Evaluating and explaining the persuasiveness of rhetorical appeals for changing travel behavior

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Abstract. We identify six rhetorical orientations that promote sustainability in travel behavior and evaluate their persuasive power. These six orientations underpinning the rhetoric of pro-sustainability messages are: economic, altruistic, justice-equity, biospheric, impact and geographical. We find that messages with impact, biospheric and geographical orientations are the most persuasive. Three explanations are provided why these three are the most persuasive: the demographic of our respondents, the relevance of the message, and the framing of the messages. We end with the limitations of our study and agenda for future work.

Keywords: rhetoric; rhetorical orientation; persuasion; environmental communication

1. INTRODUCTION

In order to sustain their robust economic growth and development, many megacities in the developing world have initiated and implemented transport reforms over the years (e.g. **Muñoz, Batarce, Hidalgo, 2014**). Some countries with megacities in the ASEAN region, such as the Philippines, have also followed suit. In 2017, the Philippines adopted a national transport policy that "recognizes the important role of transportation as an enabler and driver of socioeconomic development towards achieving inclusive and sustainable growth, and attaining the national development goals and objectives" (**National Transport Policy, 2017**).

Nonetheless, transition to a sustainable transport regime has proved to be a formidable process for many of these megacities in the ASEAN region (**Bakker et al, 2018**). The rapid economic growth has not been accompanied by improvements in public transport system, but led to an increased demand for motorized personal transportation (**Bakker et al, 2017**).

How can transition to sustainable urban mobility on a large scale be supported? **Gössling (2013)** distinguishes three general mechanisms: market-based instruments, command-and-control approaches, and soft policy measures. Market-based instruments include taxes, subsidies or duties that affect the costs for travel. Control-and-command instruments are hard policies that affect transport choices through urban design and land use planning, or investments in specific transport infrastructure. Soft policy measures are information strategies that aim at promoting voluntary shift to more socially desirable transport decisions.

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In this paper, we focus on soft policy measures through communication messages. These are persuasive appeals used in campaigns to promote sustainable behavior, policies and cultural practices (**Pangbourne, Bennett & Baker, 2020; Sunio et al, 2017**). In many studies, the approach in designing these persuasive appeals is based on *alignment with the values* of the target recipients. After all, when communication messages aimed at promoting sustainable urban mobility resonate with the person's beliefs and are congruent with his/her value orientation, they can influence a change in behavior **(Steg and Vlek, 2009; Steg et al, 2014)**[1]. In other words, a message is more persuasive when its content matches the recipient's motivational orientations (**Chong & Druckman, 2007; Hirsh, Kang, & Bodenhausen, 2012**). Thus, an important element in programs and campaigns is the inclusion of this dimension of value that heightens the appeal itself of the message. For instance, in a number of recent studies carried out, messages for promoting pro-environmental behavior are based mostly on environmental and economic appeals (**Andersson, 2020; van den Broek, Bolderdijk & Steg, 2017; Bolderdijk et al, 2013; Steinhorst & Klöckner, 2018**). Other studies consider other appeals, aside from economic and environmental: for example, health and status (**Andersson, Hiselius, & Adell, 2020**), health and convenience (**Pangbourne, Bennett & Baker, 2020**), and finally, convenience and environmental (**Anagnostopoulou et al, 2020**).

The current research departs from the dominant approach of *value-based* persuasive appeals of extant transportation literature by bringing explicitly to the fore the perspective of *rhetorical orientations* in designing persuasive messages encouraging sustainable travel behavior (**Sunio, Cortes, Lactao, 2021**). The broader literature on persuasion has long considered rhetoric as a significant device to persuade and change systems of practice (**Kennedy, 2009**). Rhetoric is the art of persuasion by words, and is concerned with how language may influence the way an audience thinks, feels or acts. This suggests that in changing mobility behavior, policies and practices towards sustainability, information campaigns that proficiently use rhetoric can be persuasive (**Cheng, Woon and Lynes, 2011**). Nonetheless, to the best of our knowledge, focus on rhetorical orientation of messages remains understudied in the transportation literature.

