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Attitude Toward Sustainable Transport as a Function of Source and Argument Reliability and Anticipated Emotions

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Abstract: The progressive development of mass communication has allowed the understanding and management of the persuasion process in a more systematic way. However, nowadays, persuasive campaigns still hardly result in behavior changes, particularly around concerns of the promotion of more sustainable lifestyles. Thus, it appears essential to investigate which dimensions are more effective in influencing people's pro-environmental actions. Relying on the conceptual frameworks provided by the elaboration likelihood model (ELM) and the model of goal-directed behavior (MGB), a questionnaire study (n = 380 urban residents) was carried out on the psycho-social antecedents of the intention to use sustainable means of transport. Structural equation modeling showed the mediating role of attitudes toward sustainable transport between ELM persuasion features (i.e., source reliability and argument reliability) and behavioral intention. Positive and negative anticipated emotions, derived from MGB, predict source reliability (the former) and argument reliability (the latter), respectively.

Keywords: persuasion; sustainable mobility; emotions; elaboration likelihood model; model of goal-directed behavior

1. Introduction

In the last few decades, persuasive communication campaigns have often been used to promote pro-environmental actions. Persuasion has been defined as “human communication that is designed to influence others by modifying their beliefs, values, or attitudes” [1] and “an attitude change resulting from exposure to information from others” [2]. O’Keefe [3] argued that there are requirements for the source, the means, and the recipient to consider something persuasive. Obviously, the communication system presents a more complex picture.

Nowadays, a considerable number of mass media messages barrage people in order to persuade them to do or buy something and they respond to such media bombardment by selecting messages on the basis of their content or other features, e.g., expert or attractive source, music, colors. Currently, however, communication campaigns hardly result in behavior changes.

Thus, how can we encourage people to reduce their environmental impact? The media, in fact, may have a positive or negative effect on environmental attitudes [4]. Understanding how to effectively communicate a persuasive environmental message can foster the likelihood of occurrence of pro-environmental behaviors, especially in facing current global environmental issues, such as vehicular emissions and climate change.

Theoretical Framework

Research literature suggests the dual-process models, e.g., the elaboration likelihood model (ELM) [5,6], as one of the most appropriate frameworks for understanding and explaining the whole persuasion process and the two different means of how people process messages.

Specifically, the ELM proposes two separate routes of persuasion: the central route and the peripheral route. The central route hypothesizes that people highly involved with the message will be influenced by the strength of the argument. On the contrary, when messages have no personal relevance, people will be persuaded by the source's expertise or attractiveness. Empirical support was provided by both psychological and sociological literature [7–9].

Regarding the promotion of behavior change, ELM represents a pertinent theoretical framework. It has been proven that increasing the knowledge of the audience is not sufficient for eliciting a behavioral change [10]. According to the ELM, taking the central route to persuasion is the key for establishing strong attitudes that can produce behavior change. Research on environmental issues underlined the effectiveness of messages tailored to the particular concerns of the audience in increasing the personal relevance of the messages and, in turn, in addressing recipients toward the central-route elaboration [11]. Empirical evidence of the effectiveness of the ELM has also been pointed out in several advertising contexts and consumer behaviors [12–15].

Some criticism about ELM pointed out the role of further (neglected) variables in influencing the elaboration [16]. Petty et al. [17] clarified that, indeed, other variables besides involvement can affect the elaboration process.

Currently, in fact, communication campaigns hardly result in behavior changes. Research reported the goodness of cognitive-based psychosocial models in explaining pro-environmental individual choice, such as the theory of planned behavior (TPB) [18]. According to the TPB, the proximal cause of behavior is the intention to perform such behavior, and attitude, in turn, is one of the determinants of intention. Integrations to the TPB model have been proposed and then empirically verified. An interesting contribution is provided by the model of goal-directed behavior (MGB) [19], described as an extension of the TPB, which focuses on the construct of anticipated emotions. Recently, an increasing amount of literature has pointed out the relevant impact of emotional dimensions in addition to the cognitive aspects in influencing people's behaviors [11,20,21]. An interesting representation of the interconnection between rational and emotional systems is provided by both the mood-as-information account and the processing-style perspective, where negative feelings work as a cue that messages must be carefully processed, whereas positive emotions are taken as a cue about the pleasantness of the messages [21]. Both perspectives are consistent with findings concerning the relevant impact of the mood in influencing the elaboration process. Specifically, it has been shown that during the communication process, a careful elaboration of the message (i.e., central route) is activated by the negative mood, whereas the positive mood stimulates the peripheral cues (i.e., peripheral route; [22,23]). In regard to sustainable behaviors, research on personal responsibility has highlighted that negative emotions such as feeling guilty and indignation may prompt pro-environmental actions [20], thus showing that affective motives may represent a constitutive part of reasoned action models such as TPB and MGB.

