, “escooter”, “kick scooters”, “Segway”, “ebike”, and “mini-vehicles”) and brand names (several specific brand names are mentioned), as well as locations (“City” and “Malaysia transport”), according to a community-oriented perspective (“gang”, “friendly”, and “fun”). This class referred to posts published in 2022, thus suggesting a declining set of discussion topics. This class was associated with a medium number of likes and the absence of comments.

8.4. Comparing SRs of Sustainable Mobility across the Two Social Networks

A comparison of contents, likes, and comments of the textual corpus across the two social networks also revealed aspects of interest. In particular, the SRs of sustainable mobility in the two SM platforms presented both aspects of similarity and dissimilarity. For example, the “objectification” of sustainable mobility in terms of electric mobility and urban micro-mobility constituted aspects of continuity between the two SM platforms, as much as the discourse about the technical and digital attributes of technological innovation (and related brands). Key thematic components characterizing sustainability discourse, such as the dyadic opposition between eco-centric vs. ego (or antropo)-centric perspectives in nature protection, as well as the temporal frame opposing the present vs. the future perspectives, also regularly recurred in the discourses recorded on both SM platforms. Moreover, a general tendency to recompose the contrasting views on the two themata (for a recent discussion, see, [95]) afore mentioned was evident across both SM platforms.

However, the SR of sustainable mobility in the two SM platforms also presented aspects of discontinuity. For example, while on Facebook eco-centric and ego-centric views still tended to emerge in distinct discourses (the three thematic classes recorded by the Descendant Hierarchical Analysis), they appeared, instead, to collapse in a unique, undifferentiated discourse in TikTok’s class 1.



CLASS 1	CLASS 2
81.8%	18.2%
Sustainable	Escooter
Future	Scooter
Car	Dualtron
Transportation	Scootering
Drive	Segway
Innovation	Xiaomi
Energy	Escooters
Experience	Ninebot
Sustainability	Kickscooter
Technology	Emobility
Revolution	Ebike
Charge	Coco
We	Gang
Commute	Motorcycle
Emission	Bike
Design	Motor
Community	Life
Style	Eco
Explore	Urban
Performance	Friendly
Luxury	Go
Tech	Cycle
Clean	Vehicle
Electrify	Electric
Journey	Mini
Environment	Ebicycle
Innovative	Eforge
Make	Balance
Travel	Malaysia
Adventure	Self
[...]	[...]

Figure 2. Dendrogram of the classes identified in the textual corpus of TikTok posts in the years 2022 and 2023. Note: words in columns are hierarchically ordered based on their contribution to their class; for each class, only the first 30 words are displayed in each column.

As for the temporal perspective, on Facebook, this translated in discourses referring to both the “present” (“today”) and the “future” (“tomorrow”), while on TikTok, the future-oriented ones seemed predominant.

Furthermore, although class 1 of Facebook and class 1 of TikTok shared similar contents, they differed in terms of likes and comments, with Facebook presenting more likes associated with its posts than TikTok.

We also noticed that Facebook showed more references to emotional status (e.g., “Joy” and “Happy”) in its posts, while references to emotional statuses of any kind were absent from the TikTok posts of our data sample.

Given the explorative nature of our investigation, it is impossible to ascertain the origins of the differences recorded between the two social networks. They could be due to the different nature and structure of the two SM platforms discussed in the introduction, as well as to the existence of an association between the number of likes and comments

received by the posts and the presence of emotional references in their contents. In our view, these represent two interesting hypotheses to test in future investigations.

9. Discussion and Conclusions

Our analyses revealed substantial differences between the social representation (SR) of sustainable mobility emerging from the social media (SM) platforms (considered in our investigations) and the SRs recorded by the literature in the past 20 years. Sustainable mobility was long considered as a beautiful utopia of the future, resulting from ideological and eccentric views of social reality. It was also perceived as extremely difficult (if not impossible) to achieve without seriously compromising the quality of life of the populations and/or jeopardizing their market/business economy. Skepticism and discouragement tended to prevail in such views, while social discussions mainly revolved around a limited number of public transportation options. Busses and bicycles were the emblems (concrete objectifications) of these representations. Hence, although significant differences existed in the perceptions of the various types of users, the adoption of sustainable forms of transportation was long viewed as a singular eccentricity, endorsed by a minority of marginal (and marginalized) groups. Such groups were seen as challenging the behavioral trends of the majority of a society firmly anchored to traditional non-renewable fuel-powered types of transportation. Our data appear to reverse this vision in many ways.