The objectives of this paper are three-fold:

- Identify rhetorical orientations for promoting sustainable travel behavior from the extant literature;
- Extract rhetorical appeals from naturally-occurring textual data; and
- Evaluate the persuasiveness of these rhetorical appeals

2. LITERATURE REVIEW

We first survey the extant literature to identify rhetorical orientations that change agents, in general, use to influence the mindset, attitude and behavior of their target audience. To facilitate or instigate change, change-makers engage in sense-giving (i.e. alter audience's perception of reality) through creative use of rhetoric. Sense-giving often contains "rhetorical orientations", which refer to things

[1] The theoretical basis is the value-belief-norm theory of changing behavior. It provides a framework for investigating normative factors that can influence a change in attitudes and behaviors (**Lind et al, 2015**). Although changing attitudes does not necessarily translate to a change in behavior, it is certainly one of the factors that may have a significant effect. In other words, value-belief-norm is one of the pathways to behavior change.

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that the change-maker highlights or pays attention to (**Chandra, 2016**). To identify these orientations, we draw from the literature streams of environmental psychology (EP) and social entrepreneurship (SE). The reason for choosing the two streams is that both are concerned with effecting change: the former promotes pro-environmental change, while the latter social change. Both changes are involved in promoting sustainable mobility. In addition to the just mentioned connection to the field of sustainable mobility, SE likewise has an already well-established rhetorical orientation (**Chandra, 2016**) that could serve as one of the templates for this type of orientation in transportation literature.

Meanwhile, the EP literature has long established the value basis or value orientations of pro-environmental concern and behavior (**Stern and Dietz, 1994; de Groot and Steg, 2008**). These value orientations are the basis of beliefs, motivations and attitudes. In turn, value orientations are closely related to rhetorical orientations, even though we can certainly distinguish one from the other. Specifically, the value orientations, convictions and beliefs of the person – those that matter to him – *may possibly* (but not necessarily) be expressed, manifested or emphasized in his or her rhetoric. **Engell (1999)** makes a case for this idea when he affirmed that social realities "depend on intricate, powerful relations between language and human motivation, between words and value" (p.1). Consequently, it makes sense for change-makers to tailor their rhetoric to the value system of the audience for effective persuasion. In EP, these value orientations have been classified as hedonic, egoistic, economic, altruistic, justice/equity and biospheric (**de Groot and Steg, 2008; Steg et al, 2014**). We explain each in the next three paragraphs.

People with *hedonic orientation* focus on values of comfort and pleasure, and on improving their feelings and reducing effort **(Steg et al, 2014**). Individuals having *egoistic orientation* pursue personal interests or self-enhancement, such as power and achievement (**de Groot & Steg, 2008**). These two value orientations are collectively categorized as pro-self or self-enhancement value orientations (e.g. **Steg et al, 2014**), and generally are associated with pro-automobile lifestyle. Since they do *not*, in general, promote sustainability, we do not consider these orientations in the design of our persuasive appeals.

Those with *economic orientation* give importance to personal gains and increases in individual resource in terms of money. People with *altruistic orientation* consider the common good, and the interests of the collective when making choices. They show a deep concern on the welfare of other human beings (**Steg et al, 2014**). A closely related value orientation to altruism is *social justice and equity*. In **Stern and Diez (1994)** and **de Groot and Steg (2007; 2008)**, the concept of social justice means "correcting injustice, care for the weak". In mobility research, the issue of social justice and equity is closely associated with "inclusive mobility", especially for people with "transport disadvantage" (e.g. **Lucas, 2012**). Hence, we conceptualize *justice-equity orientation* as a value orientation that leads individuals to develop concern about exclusion of certain population groups in the transport system (c.f. **Lucas, 2012**) and distinct from *altruistic orientation* whose focus is the interest of "the other" in general.

Those who espouse *biospheric orientation* are concerned with the quality of nature and the environment for its own sake (**Steg et al, 2014**). In this study, we use biospheric and environmental (or ecological) interchangeably, although in a number of studies both are distinguished (e.g. **Nilsson & Küller, 2000**). Collectively, the latter orientations – altruistic, justice-equity and

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biospheric – are categorized as self-transcendence value orientations, and are generally associated with pro-public/active transport lifestyle.