2. Objectives and Hypotheses

This study aims to verify a conceptual model focusing on the communication process related to the promotion of pro-environmental behaviors. Consistently with the elaboration likelihood model (ELM) [5,6], the main goal of the study is to test the persuasive role of communication dimensions such as source expertise and quality of arguments [24] in influencing the intention to use sustainable transport (i.e., different modes of transport, such as public transport, cycling or walking, having "less impact on the environment than the personal motorized transport mode" [25]). In addition, the tested model includes the anticipated emotions, which are expected to play a significant role in elaborating the messages through the central or the peripheral route.

The innovative nature of the study concerns two aspects. First, the classical dimensions analyzed in the social–psychological literature on persuasive processes have never been considered, to our knowledge, for the prediction of pro-environmental intentions. Second, the introduction of anticipated emotions as a dimension that could address the communication process, instead of the mood. In fact, some studies [22,23] have focused on the importance of mood in influencing the route to persuasion. Specifically, during the information process, the central route is activated by the negative mood while the peripheral route is activated by the positive mood. Starting from both these assumptions, the study aims to verify whether emotions operate as the mood in the persuasive elaboration process.

Thus, the two specific aims of the study are to verify the presence of two different elaboration routes within the communication process related to a specific pro-environmental behavior (i.e., sustainable mobility), and the role of negative and positive emotions as predictors of the two elaboration routes. In turn, the model aims to verify the role of attitude as a predictor of the intention to use sustainable transport.

In order to verify these goals, the following three specific hypotheses were elaborated.

Hypothesis 1. (a) *Anticipated positive emotions will significantly predict the trust in both the institution and other significant sources;* (b) *anticipated negative emotions will significantly predict the arguments about security, comfort, and economy.*

Hypothesis 2. *Trust in significant others as sources, trust in institutional sources, the security argument, the comfort argument, and the economic argument will significantly predict the attitude toward sustainable mobility.*

Hypothesis 3. *Attitude will predict the intention to use sustainable transport.*

Figure 1 reports the hypothesized prediction model.