First of all, we found that utopian views and skepticism were absent (or anyway declining) in the discourses that emerged from the posts we examined. In other words, in the particular contexts examined (Facebook and TikTok), sustainable mobility was no longer depicted as a remote impracticable hypothesis of the future; it, rather, emerged as a feasible reality of the present. Optimistic and prospective views of sustainable mobility seem now to have replaced the skeptical ones in the discussions, and an enthusiastic and full of hope endorsement of the new technologies seemed to pervade the posts examined. This means that the discussions no longer revolve around “if” sustainable mobility can be achieved. Rather, they revolve around “how” it can be achieved. This contention is supported by a substantial number of posts related to providing practical and instructive information regarding the technical characteristics of vehicles and infrastructures, as well as by the proliferation of references to specific geographical locations (nations, cities, and places) where such technologies have been (or can be) implemented. Taken together, such communications convey the idea that something is happening, and that it is happening now, in concrete identifiable places. In other words, it is there, and it is real.

The typology of vehicles considered in the communication about sustainable mobility has also widened substantially. Electric vehicles, once mostly absent from the discourses on sustainable mobility, have taken the lead in the post communications, thus outclassing those on busses and bikes.

Several signs of normalization (the process that transforms a polemic representation into an emancipated or even hegemonic one through re-negotiations and re-signification of meanings) can be observed in the discussions, indicating that the sustainable mobility concept is no longer a mere prerogative of marginal groups in society. Once for all, references to luxury, design, and style appear, typical status symbol indicators in modern society. The new expensive electric cars have now become emergent status symbols for those who can afford them and desirable dreams for those who cannot. This mirrors similar processes recorded for the traditional type of transport vehicles and represents an evident cue that the concept of sustainable mobility has started its path towards social standardization. In particular, the presence of posts mentioning luxury, design, and style indicate that business brands (and the people they target) have been starting to redefine their image and aspirations in relation to such new types of vehicles and communicate them in their posts.

Clearly, the ideological and collectivist view of environmentalism (i.e., the one oriented towards the common good and the protection of the planet) tends to persist, representing the one that is comparatively more stable across time and the type of social media (i.e., the stable nucleus of the SRs of sustainable mobility). According to this view (also known as

eco-centric or biospheric concern; [96–98]), environmental protection is mainly justified by its benefits for nature and all living beings (including humans), and it should thus become a value in itself [99]. Ecocentrism has always been seen as opposed to (read incompatible with) the more individualistic or ego-centric (also known as anthropocentric) concern for the environment in attitude studies e.g., [100–102]; for alternative views see for e.g., [103], and thus it is expected to lead to opposite behavioral outcomes. However, the SR approach has often noticed how the eco/ego-centrism dichotomy could also be reconciled into polyphasic (i.e., complex) views of environmental issues, when the discourse shifts from generic and abstract issues of an undefined global relevance to particular concrete problems of local relevance. In the latter case, more elaborate and context-oriented discourses emerge in which the boundaries between the two perspectives appear much more blurred [104–106].

Our study seems to confirm such data as, in our case also, the eco-centric representational nucleus of sustainable mobility appears to have been substantially diluted by several peripheral elements. This is clearly indicated by various cues, besides the reference to luxury, including the exaltation of personal implications (positively and not negatively oriented as in the past). A clear reference to the possibility of improving the individual quality of life is evident in the first dimension extracted from the analysis of Facebook posts and even more in the first dimensions extracted from TikTok. The fact that the latter presents the maximum contamination in this sense is also particularly informative. If TikTok constitutes the SM platform most used by youngsters, we should conclude that eco-centric instances of conservation and self-centered aspirations have found ways of cohabiting in the ecological views of the youngest generations. This suggests that environmentalism is in the process of further multiplying its forms and that the SRs of sustainable mobility on SM platforms are able to perfectly seize this transformation. The new vehicles clearly designed for the younger and more skilled generations (scooters, escooters, kickscooters, segways, and mini-vehicles) might have become the objectification of the desire for freedom and change and the impetus towards the future, adventure, and new experiences typical of this age. The alternate presence of this topic in the posts during the two years considered could parallel the inevitable highs and lows with which particular transport means (and brands) tend to enter or exit youth trends.

All in all, we can conclude that this study has offered substantial evidence of the relevant contribution that the application of the theory of social representations can provide to the understanding of issues related to sustainability in general and to sustainable mobility in particular. Guided by the model tenets, we proceeded with the identification and analysis of the elements of stability and change in the SRs of sustainable mobility, and we were then able to interpret their many social implications and meanings. However, the theory can also be of help in identifying the important changes in the social context with which the trends highlighted could be associated. For example, the theory postulates that innovations originating in the legal and policy sphere, as well as changes in the communication sector, can be associated with changes in the SRs of a socially relevant issue (for discussions regarding the environmental domain, see, [81]). In our case, we could thus hypothesize that the recent policies implemented to reduce CCG emissions worldwide could have, to some extent, contributed to the evolution of SRs regarding sustainable mobility and so may have the increase in the use of social media communication due to the COVID-19 restrictions.