Guided by the principle that language and rhetoric reveal what people value (**Engell, 1999**) we assume that each value orientation found in the EP literature corresponds to a rhetorical orientation. Indeed, the foregoing discussion on value orientations from EP literature can be used to identify and classify corresponding rhetorical orientations. For example, a rhetorical orientation that resonates with the economic value system of the audience can be referred as economic rhetorical orientation. The same correspondence is used to conceive other rhetorical orientations such as altruistic, justice-equity and biospheric orientations. This correspondence hints that when communication messages aimed at promoting pro-environmental behaviour resonate with the person's beliefs and are congruent with his/her value orientation or values prioritization, they can be effective (**Steg and Vlek, 2009; Steg et al, 2014; Cortes, 2016**; **van den Broek et al, 2017**). In other words, one may reasonably infer that a rhetorical orientation aligned with or tailored to the value orientation of the audience would be persuasive.

It needs to be affirmed, nevertheless, that a message's appeal is not solely borne out of its congruence with a person's value system or value prioritization. In their article on rhetorical strategies of legitimacy, **Suddaby and Greenwood (2005)** argue that values and wider belief systems are just one basis for legitimizing proposed change.

To expand further our list of orientations, we review and draw insights from the social entrepreneurship literature or SE (**Ruebottom, 2013; Chandra, 2016**). After all, social entrepreneurs are change agents who act for social change, of which promoting pro-environmental change is an example. In working for social change, social entrepreneurs likewise pay attention to orientations in their rhetoric, and even more directly so than in EP. Relevant orientations identified in SE are: impact and geographical (**Chandra, 2016**). These two rhetorical orientations of SE – impact and geographical – are not directly linked to any value orientation.

Social change agents employing an *impact orientation* in their rhetoric focus on maximization of effect on the outcome. Keywords associated with this orientation are "measure, impact, metric, sustainable, profound, change" (**Chandra, 2016**). Applied to this study, change agents using impact orientation emphasize the prioritization of more efficient modes, such as train or bus, over less efficient modes like car. These modes are considered more efficient (i.e. have more impact) since they are able to *move more people* compared to private vehicles.

Next, social entrepreneurs tend to use *geographical orientation* words, such as "local, villages, urban" as well as countries/regions in the developing world (e.g. India and Africa) (**Chandra, 2016**). Applied in the present study, rhetoric using geographical orientation emphasizes the appropriateness in urban areas of public transport over private vehicles. As an example of argument relying on geographical orientation, we can cite **Delbosc and Currie (2011)** who have shown by a survey of inner metropolitan, outer suburban, urban fringe and regional areas of Victoria, Australia, that there were very clear differences in mobility and car reliance between geographic locations. Car reliance peaked in fringe areas with regional areas showing slightly less car reliance. Lowest car reliance was in the inner metropolitan areas, followed by the outer suburban.

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In summary, this section has identified the following six rhetorical orientations for promoting sustainable travel behavior: economic, altruistic, justice/equity, biospheric, impact and geographical.

3. MATERIALS AND METHODS

3.1. Collection of sample of rhetorical appeals

We perform our data collection by an extensive search for opinion articles in three news media (Philippine Daily Inquirer, Rappler and Manila Times) using the following keywords: *traffic*, *opinion*, *Manila*. We limit our search only up to March 2020. In Philippine Daily Inquirer, the search yields twenty-five articles, including the newspaper editorial, by ten authors; in Rappler, five authors; and in Manila Times, one author. For each author, we perform further search by inputting as additional keyword the name of the author. This yields eleven more articles, for a total of 36 articles.

We examine each of the 36 articles and extract text segments or excerpts that may be potentially relevant. A text segment is potentially relevant if it provides some answer to the question: *"Why should walking, cycling and use of public transport be given priority over car in urban development and for our daily trips?"* Relevant excerpts are then assigned to one of the rhetorical orientation previously identified in the literature review that promote sustainable travel behavior: economic, altruistic, biospheric, justice-equity, impact and geographical (Table 1).

