Goal Framing Theory and Ecological Worldview on Cargo-Bike Sharing Systems

Lara Olivia Schmitt

S3797228

Department of Psychology, University of Groningen

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Group number: 10

Supervisor: M. Lohmeyer and Dr. J. Veldstra

Second evaluator: G. Muiños Trujillo

In collaboration with: L. Eichinger, A. Höfer, M. Prakken, J. Smit, and J. Zimmermann

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Abstract

Cargo-bikes could facilitate an emission free alternative to vehicles with combustion engines. It has been identified that biospheric framing, which is based on Goal Framing Theory, plays a crucial role in pro-environmental behaviour. Current research aims to shed light onto two types of framing, namely hedonic and biospheric, and their influence on attitude towards cargo-bike sharing. It is hypothesized that biospheric framing will result in higher attitude towards cargo-bikes sharing compared to hedonic framing, and hedonic framing compared to no framing. Further, the relationship between intention and attitude will be investigated, as well as the relationship between ecological worldview, and attitude is explored. A high attitude is hypothesized to be associated with higher intentions, and individuals who score high on ecological worldview are hypothesized to have a higher attitude. A convenience sample of eighty-three Groningen participants was gathered through a questionnaire for their ecological worldview, attitude and intention in using a cargo-bike sharing system. The sample was manipulated through randomized allocation of the participants into two framing groups: hedonic, biospheric and a control group. Between the three conditions, no significance towards attitude could be detected. Based on this research it can be concluded that framing has no effects on attitude. However, a significant link was found for the relationship between attitude and intention. Moreover, levels of ecological worldview predicted attitude towards cargo-bike sharing. Environmental education needs to be considered for pro-environmental behaviour changes. Future research could implement mentioned limitations to increase power towards possible detection of framing effects.

Keywords: goal-framing theory, ecological worldview, cargo-bike, hedonic framing, biospheric framing, attitude, intention

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"Emission-free city centre", a goal, various governments are pursuing for their cities all over the world, such as Melbourne, Copenhagen, Washington, and Utrecht. All of them are working towards the same sustainable change in the near future (van den Steen, n.d.). Likewise, the municipality of Groningen plans to make their city centre emission-free by 2025. Beforehand, new alternatives for common processes need to be explored, in particular new alternatives for combustion vehicles are becoming of high interest.

One alternative that needs to be considered is the use of (electric) cargo-bikes. Due to their shape, bigger goods can be transported in an environmentally friendly way. Before implementing such vehicles around cities, it would be beneficial to first understand the citizens opinion and beliefs, thus, their attitudes about cargo-bikes depending on how those are presented to them. According to *Goal Framing Theory*, by Lindenberg and Steg (2007), behaving environmentally friendly is influenced by the presentation of a given stimulus, and the resulting cognitive processes within an individual. Thus, different presentations of cargo-bikes might influence individuals' attitudes. Additionally, individuals' knowledge about the environment, such as the interaction between people's behaviour and their environmental surrounding, might influence the attitude towards a combustion-free vehicle. This will be explored through the variable *ecological worldview*.

Current research aims to identify the role of framing when talking about attitudes towards cargo-bike sharing systems, based on Goal Framing Theory (Lindenberg & Steg, 2007), as well as the relationship between ecological worldview and attitudes towards cargo-bike sharing systems. Lastly, we are interested in identifying the relationship between attitude and intention in regard to cargo-bike sharing. Accordingly, this research follows the questions: Does goal framing of cargo-bikes influence the attitude towards them? Does

attitude lead to a higher intention in using cargo-bikes? And finally, is ecological worldview linked to a higher attitude towards using cargo-bikes?

Cargo-Bikes

Cargo-bikes, also known as “Long John” (USA), “Lastenrad” (Germany), or “bakfiets” (Netherlands), are characterized by either a closed box or open platform, which can be located at the front or the back of the bike, allowing for different kinds of cargo-bikes, each equipped for a different purpose. In consequence, those special manufactured bikes illustrate not only an alternative to combustion vehicles, but also to regular bikes. Due to the possibility of larger transportation while not producing any emission (Piatkoswski et al., 2015); their prevalence has risen in the last years (La Ferla, 2010). Similar to regular e-bikes, cargo-bikes can also be equipped with an electrical battery. For the sake of simplicity, the term cargo-bike in the following paper entails e-cargo-bikes, as well as, regular cargo-bikes.