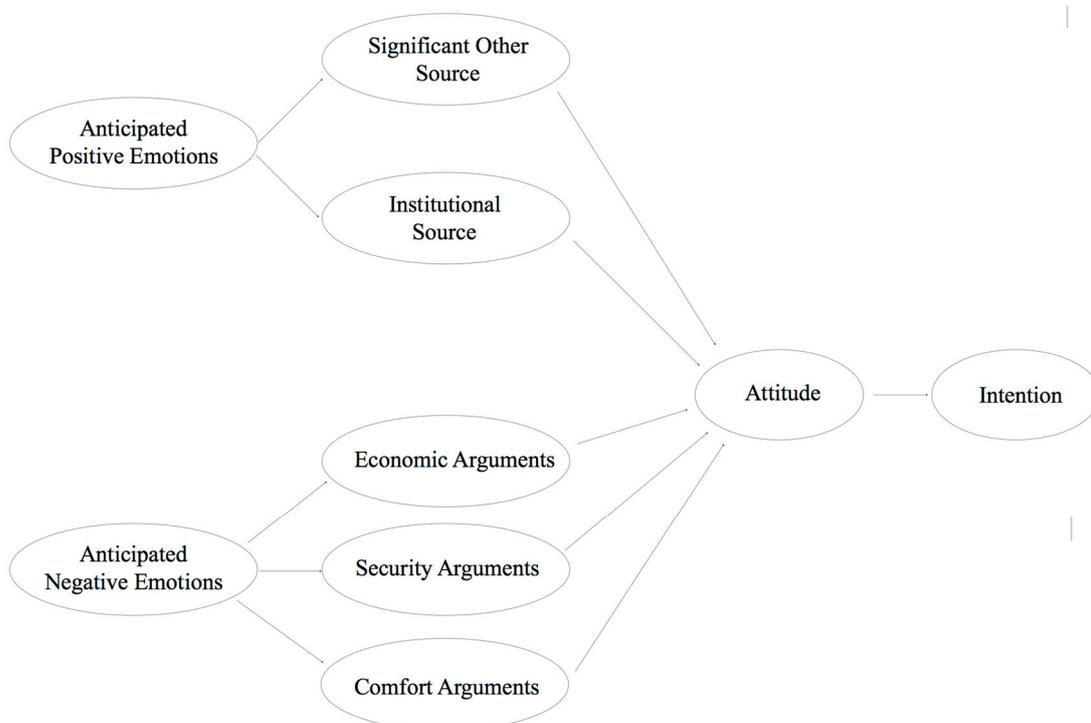


Figure 1. Expected relationships among the constructs.

3. Materials and Methods

3.1. Participants

Participants (n = 380) were residents in the broad area of Cagliari (including the municipalities of Cagliari, Quartu Sant'Elena, Quartucciu, Selargius, and Monserrato) that were recruited in various places (such as train and bus stations, urban parks, shopping malls, and post offices) through a quota sampling procedure for gender (47.9% males, 52.1% females) and age (range = 18–89; Mean = 44.37; Standard Deviation = 18.85). Concerning the education level, 5.3% of the sample attended primary school, 15.8% attended junior high school, 50.3% attended senior high school and 8.7% had a degree. As for professional status, 29.2% were students, 44.4% were employed, 17.9% were retired, 5.3% were housewives, and 3.2% were unemployed. Data collection was carried out from January 2015 to March 2015.

3.2. Measures

Participants filled in a self-report questionnaire including the following measures (Table 1):

(a) Positive anticipated emotions, 7 items [19]. The question “If during the next two weeks you will use sustainable transportation instead of the private car, how much do you think you would feel?” introduced the following emotions: delighted, excited, happy, glad, satisfied, proud, self-assured. Responses were recorded using a 5-point scale, ranging from 1 (not at all) to 5 (completely). $\alpha = 0.93$.

(b) Negative anticipated emotions, 7 items [19]. The question “If during the next two weeks you will not use sustainable transportation instead of the private car, how much do you think you would feel?” introduced the following emotions: angry, frustrated, unsatisfied, guilty, sad, disappointed, fearful. Responses were recorded using a 5-point scale, ranging from 1 (not at all) to 5 (completely) ($\alpha = 0.90$).

(c) Attitude toward the use of sustainable transport, 7 items [26]. Attitudes were measured through a semantic differential introduced by the following statement: “For me, using sustainable transport is”. Responses were recorded on a 5-point bipolar scale featuring the following adjectives: good–bad; appropriate–inappropriate; right–wrong; pleasant–unpleasant; boring–funny; harmful–beneficial; useful–useless ($\alpha = 0.84$).

(d) Intention to use sustainable transport, 3 items [26]. The intention to use sustainable transport was measured through the following items: “During the next two weeks I intend to use sustainable transport instead of the private car”; “During the next two weeks I will use sustainable transport instead of the private car”; “It doesn’t matter to me using sustainable transport during the next two weeks”. Responses were recorded using a 5-point scale, ranging from 1 (unlikely) to 5 (likely) ($\alpha = 0.90$).

(e) Security argument, 1 item (ad hoc). Arguments about security were measured through the following item: “How much would your choice of using sustainable transports be influenced by security arguments about them?” Responses were recorded on a 5-point scale from 1 (not at all) to 5 (completely).

(f) Comfort argument, 1 item (ad hoc). Arguments about comfort were measured through the following item: “How much would your choice of using sustainable transports be influenced by comfort arguments about them?”. Responses were recorded on a 5-point scale from 1 (not at all) to 5 (completely).

(g) Economic argument, 1 item (ad hoc). Arguments about cost were measured through the following item: “How much would your choice of using sustainable transports be influenced by economic arguments about them?”. Responses were recorded on a 5-point scale from 1 (not at all) to 5 (completely).