However, we would add to this view by suggesting the important additional role played by changes in the physical world, as a consequence of environmental degradation (as postulated by the Social Practices Theory). This might have increased public opinion's awareness of climate change-related issues and pushed an increasing number of people towards accepting sustainable mobility solutions. Concomitant and important innovations brought about in the technological domain (e.g., the advent of new and varied types of sustainable vehicles, from hybrid technologies to electric engines) could have also played a decisive role in this regard. In particular, technological innovations might have removed many of the barriers formerly perceived by people to the use of sustainable vehicles (e.g., low comfort, scarce practicality, and high costs), and the variety of options now available

(e.g., cars, mini-cars, ebikes, kickscooters, etc.) could have met much better the needs of many initially skeptical users. These and other social structural factors could be related to changes in the SRs of sustainable mobility that we recorded, as much as to their observed precarious nature. Indeed, the variability in the representations we recorded over time (like, for example, the differences recorded between the contents of particular SR dimensions in 2022 compared to 2023) could also be traced back to contextual changes in policies, the communication sector, the environmental conditions, and the technological innovations that have occurred in the considered period.

10. Limits of the Study, Future Research, and Practical Implications

This investigation also presents crucial limitations that could be addressed by future research. The limited number and type of social media platforms considered in this study may have produced a restricted view of the social phenomenon investigated. Although Facebook and TikTok are among the most used social media of the moment, many people still do not use them, while others may prefer other types of social media. This means that the data collected cannot account for all the discussions that took place on social media during the years considered. Our results could thus be particular to the nature of the two social media platforms considered. Although Facebook is a full-multimodal type of social media, written texts tend to play a relevant role in it. On the contrary, TikTok was launched as a video sharing platform, and users are thus more interested in viewing and posting videos than in viewing and posting the captions/comments that we analyzed.

Moreover, the type of social media we chose to focus on can also have biased the range of topics discussed, as well as the perspective with which they were presented. Facebook, for example, has been traditionally indicated as a platform for personal and more intimate communications, rather than for issues of general and public interest (for which other SM channels exist). This fact may have led to an over-representation of ego-syntonic thoughts (i.e., the personal perspective) in the posts, compared, for example, to those related to the implications for the environment and society in general. Future studies could address this aspect too, by expanding the number of social media platforms considered, in order to also include those more frequently used to discuss topics of general and public interest.

Future investigations could also expand the type of communication modality sampled and analyzed. Emoticons, photos, and videos could be as informative as textual comments in conveying people's perception of a phenomenon, and new approaches to their investigation could, and should, thus, be explored.

Our work also has some relevant practical implications. For example, it confirms social media to be a relevant social context to consider for assessing trends in the conceptual representation of environmental issues in general and sustainable mobility in particular. This seems essential for planning communicational campaigns directed at fostering the endorsement of the use of particular sustainable means of transportation. In this regard, our data indicate that both the business sector and governmental institution should pay greater attention to the emotional components of their communication campaigns, as touching people's emotions might be revealed to be as important as providing new technical information regarding the sustainable means of transportation.

Moreover, our data indicate that designers should attentively consider the different roles that various types of media channels can play in fostering sustainability awareness and engagement. For example, previous investigations remarked on the important contribution that traditional media can provide to increase the public understanding of sustainability issues in general and climate change awareness in particular [107]. However, it seems that awareness-raising campaigns can be more effective when several (different) communication strategies are put in place [108]. Combining social and mass-media channels has been indicated amongst the most promising options in this sense. Designers of public education campaigns should, thus, consider social media as both (1) a source of information on ongoing conceptual trends in society and (2) a social arena able to foster community involvement in pro-environmental behaviors in general. If adequately managed, the

ability of social media networks to build relations, involvements, and engagement on specific topics could thus become an effective leverage to increase people's actual direct involvement worldwide. Our data indicate that the business sector seems to have already started to move along this path. We would thus suggest that governmental institutions worldwide should increase interlocutions throughout these channels as well.