Table 1. Rhetorical orientations and example excerpts with keywords in boldface

Orientation	**Example Quotes**
Economic: Increasing personal gains and individual resource in terms of money (**Steg et al, 2014**)	"Private vehicles are not just easy to own but also **cheap** to use." "Bicycling to work can **save** up to 30 percent of a minimum wage earner's income." "if we want fewer private vehicles on the road, we need to reduce their relative **benefits** and increase their relative **costs**."
Altruistic: Putting the good of society and of everyone over personal good **(Steg et al, 2014**)	"Every day, rational individual choices undermine the **common good**." "The concept of the car is **individual mobility**…. But if five million people decide at pretty much the same time to be individually mobile, then the result is **collective immobility**." "future of our country and the **welfare of future generations** of Filipinos. It is about the **quality of life** for our children and their children." "**cities are for people**, and not (just) for cars"
Biospheric: Having a deep concern for the quality of nature and the environment for its own sake (**Steg et al, 2014**)	"aside from reducing **air pollution**" "the number of vehicles on the road typically decrease…and **air quality** goes up." "most **environmentally-friendly**"

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Justice-Equity: Showing concern about transport exclusion of specific group, or mobility for only a few (e.g. **Lucas, 2012**)	"The better approach is to see the challenge as one of **inclusive mobility**" "Infrastructure investments can … **hurt the poor and help the rich**, especially if these are focused prominently on roads." "Improving public transport, walking and cycling is also about **social justice and poverty alleviation**" "it might even **disadvantage the general public** as when sidewalks are removed in order to make streets wide enough for more car use."
Impact: Choosing modes that are efficiently able to move more people; higher throughput (**c.f. Chandra, 2016**)	"cars are not an effective solution to **move millions of people around**" "we should consider the **efficiency** of the specific use and **how many people** benefit from the use of road space." "Buses and jeepneys ideally pack **more people per unit of area** than other vehicles"
Geographical: Changing choice of mode depending on the geographical location: urban or rural (**c.f. Chandra, 2016**)	"Metro Manila is one of the world's densest and fastest-growing **megacities** today." "tolerable in **rural and small towns**, becomes dysfunctional in a **metropolis**." "best **cities** for people mobility (e.g., **Seoul, New York, London**) that are looking for ways to make their cities more walkable." "our rapidly **growing population**. This is especially important since, for the first time in our history, more than half of all Filipinos are projected to live in **urban areas** in the next few years"

3.2. Development of survey instrument

From these excerpts collected in the previous step, an online survey instrument was developed, consisting of rhetorical appeal messages. The message is composed of a main idea and real-world explanations. A sample graphic is also given as a sample rendition of the message. The message corresponding to each orientation is shown in Table 2. Each of these messages is then evaluated for persuasiveness via a survey.

We carried out our survey as follows. We invited students from the University of Asia and the Pacific (UA&P) in Metro Manila to accomplish the online survey. We requested some professors/lecturers of the university to allow us to promote the survey in their classes and present the survey to their students. Respondents were asked to take the survey seriously by spending at least five minutes to answer the survey. The same respondents were asked to disseminate the survey in the social networks, so in the end, we were able to obtain responses even from students not from UA&P. The survey period was three weeks. A chance to win Php 1000.00 (20 USD) was offered as an incentive. A total of 727 eligible individuals answered our survey. We resorted to convenience sampling as there is no intention to obtain a sample that is representative of the population.

Those surveyed were shown the messages and instructed to rate their persuasiveness. Furthermore, they were asked whether they perceive the message as stressing positive or negative consequences,

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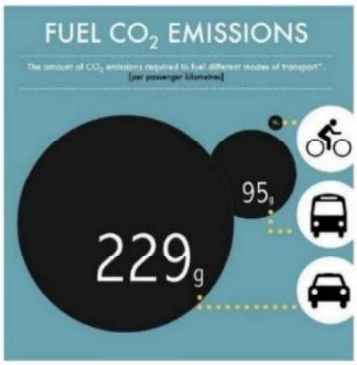
how personally relevant the issue presented by the message is for them, and what they found powerful about the most persuasive messages, and why the other messages are not so compelling. Other questions were asked, such as main mode of transportation used, demographic information, and a number of psychological items.