(h) Trust in significant others as sources, 2 items (adapted from [27]). The trust in significant others’ source (i.e., neighbors, relatives and friends) was measured through two items introduced by the question “How much do you trust the following information sources on the issue of sustainable transport?”. Responses were recorded on a 5-point scale from 1 (no trust) to 5 (full trust) ($r^2 = 0.67$).

(i) Trust in institutional sources, 2 items (ad hoc). The trust in institutional sources (i.e., organizations, companies) was measured through two items introduced by the question “How much do you trust the following information sources on the issue of sustainable transport?”. Responses were recorded on a 5-point scale from 1 (no trust) to 5 (full trust) ($r^2 = 0.45$).

The main socio-demographic variables (i.e., gender, age, education level, profession, city of residence, and neighborhood of residence) were also measured.

Table 1. Summary of constructs and items.

Construct	Item
Intention (3 item)	<ol style="list-style-type: none"> 1. During the next two weeks I intend to use sustainable transport instead of the private car 2. During the next two weeks I will use sustainable transport instead of the private car 3. It doesn't matter to me using sustainable transport during the next two weeks
Attitude (7 item)	<p>For me, using sustainable transport is:</p> <ol style="list-style-type: none"> 1. good–bad 2. appropriate–inappropriate 3. right–wrong 4. pleasant–unpleasant 5. boring–funny 6. harmful–beneficial 7. useful–useless
Negative emotions (7 item)	<p>If during the next two weeks you will not use public transportation instead of the private car, how much do you think you would feel?</p> <ol style="list-style-type: none"> 1. angry 2. frustrated 3. unsatisfied 4. guilty 5. sad 6. disappointed 7. fearful
Positive emotions (7 item)	<p>If during the next two weeks you will use public transportation instead of the private car, how much do you think you would feel?</p> <ol style="list-style-type: none"> 1. delighted 2. excited 3. happy 4. glad 5. satisfied 6. proud 7. self-assured
Security argument (1 item)	1. How much would your choice of using sustainable transports be influenced by security arguments about them?
Comfort argument (1 item)	1. How much would your choice of using sustainable transports be influenced by comfort arguments about them?
Economic argument (1 item)	1. How much would your choice of using sustainable transports be influenced by economic arguments about them?
Trust in in significant others as sources (2 item)	<p>How much do you trust the following information sources on the issue of sustainable transport?</p> <ol style="list-style-type: none"> 1. neighbors 2. relatives and friends
Trust in institutional sources (2 item)	<p>How much do you trust the following information sources on the issue of sustainable transport?</p> <ol style="list-style-type: none"> 1. organizations 2. companies

3.3. Data analysis

Structural equation modeling was performed by means of the software “R” [28] using the “lavaan” package [29]. Five indices were used in order to assess the models’ goodness of fit. These indices are the ratio between χ^2 and degrees of freedom, indicating a good fit if it is between 1 and 3 [30], and the indices (and thresholds) suggested by Hu and Bentler [31], i.e., the root mean square error of approximation (RMSEA) with a cut-off value of 0.06, the standardized root mean square residual (SRMR) with a cut-off value of 0.08, and the non-normed fit index (NNFI) and the comparative fit index (CFI) with a cut-off value of 0.95. Hooper et al. [32] also suggest an acceptable cut-off of 0.80 for the NNFI index.

In order to improve the fit during the step-by-step model improvement process, not-significant paths were eliminated and new paths were added by taking into account the modification indexes, based on the Lagrange multiplier test [33], which are justifiable by literature-based conceptual reasons.

4. Results

Figure 2 shows the final model predicting the intention to use sustainable transport. The goodness of fit of the chosen solution is satisfactory ($\chi^2 = 496.70_{(239)}$, $p < 0.001$; χ^2/df ratio = 2.07; RMSEA = 0.053; SRMR = 0.08; NNFI = 0.94; CFI = 0.95). The model explained a high proportion of variance of the outcome variable, i.e., behavioral intention (84%), as much as the following endogenous latent variables: attitudes (60%), security argument (22%), economic argument (4%), trust in significant others as sources (38%), and trust in institutional sources (5%).