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References

1. Aston, L.; Currie, G.; Delbosc, A.; Kamruzzaman, M.; Teller, D. Exploring built environment impacts on transit use—An updated meta-analysis. *Transp. Rev.* **2021**, *41*, 73–96. [CrossRef]
2. Banister, D.; Anderton, K.; Bonilla, D.; Givoni, M.; Schwanen, T. Transportation and the environment. *Annu. Rev. Environ. Resour.* **2011**, *36*, 247–270. [CrossRef]
3. Chapman, L. Transport and climate change: A review. *J. Transp. Geogr.* **2007**, *15*, 354–367. [CrossRef]
4. Geurs, K.; Boon, W.; Van Wee, B. Social impacts of transport: Literature review and the state of the practice of transport appraisal in the Netherlands and United Kingdom. *Transp. Rev.* **2009**, *29*, 69–90. [CrossRef]
5. Wang, L.; Xue, X.; Zhao, Z.; Wang, Z. The impacts of transportation infrastructure on sustainable development: Emerging trends and challenges. *Int. J. Environ. Res. Public Health* **2018**, *15*, 1172. [CrossRef] [PubMed]
6. UN—United Nations. *Report of the United Nations Conference on Environment and Development—Rio de Janeiro, 3–14 June 1992. Volume I—Resolutions Adopted by the Conference; A/CONF.151/26/Rev.1 (Vol. I); United Nations: New York, NY, USA, 1993; Sales No 93.I.8.* Available online: https://www.un.org/esa/dsd/agenda21/res_agenda21_00.shtml (accessed on 27 March 2024).
7. UN—United Nations. *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–September 2002; United Nations: New York, NY, USA, 2002; A/CONF.199/20**. Available online: <https://digitallibrary.un.org/record/478154?v=pdf> (accessed on 27 March 2024).
8. Un—United Nations. *The Future We Want: Agenda Item 10, the Outcome of the Conference. Rio de Janeiro, Brasil, 20–22 June 2012; United Nations: New York, NY, USA, 2012; A/CONF.216/L.1**. Available online: <https://wedocs.unep.org/bitstream/handle/20.500.11822/13662/N1238164.pdf?sequence=1&isAllowed=> (accessed on 27 March 2024).
9. UN—United Nations/Independent Group of Scientists appointed by the Secretary-General. *Global Sustainable Development Report 2023. Times of Crisis, Times of Change. Science for Accelerating Transformations to Sustainable Development; United Nations: New York, NY, USA, 2023.* Available online: https://sdgs.un.org/sites/default/files/2023-09/FINAL%20GSDR%202023-Digital%20-11092_3_1.pdf (accessed on 27 March 2024).
10. Banister, D. The sustainable mobility paradigm. *Transp. Policy* **2008**, *15*, 73–80. [CrossRef]
11. Cass, N.; Faulconbridge, J. Commuting practices: New insights into modal shift from theories of social practice. *Transp. Policy* **2016**, *45*, 1–14. [CrossRef]
12. Haustein, S.; Nielsen, T.A.S. European mobility cultures: A survey-based cluster analysis across 28 European countries. *J. Transp. Geogr.* **2016**, *54*, 173–180. [CrossRef]
13. Aldred, R.; Jungnickel, K. Why culture matters for transport policy: The case of cycling in the UK. *J. Transp. Geogr.* **2014**, *34*, 78–87. [CrossRef]
14. Vannini, P. Mobile Cultures: From the sociology of transportation to the study of mobilities. *Sociol. Compass* **2010**, *4*, 111–121. [CrossRef]
15. Rimano, A.; Piccini, M.P.; Passafaro, P.; Metastasio, R.; Chiarolanza, C.; Boison, A.; Costa, F. The bicycle and the dream of a sustainable city: An explorative comparison of the image of bicycles in the mass-media and the general public. *Transp. Res. Part F Traffic Psychol. Behav.* **2015**, *30*, 30–44. [CrossRef]
16. Sarrica, M.; Alecci, E.; Passafaro, P.; Rimano, A.; Mazzara, B. The social representations of cycling practices: An analysis of symbolic, emotional, material and bodily components, and their implication for policies. *Transp. Res. Part F Traffic Psychol. Behav.* **2019**, *64*, 119–132. [CrossRef]