Table 2. Orientation and Messages (Main Idea + Real World Explanation + Sample Graphic)

Orientation	Message
Economic	**Real-world Explanations:** "Bicycling to work can **save** up to 30 percent of a minimum wage earner's income." "The majority of commuters rely on bus and jeepney users for their daily mobility. These public transport modes are much **more affordable for the masses**" **Sample Graphic:**  **Main idea: Using Public Transportation Saves Money**
Altruistic	**Real-world Explanations:** "The concept of the car is **individual mobility**…. But if five million people decide at pretty much the same time to be individually mobile, then the result is **collective immobility**." "Each passing day of Carmageddon takes a toll on our **collective productivity**." "What is at stake is the future of our country and the **welfare of future generations** of Filipinos. It is about the **quality of life** for our children and their children." **Sample Graphic:**  **Main idea: Transportation issues are quality-of-life issues**
Biospheric	**Real-world Explanations:** "If only more people started walking, cycling or taking public transport to work and to get around, our national **carbon footprint would be much lower**." "Bikes are **environment-friendly**. Being human-powered, they do not dump pollutants into the atmosphere. **Carbon emissions** from their use (and also from the use of public transport) are **far lower than those from driving motorized vehicles**." **Sample Graphic:**  **Main idea: Cars emit more carbon which harms our environment**

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<table>
<tr>
<td>Impact</td>
<td>
Real-world Explanations:

"Cars are not an effective solution to move millions of people around. Buses, trains and jeepneys ideally pack more people per unit of area than other vehicles. They move people efficiently from their homes to their work places."

Sample Graphic:

<u>Main idea: Cars move people less efficiently; public transport move more people</u>
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<tr>
<td>Justice-Equity</td>
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Real-world Explanations:
"Expanding a road to ease traffic for private vehicles provides a benefit to a small minority in our society—the less than 10% of families who own cars."

"Infrastructure investments can hurt the poor and help the rich, especially if these are inordinately directed toward car owners in the form of more road infrastructure."

"It might even disadvantage the general public as when sidewalks are removed in order to make streets wide enough for more car use."

"By constraining the mobility of one segment of society, we force PWDs to use private motor vehicles to move around our city"

"The better approach is to see the challenge as one of inclusive mobility"

Sample Graphic:

<u>Main idea: Improving public transport, walking and cycling is a justice and equity issue</u>
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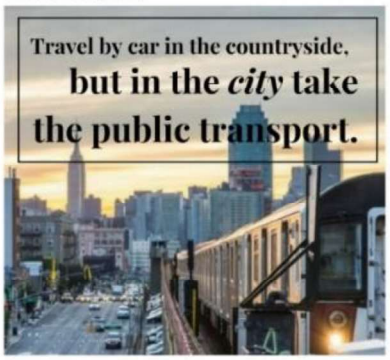
<tr>
<td>Geographical</td>
<td>
Real-world Explanations:
"Metro Manila is one of the world's densest and fastest-growing megacities today."

"we can overhaul our urban landscapes to accommodate our rapidly growing population. This is especially important since, for the first time in our history, more than half of all Filipinos are projected to live in urban areas in the next few years"

"Cars are tolerable in rural and small towns, becomes dysfunctional in a metropolis."

"The best cities for people mobility (e.g., Seoul, New York, London) are looking for ways to make their cities more walkable."

Sample Graphic:



<u>Main idea: If rapid urbanization trends of megacities are to be sustainable, an efficient mass transit, not more cars, is needed</u>
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3.3. Measures

The following are measured via the survey[2]:

Persuasiveness. Respondents were asked to rate the message according to how persuasive each one is as an answer to the question above using a Likert scale: Extremely persuasive (4), Persuasive (3), Somewhat persuasive (2), A bit persuasive (1), Not persuasive (0), Not credible (-1).

Main Mode. After the question, "For your daily trips to or from the university, which modes of transportation do you use? Choose all that apply," respondents were then asked: "Among those chosen, choose main mode of transportation that you often use." Choices are: car, public transport (train, bus, jeep), walk/cycle, carpool, and rideshare.

Induction check. The check for message framing manipulations was measured by asking the respondents if the message tends to stress more the positive or the negative consequences, or both aspects equally. The options emphasizing the positive, neutral and negative consequences are coded with +1, 0, -1, respectively. For example, in the geographical message, induction check is performed by asking: "On reading the message (the main idea and real-world explanation) in this section, which of the following statements do you agree with?" Three options are given: (a) "This message emphasizes MORE how SUSTAINABLE the urbanization of our fast-growing megacity would be if public transport is improved." (b) "This message emphasizes MORE how UNSUSTAINABLE the urbanization of our fast-growing megacity would be if public transport is not developed." (c) "This message emphasizes EQUALLY both aspects." To determine if the induction is negative or positive, we perform a one-sample t-test from the mean of 0.