The transportation purposes of cargo-bikes are numerous: food, drinks, materials and children (Becker & Rudolf, 2018; Riggs, 2016). Different sources stated different primary uses, indicating that the primary use for cargo-bikes might potentially be moderated by demographic variables, such as age or family status. The provision of cargo-bikes for parents led to an increase in cycling behaviour and, consequently, a decrease in car usage (Bjørnarå et al., 2019); concretely, a measured reduction of one to two car travels per day was declared (Riggs, 2016). Although an increase in motivation towards cargo-bike cycling was reported (Bjørnarå et al., 2019). Research also indicated that only roughly one third of the given participants would have been interested in buying a cargo-bike for their private use (Becker & Rudolf, 2018). This indicates a drawback of cargo-bikes, namely the initial investment. An attractive alternative to this drawback is the act of bike sharing, which has become popular, especially in Europe (Shaheen et al., 2010). According to recent research, cargo-bike sharing was evaluated positively, as ninety percent of the participants who used cargo-bike sharing

systems in the past intended to do so again in the future (Becker & Rudolf, 2018). In concordance with Becker and Rudolf's (2018) research, those who used a cargo-bike regularly, indicated that if such a sharing system would not exist, the car would be their alternative.

In conclusion, it is a worthy endeavour to explore cargo-bikes in order to develop an emission free city centre. Nevertheless, the presentation of such a bike to its potential users is crucial, since this influences its persuasiveness and in turn individuals' perception, intention and future behaviour (Yonn et al., 2020).

Goal Framing Theory

Normative, Hedonic and Gain Goal Framing

Every individual perceives the environment differently, even though they might be looking at the same thing. This can be due to the underlying goals influencing how we perceive the environment. Lindenberg and Steg (2007) proposed with their Goal Framing Theory, three main goals in relation to pro-environmental behaviour; namely normative, hedonic and gain goals. Depending on how a given subject is presented, it influences the cognitive processes and, subsequently, someone's attitudes, which is called *framing*. A hedonic goal frame emphasizes the enjoyment at the present moment, the gain goal frame expresses the improvement of one's resources, and the normative goal focuses on behaving 'appropriately' (Lindenberg & Steg, 2007). Multiple theories tried to grasp the underlying framework concerning environmentally friendly behaviour, nonetheless, Goal Framing Theory has been found to be most accurate in predicting green attitudes (Wang et al., 2021).

Within Goal Framing Theory one goal predominates within an individual and, thus, is central (Steg & Nordlund, 2013). Gain goals are more easily activated within individuals, compared to normative and hedonic one's (Lindenberg & Steg, 2007). However, if the followed behaviour implies consequences, normative goals are central (Lindenberg & Steg,

2007). The normative goal compared to the hedonic and gain goal are often in conflict when pursuing the goal of behaving environmentally friendly (Steg et al., 2014). This is in line with various research, declaring: Individuals are most likely to engage in environmentally friendly behaviour when their normative goal is central (Steg & Vleg, 2009; Yang et al., 2020). This is because pro-environmental behaviour is generally seen as the right way to behave. Other research proposes that not only normative goals are significant in predicting sustainable behaviour, but hedonic frames do so as well (Wang et al., 2021). Gain goal, however has not been found to predict pro-environmental behaviour (Hameed & Khan, 2020), which is possibly because pro-environmental behaviour is time-consuming, often accomplished by high costs and perceived as inconvenient (Steg et al., 2014).

Westin et el., (2020) implemented Goal Framing Theory in an experimental setting by framing the reasons of a policy change for parking fees, based on 3 different frames: hedonic, gain, normative, and one control group. Results indicated that goal framing compared to no framing resulted in more positive attitudes towards the proposed policy change (Westin et al., 2020). Similar to the study by Westin et al., (2020), our research will implement Goal Framing Theory into an experimental setting, to understand the effects of different frames on attitude in relation to cargo-bike sharing. Due to the environmental importance in our research, normative goals will be referred to as biospheric goals, which indicates the correct way to behave and is in line with the original definition by Lindenberg and Steg (2007).

Hypothesis 1. Hedonic framing will result in higher attitude towards cargo-bike sharing compared to no framing (Figure 1, H1).

Hypothesis 2. Biospheric framing will result in higher attitude towards cargo-bike sharing compared to hedonic framing (Figure 1, H2).

Until now, most research has measured pre-existing goal frames within individuals, and their effects on behaving environmentally friendly (Hameed & Khan, 2020; Steg et al.,

2014; Steg & Nordlund, 2013; Steg & Vleg, 2009, Yang et al., 2020). However, our research, will apply Goal Framing Theory in a new context, similarly to Westin et al. (2020), who manipulated information based on framing groups. Understanding the consequences of active framing, can bring new dimensions for green persuasion techniques. Our findings will not only be beneficial for the municipality of Groningen when implementing cargo-bikes, but generally, for all salesmen and providers of pro-environmental objects or services. Active framing might establish itself as a new persuasion technique. Moreover, a better understanding of manipulated framing is beneficial for advertisement, where active framing has been used to persuade individuals though commercials. Again, framing has influenced the intentions and behaviours of the viewers (Burböck et al., 2019). In regard to health behaviour, framing has been used more widely for persuasion (Chia-Yen & Yeh, 2017; Gallagher & Updegraff, 2012).