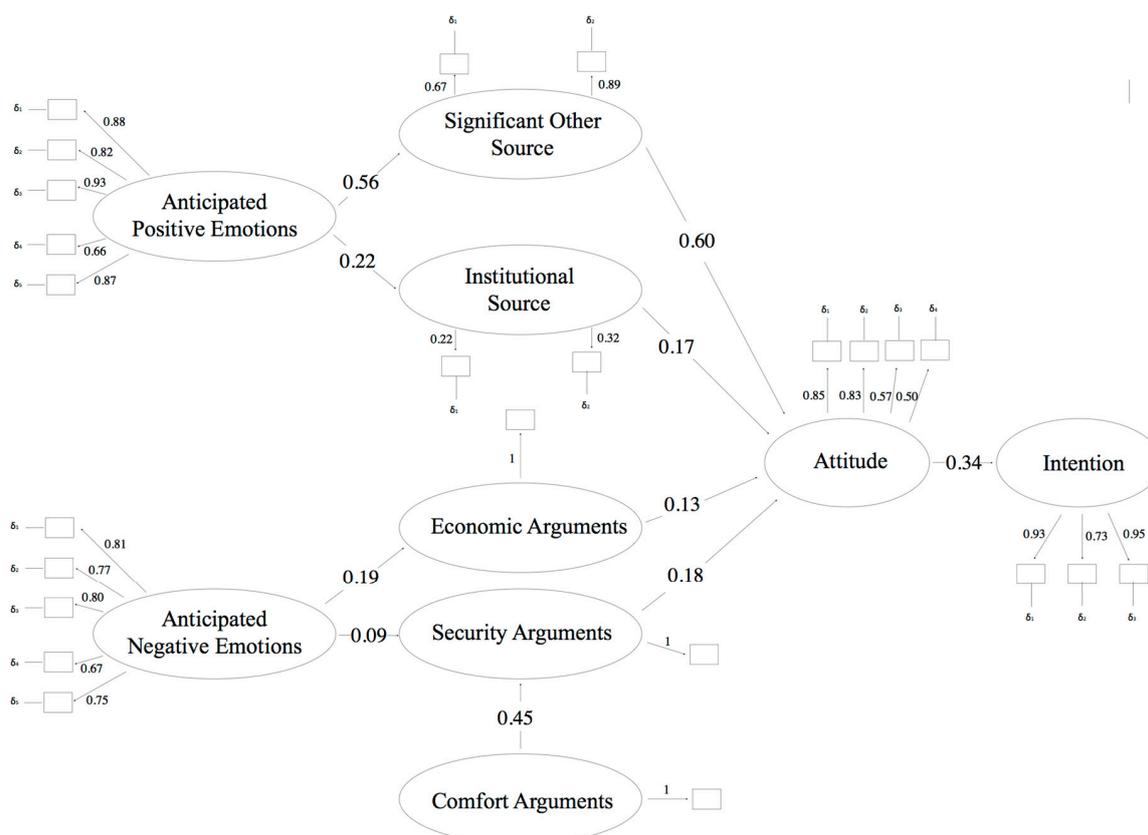


Figure 2. Structural equation model predicting intention to use sustainable transport.

Analyzing the values (i.e., technically, the structural coefficients β and γ) representing the strength of association between the measured constructs (i.e., technically, the latent factors), attitude emerged as the strongest predictor of behavioral intention ($\beta = 0.34$). Furthermore, results show that trust in significant others as sources ($\beta = 0.60$), trust in institutional source ($\beta = 0.17$), security argument

($\beta = 0.18$), and economic argument ($\beta = 0.13$) are significant predictors of attitude. Also, in line with the ELM postulate, the trust in significant others as sources ($\gamma = 0.56$) and the trust in institutional sources ($\gamma = 0.22$) are predicted by positive emotions, while security argument ($\gamma = 0.09$) and economic argument ($\gamma = 0.19$) are predicted by negative emotions. Different from what was expected, there is no direct arrow toward attitudes from the comfort argument, but it represents a direct antecedent of the security argument ($\gamma = 0.45$).