17. Sarrica, M.; Rimano, A.; Rizzoli, V.; Passafaro, P. Are e-bikes changing the social representation of cycling? An exploration of articles on cycling in Italian online publications. *Sustain. Sci. Pract. Policy* **2020**, *16*, 155–168. [CrossRef]
18. Ferreira, L.J.; Liu, J. Social determinants, motivation, and communication: How people perceive and choose sustainable mobility at a local level in Portugal. *Sustainability* **2023**, *15*, 13294. [CrossRef]
19. Goetzke, F.; Rave, T. Bicycle use in Germany: Explaining differences between municipalities with social network effects. *Urban Stud.* **2011**, *48*, 427–437. [CrossRef] [PubMed]
20. Dickinson, J.E.; Dickinson, J.A. Local transport and social representations: Challenging the assumptions for sustainable tourism. *J. Sustain. Tour.* **2006**, *14*, 192–208. [CrossRef]
21. Dickinson, J.E.; Robbins, D. Using the car in a fragile rural tourist destination: A social representations perspective. *J. Transp. Geogr.* **2007**, *15*, 116–126. [CrossRef]
22. Dickinson, J.E.; Robbins, D. “Other people, other times and special places”: A social representations perspective of cycling in a tourism destination. *Tour. Hosp. Plan. Dev.* **2009**, *6*, 69–85. [CrossRef]
23. Dickinson, J.E.; Robbins, D.; Fletcher, J. Representation of transport: A rural destination analysis. *Ann. Tour. Res.* **2009**, *36*, 103–123. [CrossRef]
24. Hoffmann, C.; Abraham, C.; White, M.P.; Ball, S.; Skippon, S.M. What cognitive mechanisms predict travel mode choice? A systematic review with meta-analysis. *Transp. Rev.* **2017**, *37*, 631–652. [CrossRef]
25. Lanzini, P.; Khan, S.A. Shedding light on the psychological and behavioral determinants of travel mode choice: A meta-analysis. *Transp. Res. Part F* **2017**, *48*, 13–27. [CrossRef]
26. DeVos, J.; Singleton, P.A.; Gärling, T. From attitude to satisfaction: Introducing the travel mode choice cycle. *Transp. Rev.* **2022**, *42*, 204–221. [CrossRef]
27. Bamberg, S.; Hunecke, M.; Blöbaum, A. Social context, personal norms and the use of public transportation: Two field studies. *J. Environ. Psychol.* **2007**, *27*, 190–203. [CrossRef]
28. Fessler, A.; Klöckner, C.A.; Hausteiner, S. Formation of crowdshipping habits in public transport: Leveraging anticipated positive emotions through feedback framing. *Transp. Res. Part F Psychol. Behav.* **2023**, *94*, 212–226. [CrossRef]
29. Heinen, E. Identity and travel behavior: A cross-sectional study on commute mode choice and intention to change. *Transp. Res. Part F Traffic Psychol. Behav.* **2016**, *43*, 238–253. [CrossRef]
30. Göransson, J.; Andersson, H. Factors that make public transport systems attractive: A review of travel preferences and travel mode choices. *Eur. Transp. Res. Rev.* **2023**, *15*, 32. [CrossRef]
31. Gössling, S. ICT and transport behavior: A conceptual review. *Int. J. Sustain. Transp.* **2018**, *12*, 153–164. [CrossRef]
32. Javaid, A.; Creutzig, F.; Bamberg, S. Determinants of low-carbon transport mode adoption: Systematic review of reviews. *Environ. Res. Lett.* **2020**, *15*, 103002. [CrossRef]
33. Mandy, F. Electric vehicles and consumer choices. *Renew. Sustain. Energy Rev.* **2021**, *142*, 110874. [CrossRef]
34. Glazener, A.; Wylie, J.; van Waas, W.; Khreis, H. The impact of car-free days and events on the environment and human health. *Curr. Environ. Health Rep.* **2022**, *9*, 165–182. [CrossRef] [PubMed]
35. Winters, M.; Buehler, R.; Götschi, T. Policies to promote active travel: Evidence from reviews of the literature. *Curr. Environ. Health Rep.* **2017**, *4*, 278–285. [CrossRef] [PubMed]
36. Watson, M. How theories of practice can inform transition to a decarbonized transport system. *J. Transp. Geogr.* **2012**, *24*, 488–496. [CrossRef]
37. Shove, E.; Pantzar, M.; Watson, M. *The Dynamics of Social Practice*; Sage: London, UK, 2012.
38. Engeström, Y. Concept formation in the wild: Towards a research agenda. *Éduc. Didact.* **2020**, *14*, 99–113. [CrossRef]
39. Maloney, M.P.; Ward, M.P. Ecology: Let’s hear from the people. *Am. Psychol.* **1973**, *28*, 583–586. [CrossRef]
40. Dhingra, M.; Mudgal, R.K. Historical Evolution of Social Media: An Overview. In Proceedings of the International Conference on Advances in Engineering Science Management & Technology (ICAESMT)—2019, Uttaranchal University, Dehradun, India, 15 March 2019. [CrossRef]
41. Grover, P.; Kar, A.K.; Dwivedi, Y. The evolution of social media influence. A literature review and research agenda. *Int. J. Inf. Manag. Data Insights* **2022**, *2*, 100116. [CrossRef]
42. Fischer, D.; Lüdecke, G.; Godemann, J.; Michelsen, G.; Newig, J.; Rieckmann, M.; Schulz, D. Sustainability Communication. In *Sustainability Science. An Introduction*; Heinrichs, H., Partens, P., Michlsen, G., Wiek, A., Eds.; Springer: Dordrecht, The Netherlands, 2016; pp. 139–148.
43. Aichner, T.; Grünfelder, M.; Maurer, O.; Jegeni, D. Twenty-five years of social media: A review of social media applications and definitions from 1994 to 2019. *Cyberpsychol. Behav. Soc. Netw.* **2021**, *24*, 215–222. [CrossRef] [PubMed]
44. Kapoor, K.; Tamilmani, K.; Rana, N.P.; Patil, P.; Dwivedi, Y.K.; Nerur, S. Advances in social media research: Past, present and future. *Inf. Syst. Front.* **2018**, *20*, 531–558. [CrossRef]
45. McFarland, L.A.; Ployhart, R.E. Social media: A contextual framework to guide research and practice. *J. Appl. Psychol.* **2015**, *100*, 1653–1677. [CrossRef] [PubMed]
46. Duong, C.T.; Lebet, R.; Aberer, K. Multimodal classification for analyzing social media. *arXiv* **2017**, arXiv:1708.02099. Available online: <https://arxiv.org/pdf/1708.02099.pdf> (accessed on 27 March 2024).