Attitude and Intention

Environmental psychology is especially interested in human's intentions and behaviour's, since those affect the environment positively, or also negatively, in the long run. As elaborated earlier, we are interested in persuading individuals' green attitudes, but, in turn, the link between attitude and intention is essential for pro-environmental behaviour. The link for attitude and intention has been investigated intensively for various topics (Elliott et al., 2015; Pires et al., 2015; Wolgemuth et al., 2018; Zhang et al., 2022). More recently, the relationship between attitude and intention has been investigated in regard to pro-environmental topics, such as recycling (Onel & Mikherjee, 2017), and visiting green hotels (Wang et al., 2021). Research indicates: Higher attitudes are linked to higher intentions (Onel & Mikherjee, 2017, Wang et al., 2021; Yu et al., 2018). Consequently, it is expected that those findings can be applied to cargo-bike sharing, which has yet not been investigated. Our research aims to replicate those findings for cargo-bike sharing.

Hypothesis 3. A higher attitude towards cargo-bike sharing is linked to higher intention in using cargo-bike sharing systems (Figure 1, H3).

This research is important to obtain a deeper understanding of the relationship between intention and attitude for various topics. Reassurance of the link between those two variables is crucial, since the adjustment or update to a greener attitude alone might not lead to a visible action. Only if the individual is intending to live out their attitude through intentions, and behaviour, a change towards a greener environment will be visible in the long run.

Ecological Worldview

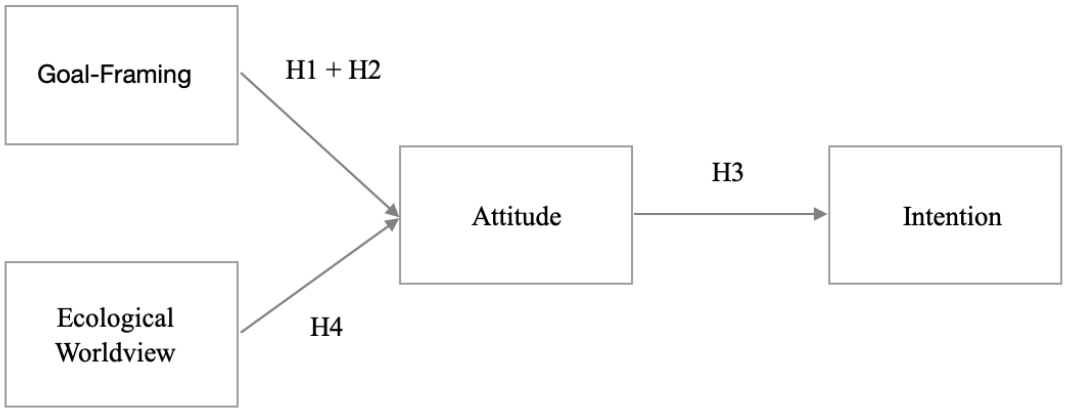
In addition to goal framing, also the knowledge about certain subjects can influence the perception of the surroundings within individuals. Knowing the consequences of human behaviour on this earth might lead to higher interests towards sustainable and environmentally friendly alternatives. The variable ecological worldview can be found in the value-belief-norm theory of environmentalism (Steg & Nordlund, 2013), where ecological worldview is predicted by biospheric, altruistic and egoistic values and predicts further beliefs around awareness of consequence and ascription of responsibility. The scale measuring ecological worldview is the New Ecological Paradigm (NEP) (Dunlap et al., 2002). The NEP conceptualizes the general concern towards the environment and the interrelation between humans and the environment (Stern et al., 1995). Ecological worldview serves as a predictor for attitudes towards relevant environmental topics such as renewable energy, environmental protection or the support of environmental policies (Hornsey et al., 2016). In addition, some research claims that a high score on the NEP can be seen as a predictor for pro-environmental behaviour (Xiao et al., 2019). Generally speaking, ecological worldview is found to influence attitudes concerning environmentally friendly topics (Gkargkavouzi et al., 2018; Moghimehfar et al., 2020).

Hypothesis 4. High ecological worldview is linked to a higher attitude towards cargo-bike sharing (Figure 1, H4).

Yet, no research has investigated the relationship between ecological worldview and the attitude towards cargo-bike sharing, which represents one pro-environmental alternative to combustion vehicles. Therefore, it is of high interest to understand the relationship between those two variables, in order to grasp the influence of ecological worldview on pro-environmental attitudes, as ecological worldview represents societies' knowledge about the environment. Consequently, further ecological education can be implemented to raise more awareness towards the environment and its struggles due to human behaviour.