5. Discussion

Relying on the framework of the ELM [6] and of the MGB [19], this study tested the effect of different sources, arguments, and emotions on the attitudes and the intention related to a specific travel choice, i.e., the public transport option, which represents a more sustainable mode of transport than the use of a private car.

Overall, the model showed the significant role of attitudes on behavioral intention. A high proportion of variance of the attitude toward the use of sustainable transport is explained by the prediction model, which highlights the relevant role of negative and positive anticipated emotions within the elaboration process.

The tested model reveals the predictive effect of negative and positive emotions on, respectively, the perceived relevance of arguments and sources, thus confirming Hypothesis 1. In particular, (i) the higher the score in anticipated positive emotions (concerning the use of sustainable transport), the higher the trust in social-relational and institutional sources (peripheral route); and (ii) the higher the score in anticipated negative emotions (concerning the use of private cars), the higher the perceived relevance of arguments regarding the use of sustainable transport (central route). The activation of a negative emotion seems to drive people towards a more careful consideration of the arguments in favor of a travel choice, whereas positive anticipated emotions should activate those peripheral cues associated with the message (e.g., the source's attractiveness or credibility, music or pictures which are part of the message). This outcome is in line with previous research concerning the role of mood on the elaboration process [22,23] offering evidence of the specific contribution of a further construct, i.e., emotions, in explaining the persuasion process. Moreover, the actuator role of emotions in directing the elaboration of the persuasive message confirms the suggestion of an integrated mechanism of cognition and emotions in order to better understand human behavior [34–36].

In terms of the role of both arguments and sources as antecedents of attitude toward sustainable mobility (Hypothesis 2), the hypothesized direct associations are partially confirmed. Although there was a strong direct link between both sources and attitude from one side, on the other side, the comfort argument provides no direct link with attitude, whereas arguments about security and economy revealed the significant predictor role. The most interesting finding is the stronger effect of security arguments in predicting a positive attitude than arguments concerning economic issues. Furthermore, the model showed no direct connection between comfort arguments and attitude, but rather a strong link of the latter with security arguments. In other words, a message referring to a comfortable setting (e.g., well-lit environments, the presence of wide spaces) seems to reinforce the relevance of arguments related to personal safety. Consistently with other studies, addressing similar psychological patterns but in different settings such as urban neighborhoods [29,37] and stadiums [38], the attention to design issues increase the perception of security and the overall satisfaction toward a given setting. Thus, in order to improve the persuasive role of security arguments on the final behavior, it seems crucial to act on its antecedents, such as the upkeep and the comfort elements (e.g., lighting, wide spaces, comfort seats) of settings such as the bus or train stations, the waiting areas, and the vehicles themselves.

Concerning Hypothesis 3, attitude toward sustainable transport emerged as a significant predictor of the intention, in line with the vast research literature on the attitude–intention relationship [18]. Thus, the development of a positive attitude toward the use of more ecological travel modes should promote a congruent intention, which is in turn supposed to elicit a congruent action.

6. Conclusions

The general aim was to show that, in order to better understand which factors influence the persuasive process, both cognitive and emotional motives should be taken into account, especially in light of developing strategies for changing those behaviors based on habits, such as the use of a private car. In summary, results of the study supported the idea of a key role of anticipated emotions in the elaboration of the persuasive message, thus confirming the interplay between cognition and emotion in the explanation of human behavior [37–39].

Some study limitations need to be mentioned. First of all, the correlational nature of this study does not allow us to make claims in terms of causal inferences about the tested associations. An experimental research design should thus be set up for providing more solid evidence to the emerged links. A second limitation regards the use of single items, which are typically more prone to measurement error, for measuring the three analyzed arguments. Nevertheless, the “argument” factors were not the key variables of this study, and it should be noted that both intention and attitude (i.e., the two core dimensions which were used here as outcome variables) were measured by a good number of items (i.e., respectively, three and four).

In conclusion, the findings of this study provide some evidence towards the importance of emotions, arguments, and sources in driving the elaboration of the message by the actual and potential users of sustainable travel modes. In this regard, future communication campaigns should accurately consider which kinds of emotions should be triggered, which arguments should be highlighted, and which kinds of sources should be involved in order to increase the likelihood of the use of more sustainable means of transport.

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