47. De Rosa, A.M.; Bocci, E.; Bonito, M.; Salvati, M. Twitter as social media arena for polarised social representations about the (im)migration: The controversial discourse in the Italian and international political frame. *Migr. Stud.* **2021**, *9*, 1167–1194. [[CrossRef](#)]
48. Keenan, A.; Shiri, A. Sociability and social interaction on social networking websites. *Libr. Rev.* **2009**, *58*, 438–450. [[CrossRef](#)]
49. Karami, A.; Lundy, M.; Webb, F.; Dwivedi, Y. Twitter and research: A systematic literature review through text mining. *IEEE Access* **2020**, *8*, 67698–67717. [[CrossRef](#)]
50. Cano-Marin, E.; Mora-Cantalops, M.; Sánchez-Alonso, S. Twitter as a predictive system: A systematic literature review. *J. Bus. Res.* **2023**, *157*, 113561. [[CrossRef](#)]
51. Kirilenko, A.P.; Molodtsova, T.; Stepchenkova, O. People as sensors: Mass media and local temperature influence climate change discussion on Twitter. *Glob. Environ. Change* **2015**, *30*, 92–100. [[CrossRef](#)]
52. Haunschild, R.; Leydesdorff, L.; Bornmann, L.; Hellsten, I. Does the public discuss other topics on climate change than researchers? A comparison of explorative networks based on author keywords and hashtags. *J. Infometrics* **2019**, *13*, 695–707. [[CrossRef](#)]
53. Sdoukopoulos, A.; Nikolaidou, A.; Pitsiava-Latinopoulou, M.; Papaioannou, P. Use of social media for assessing sustainable urban mobility indicators. *Int. J. Sustain. Dev. Plan.* **2018**, *13*, 338–348. [[CrossRef](#)]
54. Rahman, R.; Shabab, K.R.; Roy, K.C.; Zaki, M.H.; Hasan, S. Real-time twitter data mining approach to infer user perception toward active mobility. *Transp. Res. Rec.* **2021**, *2675*, 947–960. [[CrossRef](#)]
55. Balla, S.N.; Pani, A.; Sahu, P.K.; González-Feliu, J. Examining shifts in public discourse on electric mobility adoption through Twitter data. *Transp. Res. Part D Transp. Environ.* **2023**, *121*, 103843. [[CrossRef](#)]
56. Hellemans, J.; Willems, K.; Brengman, M. Daily active users of social network sites: Facebook, Twitter, and Instagram-use compared to general social network site use. In *Advances in Digital Marketing and eCommerce*; Springer: Cham, Switzerland, 2020; pp. 95–103.
57. Pew Research Center. Americans' Social Media Use. 2024. Available online: https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2024/01/PI_2024.01.31_Social-Media-use_report.pdf (accessed on 27 March 2024).
58. Pew Research Center. Social Media and News Fact Sheet. 2023. Available online: <https://www.pewresearch.org/journalism/fact-sheet/social-media-and-news-fact-sheet/> (accessed on 27 March 2024).
59. Hellemans, J.; Willems, K.; Brengman, M. The new adult on the block: Daily active users of TikTok compared to Facebook, Twitter, and Instagram during COVID-19 crisis in Belgium. In *Advances in Digital Marketing and eCommerce*; Springer: Cham, Switzerland, 2021; pp. 194–202.
60. Sammut, G.; Andreouli, E.; Gaskell, G.; Valsiner, J. (Eds.) *The Cambridge Handbook of Social Representations*; Cambridge University Press: Cambridge, UK, 2015.
61. Moscovici, S. Attitudes and Opinions. *Annu. Rev. Psychol.* **1963**, *14*, 231–260. [[CrossRef](#)] [[PubMed](#)]
62. Moscovici, S. The history and actuality of social representations. In *The Psychology of the Social*; Flick, U., Ed.; Cambridge University Press: Cambridge, UK, 1998; pp. 209–247.
63. Fraser, C. Attitudes, social representations and widespread beliefs. *Pap. Soc. Represent.* **1994**, *3*, 13–25.
64. Moscovici, S. *La Psychanalyse Son Image et Son Public. Etude Sur la Representations Sociale de la Psychanalyse*; P.U.F.: Paris, France, 1961.
65. Moscovici, S. The phenomenon of social representations. In *Social Representations*; Farr, R., Moscovici, S., Eds.; Cambridge University Press: Cambridge, UK, 1984; pp. 3–69.
66. Howarth, C. A social representation is not a quiet thing: Exploring the critical potential of social representation theory. *Br. J. Soc. Psychol.* **2006**, *45*, 65–86. [[CrossRef](#)] [[PubMed](#)]
67. Bauer, M.W.; Gaskell, G. Towards a paradigm for research on social representations. *J. Theory Soc. Behav.* **1999**, *29*, 163–186. [[CrossRef](#)]
68. Abric, J.C. L'organisation interne des representations sociale: système central et système péripérique. In *Structures e Transformations des Representations Sociales*; Guimelli, C., Ed.; Delachaux e Niestlé: Lausanne, Switzerland, 1994; pp. 73–84.
69. Flament, C.; Rouquette, M.L. *Anatomie des Idées Ordinaires*; Armand Colin: Paris, France, 2003.
70. Wagner, W.; Duveen, G.; Farr, R.; Jovchelovitch, S.; Lorenzi-Cioldi, F.; Marková, I.; Rose, D. Theory and method of social representations. *Asian J. Soc. Psychol.* **1999**, *2*, 95–125. [[CrossRef](#)]
71. Wachelke, J. Social representations: A review of theory and research from the structural approach. *Univ. Psychol.* **2012**, *11*, 729–741. [[CrossRef](#)]
72. Marková, I. Objectification in common sense thinking. *Mind Cult. Act.* **2012**, *19*, 207–221. [[CrossRef](#)]
73. Doise, W. L'ancrage dans l'études sur les representations. *Bull. Psychol.* **1992**, *45*, 195–198. [[CrossRef](#)]
74. Doise, W.; Spini, D.; Clémence, A. Human rights studies as social representations in a cross-national context. *Eur. J. Soc. Psychol.* **1999**, *29*, 1–29. [[CrossRef](#)]
75. Marková, I. *Dialogicality and Social Representations: The Dynamics of Mind*; Cambridge University Press: Cambridge, UK, 2003.
76. Moscovici, S. Notes towards a Description of Social Representations. *Eur. J. Soc. Psychol.* **1988**, *18*, 211–250. [[CrossRef](#)]
77. De Rosa, A.S.; Bocci, E.; Dryjanska, L. The Generativity and Attractiveness of Social Representations Theory from Multiple Paradigmatic Approaches in Various Thematic Domains: An Empirical Meta-theoretical Analysis on Big-data Sources from the Specialised Repository "SoReCom 'A.S. de Rosa' @-library". *Pap. Soc. Represent.* **2018**, *27*, 6.1–6.35.