Figure 1

Theoretical Framework



Method

Participants

The sample used in this research consisted of 83 participants, who were eligible when (a) living in the city of Groningen and (b) were older than 15 years old. Based on the power-analysis which was done prior to the data collection (f = 0.25, 1-β = 0.8, α = .05), a sample of 159 subjects would have been needed. From the 83 participants, 31 participants (37.3%)

identified themselves as male, 51 (61.4%) as female and one (1.2%) individual as non-binary/third gender. The age group of 20 to 29 was presented the highest (73.5%) compared to the age group 50-59 and 60+ which were presented lowest with 1.2% each. Approximately half of our participants obtained a bachelor's degree (44.5%), followed by individuals, who obtained a general secondary education (24.1%), and those having a master's degree (18.1%). Looking at the location of our participants it is recognizable that most participants lived in the centre of Groningen (36.1%), followed by the area Oude Wijken (26.5%), and the south of Groningen (14.5%). Less than half of our participants either own a car (18.1%), or have access using one (25.3%), compared to those who do not own a car themselves (56.6%). Between the three experimental conditions no significant differences were found for the variables age, $\chi^2\,(10) = 13.447$, $p = .200$; gender, $\chi^2\,(4) = 4.363$, $p = .359$; education, $\chi^2\,(10) = 8.364$, $p = .593$; location, $\chi^2\,(14) = 10.519$, $p = .723$; nor car-ownership, $\chi^2\,(4) = 5.100$, $p = .278$.

Design

This between-subject experimental study explored the effects of different goal frames, namely hedonic, biospheric and a control frame, on the attitude and intention to use cargo bike-sharing systems in Groningen. Thereby, the independent variable was goal framing, and the dependent variables were attitude and intention. Consequently, we investigated how the framing of cargo-bike sharing systems influenced the attitude towards them and, following to that, their intention in using them. In addition, the relationship between ecological worldview, and attitude is investigated, whereby ecological worldview and attitude are measured; the latter being the dependant variable.

Procedure

Participants were approached in the Groningen city centre with flyers containing a QR-code, as well as the website link (Appendix B), leading to the corresponding research,

combined with a brief introduction to the topic. Half-way through the data collection, the Dutch government decided for a lockdown due to the Covid-19 pandemic. Therefore, we adjusted our collection procedure and distributed the questionnaire in our personal circle, as well as on online platforms. Ultimately, resulting in a convenience sample. The questionnaire was available in English as well as in Dutch. Participants received a consent form, containing information about the purpose of the study. They were assured that participation is voluntary, anonymous, and confidential. Secondly, the demographics of our participants was assessed (gender, age, and education). Participants were asked to state which value they find important in their lives and, in addition, their attachment to the city of Groningen was investigated. Furthermore, respondents could indicate their knowledge about the environment. Then, participants were randomly assigned to one scenario condition about cargo-bikes. Afterwards, the manipulation was checked through indicating the main benefits presented in the text they have read. Moreover, the attitude towards cargo-bikes was evaluated. Participants were asked about their intentions in using a cargo-bike in the future and could then indicate how confident they felt in using a cargo-bike. Respondents also reported their location of living, and were asked about their transportation usage of cars and cargo-bikes. In the end, participants were debriefed about our study and were told about the condition they were assigned to. The respondents also had the opportunity to leave comments and remarks. For this study, participants were not compensated for their participation.

Manipulation

Participants were randomly allocated to one of the three conditions. They were presented with a half-page long text informing about cargo-bikes (Appendix A). In the control group, the information about cargo-bike sharing systems was presented neutrally, by describing a cargo-bike's property, as well as its general usage. In the other two groups, namely the hedonic and biospheric group, specific information was added. In the hedonic

group, the fun and practical aspect of using this kind of transportation was described, through words such as: “spent time outside with friends and family” and “convenient and flexible type of transport”. For the biospheric group the environmental aspect was highlighted in addition to the general information of cargo-bike sharing systems, through words such as “more sustainable”, “reduce CO2 emission”, and “more green spaces and biodiversity in the future”. Lastly, a picture of a cargo-bike was added in every condition to illustrate visually how such a bike looks like (Appendix A).

Materials

For this research multiple scales were used, as described in the procedure paragraph. However, only the relevant scales for this paper, hence, ecological worldview, attitude and intention will be discussed in detail.

Ecological Worldview

The ecological worldview was assessed with the New Ecological Paradigm Scale (Dunlap et al., 2002). Only ten from the 15 questions of the original questionnaire were used due to time reasons of the whole questionnaire. Those questions were assessed with a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). This scale included items such as: “The balance of nature is very delicate and easily upset.”, or “Humans have the right to modify the natural environment to suit their needs.”. The latter is exemplary for one of the four reversed items, thus, a low score on this question represents high ecological worldview. For the analysis, reversed items were recoded. The Cronbach’s alpha for this scale is acceptable (α = .616, M = 3.63, SD = 0.50).