Issue Relevance. On six-point Likert scales, participants indicated the degree to which they agreed with "How personally relevant for you is the topic of this message?" 0-point is coded with "This is a non-issue for me." 5-point is assigned with "I feel very strongly about this issue."

4. RESULTS

In this section we present the results of our message persuasiveness survey. Table 3 provides details of the demographics of the respondents. We limit our analysis to respondents aged 18-22 years old since this is the cohort which we want to influence. According to **Belgiawan, Schmöcker and Fujii (2016)**, influencing young people's habits is important as perspectives, attitudes and behavior formed during their university years may have an effect for the rest of their life course.

Nearly 60% of the respondents are female. Majority (70.8%) come from the University of Asia and the Pacific[3]. Of the total cohort number, 41.3% use car as their main mode of transportation to and from the university, 21.2% live close to the university so they walk or cycle, 27.2% travel

[2] Other metrics were measured such as "rank", but these are not reported in this paper.
[3] We received responses from students who are not from UA&P because the students from UA&P disseminated the survey in their social networks.

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by public transport, 6.6% go by rideshare (e.g. ridesharing car or ride-hailing motorbike) and only 3.7% carpool.

Table 3. Demographics of the survey respondents

Sample Size	N=727
Age	18-22 y.o. Mean: 19.21 years old (SD=1.56)
Gender	Male (38.1%); Female (59.7%); Others (2.2%)
University	70.8% are from the University of Asia and the Pacific (UA&P)
Main Mode	Car (41.3%); Walk/Cycle (21.2%); Public Transport (27.2%); Rideshare (6.6%); Carpool (3.7%)

To determine the persuasiveness of the rhetorical orientations in promoting sustainable mobility behavior, we perform the following analysis. We obtain the average of the persuasiveness ratings for each orientation and sort the orientations based on their average ratings. Figure 1 shows the mean persuasiveness rating with 95% confidence intervals.

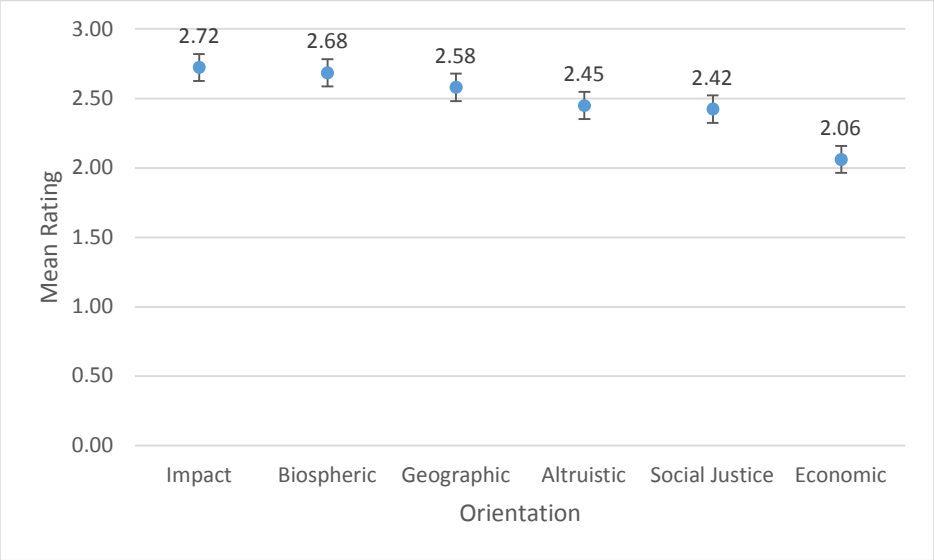

Fig. 1. Mean rating with 95% confidence intervals.