78. De Rosa, A.M.; Mannarini, T. The “invisible other”: Social Representations of COVID-19 pandemic in media and institutional discourse. *Pap. Soc. Represent.* **2020**, *29*, 5.1–5.35.
79. Inzunza-Acedo, B.E. Media as source of information in the construction of social representations. *Comun. Soc.* **2017**, *29*, 167–182.
80. Castro, P. Applying social psychology to the study of environmental concern and environmental worldviews: Contributions from the social representations approach. *J. Community Appl. Soc. Psychol.* **2006**, *16*, 247–266. [[CrossRef](#)]
81. Castro, P. The approach of social representations to sustainability: Researching time, institution, conflict and communication. In *Handbook of Social Representations*; Sammut, G., Andreouli, E., Gaskell, G., Valsiner, J., Eds.; Cambridge University Press: Cambridge, UK, 2014.
82. Höijer, B. Social representations theory. A new theory for media research. *Nord. Rev.* **2011**, *32*, 3–16. [[CrossRef](#)]
83. Moloney, G.; Leviston, Z.; Lynam, T.; Price, J.; Stone-Jovicich, S.; Blair, D. Using social representations theory to make sense of climate change: What scientists and non scientists in Australia think. *Ecol. Soc.* **2014**, *19*, 19. [[CrossRef](#)]
84. Sarrica, M.; Brondi, S.; Cottone, P.; Mazzara, B.M. One, no one, one hundred thousand energy transitions in Europe: The quest for a cultural approach. *Energy Res. Soc. Sci.* **2016**, *13*, 1–14. [[CrossRef](#)]
85. Sarrica, M.; Biddau, F.; Brondi, S.; Cottone, P.; Mazzara, B.M. A multi-scale examination of public discourse on energy sustainability in Italy: Empirical evidence and policy implications. *Energy Policy* **2018**, *114*, 444–454. [[CrossRef](#)]
86. Passafaro, P.; Rimano, A.; Piccini, M.P.; Sarrica, M.; Alecci, E.; Mazzara, B. A psychosocial analysis of citizens’ orientations towards sustainable urban mobility: Overview of results from 10 years of research in Italy (and abroad). In *Proceedings from EDRA 50: Sustainable Urban Environments*; Beth, A., Wener, R., Yoon, B., Rae, R.A., Morris, J., Eds.; Environmental Design Research Association: Brooklyn, NY, USA, 2019. Available online: <https://cuny.manifoldapp.org/read/untitled-ecc4ff05-1d53-4c5e-a9b5-192e4d12292d/section/cb631f97-35f2-4caa-8090-0fb64d48e40a> (accessed on 27 March 2024).
87. Herring, S.C. Web content analysis: Expanding the paradigm. In *International Handbook of Internet Research*; Husinger, J., Klastrup, L., Allen, M., Eds.; Springer: Dordrecht, The Netherlands, 2010; pp. 233–249.
88. Khder, M.A. Web scraping or web crawling: State of art, techniques, approaches and application. *Int. J. Adv. Soft Comput. Appl.* **2021**, *13*, 144–168. [[CrossRef](#)]
89. Weare, C.; Lin, W.Y. Content analysis of the World Wide Web: Opportunities and challenges. *Soc. Sci. Comput. Rev.* **2000**, *18*, 272–292. [[CrossRef](#)]
90. Scholz, R. Lexicometry: A Quantifying Heuristic for Social Scientists in Discourse Studies. In *Quantifying Approaches to Discourse for Social Scientists. Postdisciplinary Studies in Discourse*; Scholz, R., Ed.; Palgrave Macmillan: Cham, Switzerland, 2019. [[CrossRef](#)]
91. Camargo, B.V.; Justo, A.M. IRAMUTEQ: Um software gratuito para análise de dados textuais [IRAMUTEQ: Free software for textual data analysis]. *Temas Em Psicol.* **2013**, *21*, 513–518. [[CrossRef](#)]