Attitude

To measure attention towards cargo-bike sharing four questions of an attitude scale were used, invented by Fishbein and Ajzen (1975). Likewise, those were administered through a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An

example of such a question is the following: “In my opinion, it would be desirable to use a cargo bike sharing system”. The Cronbach’s alpha for this scale is decent (α = .89, *M* = 3.85, *SD* = 0.83).

Intention

The intention towards cargo-bike sharing systems was measured through two questions from the intention scale introduced by Fishman and colleagues (2020). The 5-point Likert scale ranged from 1 (*very unlikely*) to 5 (*very likely*), indicating the likelihood of our participants on using cargo-bike sharing systems in the future. An example of such a question is: “How likely are you to use a cargo-bike sharing system in the future?”. The Cronbach’s alpha for this scale is good (α = .72, *M* = 3.42, *SD* = 1.10).

Results

Manipulation Check

The data was analysed using IBM SPSS Statistics, version 26. Before starting to analyse the proposed hypotheses, the manipulation was checked through a Chi-square test, indicating a significant result, $\chi^2(4) = 32.30$, $p < .001$. Showing that the manipulation was successful, illustrated through Table 1.

Table 1
Crosstabulation: Manipulation Check
Count

		Transporting Goods	Fun, Convenience, Time-Efficiency and Transporting Goods	Reducing CO2 Emissions, Environmental Preservation and Transporting Goods	Total
Condition	Control	13	7	6	26
	Hedonic	7	16	7	30
	Biospheric	3	2	22	27
Total		23	25	35	83

Note. Correct manipulation check is given by control and transporting goods; hedonic and fun, convenience, time-efficiency and transporting goods; and biospehric and reducing CO2 emissions, environmental preservation and transporting goods.

Goal Framing and Attitude

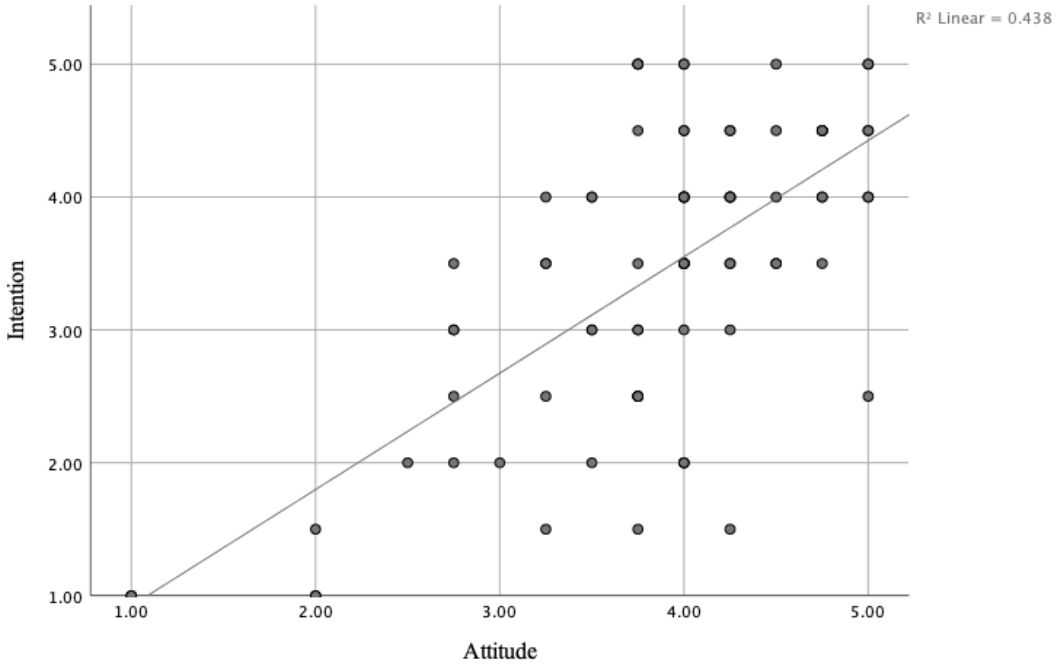
Primarily, the first two hypotheses stating that biospheric framing will lead to the highest attitude, followed by hedonic framing and the control group, were investigated. Therefore, the assumptions for the appropriate analysis were checked. Our sampling met the assumption of independence, since the data was collected randomly and independent. Further, to test the assumption of normality, the Kolmogorov-Smirnov test was performed, displaying a significant *p*-value ($p < 0.05$) in the control and biospheric condition for attitude. Therefore, the normality assumption was violated, and, consequently, a non-parametric Kruskal-Wallis test was performed, demonstrating a non-significant result, $H(2) = .088$, $p = .957$; illuminating the closeness of means for attitude over all three conditions (condition 1: $M = 3.79$, $SD = 0.93$; condition 2: $M = 3.90$, $SD = 0.75$; condition 3: $M = 3.84$, $SD = 0.84$). In conclusion, the hypothesis expecting that individuals exposed to hedonic framing will have a higher attitude towards cargo-bike sharing compared to no framing, is not supported. Neither is the second hypothesis, stating that biospheric framing will result in higher attitude towards cargo-bike sharing compared to hedonic framing.