In Figure 1, the impact orientation has the highest persuasiveness mean rating, followed by the biospheric orientation then the geographic orientation. We perform the Kruskal-Wallis Test to determine if there are statistically significant differences between two or more groups of an independent variable (i.e. the orientation) on the ordinal dependent variable (i.e. the persuasiveness rating). Performing the Kruskall-Wallis H test on all the 6 orientation groups results to $p<0.001$. We perform the same test on the first four orientations only (namely, impact, biospheric, geographic and altruistic orientations) and this produces $p<0.001$. This implies that at least two orientations are statistically different from each other.

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We therefore perform Mann-Whitney test as a post hoc test to determine if the average rating of a higher-ordered orientation is significantly greater than the lower-ordered orientation. We perform the pair-wise Mann-Whitney test of the average ratings only among impact, biospheric, geographic and altruistic orientations.

Table 4. p-values from Mann-Whitney pairwise comparison test of the mean persuasiveness rating

	Biospheric	Geographic	Altruistic
Impact	0.12	0.01	<0.001
Biospheric		0.10	<0.001
Geographic			<0.01

Table 4 shows that although impact orientation obtained the highest average rating, it is not significantly greater than the biospheric orientation. Nonetheless, the impact and biospheric orientations are significantly more persuasive than the geographic orientation (at 0.01 and 0.10 significance level). Hence, the two most persuasive orientations are: impact and biospheric. This is followed by the geographic orientation, which is significantly more persuasive than the altruistic orientation.

Table 5 shows the induction values and issue relevance of each orientation. Induction is done to check if the message framing tends to stress more the positive or negative aspects, as perceived by the respondents. For example, the impact message "Cars move people less efficiently; public transport move more people" can be perceived in terms of gain ("This message stresses MORE how much space and time are SAVED by using bus or bicycle to move 60 people."), loss ("This message stresses MORE how much space and time are WASTED by using cars to move 60 people."), or neither ("This message tends to emphasize EQUALLY both aspects."). Relevance for impact message ("How personally relevant for you is the topic of this message, i.e., "transport as an issue of maximizing use of road space"?") is measured through a Likert scale from 0 ("This is a non-issue for me.") to 5 (I feel very strongly about this issue.).

To determine if the induction is negative or positive, we perform a one-sample t-test from the mean of 0 (the neutral score). From Table 5, we see that the impact, geographic and economic messages are perceived as positive frames, while biospheric and social justice messages are framed as negative. Altruistic message is perceived as neither positive nor negative.

Table 5. Induction values significant at 0.05*, 0.01**, 0.001*** level compared to the neutral 0. No significance testing done for relevance.

Orientation	**Induction**	**Relevance**
Impact	0.237***	3.899
Biospheric	-0.151*	3.676
Geographic	0.187**	3.928
Altruistic	0	3.403
Social Justice	-0.216**	3.201
Economic	0.719***	3.396

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5. DISCUSSION

In this work, our overall objective is to design persuasive normative messages based on rhetorical orientations for promoting sustainable urban mobility in a developing country.

We found out that messages with impact, geographical and biospheric are the most persuasive. This is confirmed by the persuasiveness ratings. Why are the three orientations (impact, geographic and biospheric) strong and compelling, i.e. persuasive?

One possible explanation is the demographic itself of the respondents. The respondents are young (18-22 years old), mostly female (59.7%), educated (all are university students), and mostly upper-class (41.3% have access to cars, and 21.2% live in areas near the university which is in a central business district with expensive rent). This perhaps explains why they find the message with biospheric orientation very persuasive. According to **Marquart-Pyatt (2007)**, "research demonstrates that more highly educated, younger, and female respondents, postmaterialists, liberals, and egalitarians tend to express more pro-environmental attitudes and engage in fewer environmentally damaging behaviors." Moreover, there is some evidence that "environmental concern was apparent in developing or industrializing countries at similar levels and in some instances even surpassing those of advanced industrialized countries." There is also a "strong concern about climate change to be higher in developing countries" **(Kim & Wolinsky-Nahmias, 2014**). This is confirmed by a nationwide study conducted by **Sia Su (2008)**, which reveals that "most of the students in the Philippines expressed strong environmentally supportive views and beliefs."