92. Chaves, M.M.N.; dos Santos, A.P.R.; dos Santosa, N.P.; Larocca, L.M. Use of the Software IRAMUTEQ in Qualitative Research: An Experience Report. In *Computer Supported Qualitative Research. Studies in Systems, Decision and Control*; Costa, A., Reis, L., Neri de Sousa, F., Moreira, A., Lamas, D., Eds.; Springer: Cham, Switzerland, 2017; Volume 71. [[CrossRef](#)]
93. Reinert, M. Une methode de classification descendante hierarchique: Application a l’analyse lexicale par contexte. *Les Cah. L’analyse Des Données* **1983**, *8*, 187–198.
94. Reinert, M. Les “mondes lexicaux” et leur ‘logique” à travers l’analyse statistique d’un corpus de récits de cauchemars. *Lang. Soc.* **1993**, *66*, 5–39. [[CrossRef](#)]
95. Marková, I. Themata in science and in common sense. *J. Philos. Sci.* **2017**, *19*, 68–92. [[CrossRef](#)]
96. Eckersley, R. *Environmentalism and Political Theory: Toward an Ecocentric Approach*; State University of New York Press: Albany, NY, USA, 1992.
97. Stern, P.C.; Dietz, T. The value basis of environmental concern. *J. Soc. Issues* **1994**, *50*, 65–84. [[CrossRef](#)]
98. Stern, P.C.; Dietz, T.; Kalof, L. Value orientations, gender, and environmental concern. *Environ. Behav.* **1993**, *25*, 322–348. [[CrossRef](#)]
99. Steg, L.; de Groot, J.I.M. Environmental values. In *The Oxford Handbook of Environmental and Conservation Psychology*; Clayton, S.D., Ed.; Oxford University Press: New York, NY, USA, 2012.
100. Thompson, S.C.G.; Barton, M.A. Ecocentric and anthropocentric attitudes towards the environment. *J. Environ. Psychol.* **1994**, *14*, 149–157. [[CrossRef](#)]
101. Schultz, P.W. The structure of environmental concern: Concern for self, other people, and the biosphere. *J. Environ Psychol.* **2001**, *21*, 327–339. [[CrossRef](#)]
102. Snelgar, R.S. Egoistic, altruistic, and biospheric environmental concerns: Measurement and structure. *J. Environ. Psychol.* **2006**, *26*, 87–99. [[CrossRef](#)]
103. Van Zomeren, M. Synthesizing individualistic and collectivistic perspectives on environmental and collective action through a relational perspective. *Theory Psychol.* **2014**, *24*, 775–794. [[CrossRef](#)]
104. Buijs, A.; Hovardas, T.; Figari, H.; Castro, P.; Devine-Wright, P.; Fischer, A.; Mouro, C.; Selge, S. Understanding people’s ideas on natural resource management: Research on social representations of nature. *Soc. Nat. Resour.* **2012**, *25*, 1167–1181. [[CrossRef](#)]
105. Castro, P.; Lima, M.L. Old and new ideas about the environment and science: An exploratory study. *Environ. Behav.* **2001**, *33*, 400–423. [[CrossRef](#)]
106. Castro, P.; Mouro, C.; Gouveia, R. The conservation of biodiversity in protected areas: Comparing the presentation of legal innovations in the national and the regional press. *Soc. Nat. Resour.* **2012**, *25*, 539–555. [[CrossRef](#)]

107. Manuti, A. Climate Change Awareness: An Explorative Study on the Discursive Construction of Ethical Consumption in a Communication Campaign. *Am. J. Appl. Psychol.* **2013**, *1*, 65–71. [CrossRef]
108. Climate-ADAPT. 2023. Available online: <https://climate-adapt.eea.europa.eu/en/metadata/adaptation-options/awareness-campaigns-for-behavioural-change> (accessed on 12 December 2023).

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