Attitude and Intention

Secondly, a positive significant correlation between attitude and intention was detected by means of the non-parametric Spearman's Roh, $r(81) = 0.576$, $p < .001$, 95% *CI* [.499, .779], which was used due to the violation of the normality assumption. The scatterplot shows a positive relationship between intention and attitude, where higher scores in attitude are associated with higher scores in intention (Figure 2). In consequence, the third hypothesis, where attitude predicts intention, is supported.

Figure 2

Scatterplot for Attitude and Intention

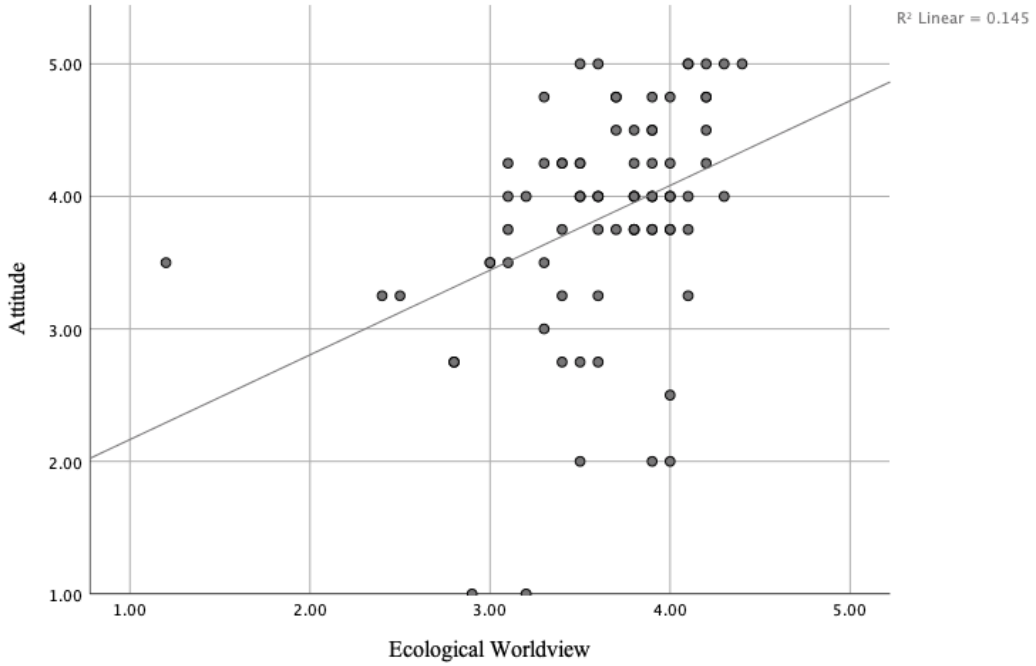


Attitude and Ecological Worldview

Lastly, the fourth hypothesis, individuals' high score on ecological worldview are linked to a higher attitude towards cargo-bike sharing, was examined. A regression analysis was performed since the different conditions of the participants need to be taken into account. The manipulation, which was done after measuring ecological worldview, but before measuring attitude, might have led to framing effects in the data. Therefore, ecological worldview and the variable condition were regressed. The ANOVA displays a significant result, $R^2 = .15$, F (2, 80) = 6.81, $p = .002$. However, only the variable ecological worldview predicted attitude significantly, $b = .38$, t (80) = 3.68, $p < .001$; not so for condition, $b = .010$, t (80) = .093, $p = .926$. Consequently, ecological worldview significantly predicts attitude towards cargo-bike sharing, and the third hypothesis is supported (Figure 3). However, the Kolmogorov-Smirnov indicated a significant result for normality, thus, the normality assumption was not met. Interpretation of the results need to done with caution.