Another explanation is involvement, defined as "centrality or relevance of an object to people's interests" (**Segev, Fernandes & Wang, 2015**). Studies indicate that individuals' involvement is an important factor that moderates the effectiveness of messages (**Chang, 2010; Segev, Fernandes & Wang, 2015**). In our survey, when asked how "personally relevant" each issue is for them, the highest results are: Geographical Message (3.928), Impact Message (3.899) and Biospheric Message (3.676). Respondents consider the three persuasive messages as the most personally relevant as well. It seems therefore that when individuals find the issue of a message personally relevant, they engage in message elaboration, allowing the message to produce its effect. Involvement thus increases the effectiveness of personally congruent messages (**Chang, 2010**).

Another explanation is the message framing itself. A message can be framed in two possible ways: loss-frame or gain-frame. A gain-framed message stresses the positive outcomes of compliance (e.g., "If you recycle, you will live in a cleaner environment"), while a loss-framed message emphasizes the negative outcomes of noncompliance (e.g., "If you don't recycle, you will live in a polluted environment") (**Segev, Fernandes & Wang, 2015**). Studies indicate that, overall, loss framing appears to be more effective than gain framing in the promotion of environmental behavior (**Cheng, Woon, Lynes, 2011**). In other words, environmental messages emphasizing losses associated with inaction are generally more persuasive than messages emphasizing gains associated with action (**Davis, 1995**). Induction check in our survey shows that respondents perceived the environmental message to emphasize the negative consequences more ($\overline{x}_{Biospheric} = -0.151$, $p<0.05$).

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In general, target outcomes that are viewed as preventive and low-risk are best framed in terms of gains (**Rothman and Salovey, 1997; Segev, Fernandes & Wang, 2015**). Increasing people throughout by means of optimized road space efficiency (impact) and improving urban sustainability through development of public transport (geographical) are both seen as presenting no immediate risk to the message recipient. Hence, a gain-frame will render the message more effective. Induction check confirms this: Impact and geographical messages are perceived to stress more the positive consequences of action, i.e. gain-framed ($\overline{x}_{Impact} = 0.237$, $p<0.001$; $\overline{x}_{Geographical} = 0.187$, $p<0.01$).

6. SUMMARY, CONCLUSION, IMPLICATIONS AND FUTURE WORK

The present work introduces rhetoric as a novel perspective in the promotion of sustainable travel behavior. Whereas rhetoric has been recognized as important in institutional change (**Ruebottom, 2013; Chandra, 2016**), we notice that rhetoric, as a strategy of persuasion promoting sustainable travel behavior change, is under-studied (**Sunio, Cortes and Lactao, 2021**). The current study thus contributes to the extant literature in three ways. First, it presents six rhetorical orientations, namely impact, geographical, biospheric, altruistic, social justice and economic. Second, it evaluates the persuasiveness of messages based on these rhetorical orientations. We found that among the six rhetorical orientations, impact, biospheric and geographical orientations are the most persuasive. And third, it provides explanation for the persuasiveness of the rhetorical appeals.

The results of this study have important implications for policy-making. First, the current study explicitly brings to the fore the dimension of rhetoric in the design of persuasive appeals for sustainability campaigns. Rhetoric is persuasive language and recognized as a key tool for shaping reality and changing systems of practice (**Ruebottom, 2013**). It is important therefore for campaigns to consider this persuasion strategy. Second, considering the high persuasive power of the impact, biospheric and geographical orientations, it is important for individuals and agencies engaged in the promotion of sustainable travel behavior to design their appeals using these three orientations. Third, since sustainability campaigns typically confront resistance because of their change agenda, rhetoric can be a means for legitimacy-building (**Chandra, 2016**).

The present work has a number of limitations. First, it does not address the effect of frames simultaneously deployed together as a combination. A combination of weak and strong frame may produce a combined effect more powerful than a combination of two strong frames (**Chong & Druckman, 2007**). For example, deploying altruistic and geographic together may render the combined effect of both even more persuasive than the combined effect of biospheric and impact. Second, we did not check the effect in a competitive environment, i.e. we did not deploy pro-car and pro-sustainability messages together and assess their persuasive power. **Chong and Druckman (2007)** suggest: "A frame can be effective in one context but not in another. A strong frame is likely to be effective in one-sided contexts but may not be effective in competition with other frames. A weak frame may be effective among less knowledgeable individuals in noncompetitive contexts". These can be topics for future work.

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