Figure 3

Scatterplot for Ecological Worldview and Attitude

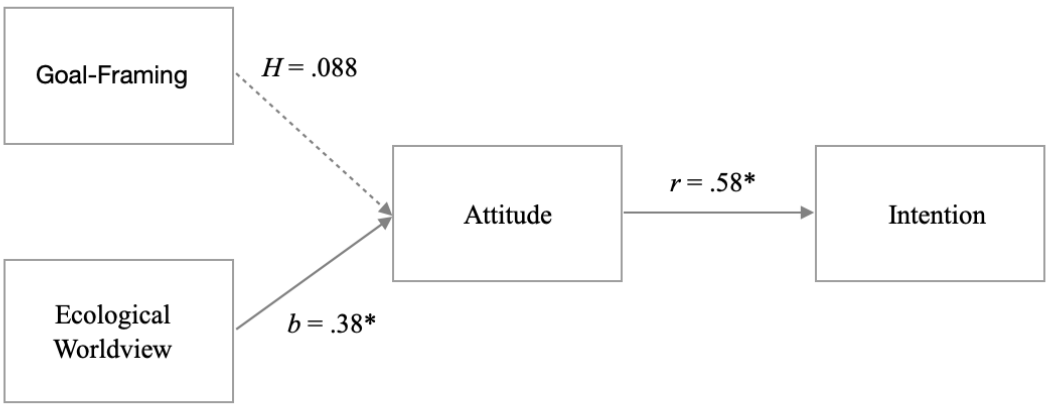


Framework

As an overview of the relevant results, the framework with the corresponding test results is presented in Figure 4.

Figure 4

Framework with Results



Note: Corresponding test results for each hypothesis, * indicating a significant *p*-value at < .001 level.

Exploratory Analysis

In the questionnaire, individuals were asked to indicate the main benefits presented in the earlier framed text, which they were randomly allocated to. As illustrated in Table 1, most participants replied to the manipulation check correctly. Yet, some did not, e.g. in the biospheric condition, seven people did not answer the question correctly, and indicated that the main feature discussed about cargo-bikes was fun, convenience, and time-efficacy. The same is applicable for the hedonic condition, where e.g., seven individuals indicated that transporting goods is the main component discussed in the text, compared to the 22 individuals answering correctly. In total, 38,6 % of the participants chose the wrong answer option, which leaves room for the assumption, that the framed manipulation towards cargo-bikes might not have worked thoroughly enough. Beforehand, it was decided to not exclude individuals based on their answer in the manipulation check, because it was rather seen as an indicator for a successful manipulation. Given the insignificant results for Hypothesis 1 and 2 an extra analysis is performed: Individuals, who did not answer the manipulation check correctly, were excluded. Based on the remaining 51 cases the non-parametric test was not able to detect significant differences between the three framing groups, H (2) = .304, p = .859. Even though slightly more differences between groups could be noticed, they were still insignificant.

Discussion

This paper tries to answer the following research questions: Does framing of cargo-bikes influence the attitude towards them? Does attitude lead to a higher intention in using cargo-bikes? And finally, is ecological worldview linked to a higher attitude towards using cargo-bikes? The results will be discussed in the following paragraphs.

Goal Framing and Attitude

It was hypothesized that individuals who are exposed to hedonic farming will have a higher attitude towards cargo-bike sharing compared to no framing. Furthermore, we hypothesized that biospehric framing will result in higher attitude towards cargo-bike sharing compared to hedonic framing. Nevertheless, our data could not support those claims, on the contradictory, all three framing groups scored on average close to identical on attitude, indicating no significant differences between the three groups: hedonic, biospheric and control group.

On the basis of past research, it was expected to see differences between groups (Hameed & Khan, 2020; Steg & Vleg, 2009; Wang et al., 2021; Yang et al., 2020). More concretely, normative framing has been recognised as being the best predictor for pro-environmental attitudes (Steg et al., 2014; Steg & Vleg, 2009; Yang et al., 2020). Whereas hedonic framing has only been able to predict on some occasions (Wang et al., 2021). Further, goal framing was linked to higher attitudes, compared to no goal framing (Westin et el., 2020). Nonetheless, our data was not in line with previous research. Through the manipulated framing of cargo-bikes in the research set-up, one goal was predominated within an individual. However, based on our result it can be concluded that framing has no observable effects on attitude. This inability to detect differences between the three conditions could be due to various drawbacks of our research, discussed in more detail in the Limitations paragraph.

Attitude and Intention

It was hypothesized that a higher attitude towards cargo-bike sharing is linked to higher intention in using them. Our data supported this hypothesis. Previous research has announced a significant link between attitude and intention for all kind of topics (Elliott et al., 2015; Pires et al., 2015; Wolgemuth et al., 2018; Zhang et al., 2022). Lately, the relationship

between attitude and intention in regard to environmentally friendly topics was investigated (Wang et al., 2021, Yu et al., 2018); e.g. recycling behaviour (Onel & Mikherjee, 2017). Hence, a significant link between attitude and intention is detected for an environmentally friendly means of locomotion due to this research. Thus, the findings strengthen previous results, and can be seen as a replication of the relationship between attitude and intention, especially for pro-environmental attitudes and intentions.

Ecological Worldview and Attitude

The fourth hypothesis stated that higher ecological worldview is linked to a higher attitude. This is supported through significant results by the data. Thus, having a higher ecological worldview is linked to having higher attitude towards cargo-bike sharing. This is in line with past research, which stated that ecological worldview predicts attitudes in regard to environmental topics (Gkargkavouzi et al., 2018; Hornsey et al., 2016; Moghimehfar et al., 2020; Xiao et al., 2019). Subsequently, cargo-bike sharing can be added as a topic where attitude could be predicted through ecological worldview. Subsequently, cargo-bike sharing can be added as a topic where attitude could be predicted through ecological worldview, and it can therefore be concluded that the knowledge about the environment and the crisis we are facing, influences beliefs and cognitions in individuals. This indicates that educating such knowledge is still of high relevance, when persuading individual's behaviour to a more pro-environmental one, such as an emission-free city centre by implementing cargo-bike sharing systems. The link between education and attitude has been recognized before for non-environmental topics (Theriault et al., 2017). For example, providing better education to medical staff about elderly and their aging process, resulted in a higher attitude towards them (Tufan et al., 2015)

In regard to the findings it is worth mentioning that the internal consistency, as well as the analyses need to be considered when discussing the significant results for ecological

worldview and attitude, which will be discussed more in the Limitations paragraph. Interpretation of the results should be done with caution.

Exploratory Analysis

The exploratory analysis aimed to further understand the effect of framed individuals on attitude towards cargo-bike sharing. Table 1 presents participants' responses of the manipulation check. This revealed that 32 individuals indicated the main benefit of cargo-bikes correctly. Yet, the manipulation check was significant between groups, which was concluded as a successful manipulation. Nevertheless, individuals who answered wrongly were still included in the analysis for Hypothesis 1 and 2, even though it can be assumed that the manipulation of framing was not successful for them. As a consequence, an analysis without those cases was performed. Still, the results were insignificant, while keeping in mind that the sample size has shrunk to only 52 cases. Based on this insight into the manipulation it can be concluded that the incorrectly answered manipulation check was not the cause of the overall found insignificant results.

Rather recently it has been pointed out that the exclusion of subjects, who fail the manipulation check should be prohibited due to the increase of bias (Aronow et al., 2019). However, different practices by researchers have been reported in regard to the manipulation check and more importantly on how to proceed with the gained knowledge (Kotzian et al., 2020).

Theoretical and Practical Implications

This research is able to imply higher theoretical and practical understanding of the variables and the framework they are presented in. Goal Framing Theory has often been used to measure pre-existing goals within individuals (Hameed & Khan, 2020; Steg et al., 2014; Steg & Nordlund, 2013; Steg & Vleg, 2009, Yang et al., 2020). This research broadened its application, by using the theory in an experimental setting when looking at environmental

behaviour. Even though our results were insignificant when looking at the effects of framing onto attitude (Hypothesis 1 and 2), the possible practical applications can be meaningful. Our findings illustrate that active framing does not matter for higher attitude towards cargo-bike sharing. Consequently, the Groningen municipality should be as successful when presenting cargo-bikes to their citizens neutrally, as well as environmentally friendly. Conversely, past research suggests that cargo-bikes should be presented within a framing, compared to no framing, whereas the actual framing does not matter (Westin et al., 2020). Moreover, normative framing has been found to be best in predicting pro-environmental behaviour (Steg et al., 2014; Steg & Vleg, 2009; Yang et al., 2020). Therefore, this research can be seen as a stepping stone for future research to apply Goal Framing Theory in an experimental design, since a deeper understanding of this matter will open doors for green persuasion of individuals, which will be beneficial for society, but more importantly for the earth.

Furthermore, the replicated relationship between attitude and intention demonstrates that a change in attitude can, in consequence, lead to a different behaviour, suggesting that attitude might be crucial to look at when talking about behaviour change. Nonetheless, it is important to consider, that intention and actual behaviour are still two different variables. The assumed link between those two variables cannot always be supported (Davies, 2002). Research has not only introduced the term of an intention-behaviour gap, moreover, different solutions are offered to decrease this gap (Birch & Memery, 2020).

In addition, the detected link of ecological worldview on attitude has theoretical as well as practical implications that are worth mentioning. Ecological worldview was taken out of the suggested framework of value-belief-norm theory, and it was looked at it as a single variable. Frequently, ecological worldview is only one component of a complex framework with bidirectional influences. Conversely, in this framework ecological worldview was used as an independent variable. Moreover, the link between ecological worldview and attitude has

vital practical implications. The positive relationship between attitude and ecological worldview illuminates the notion that individuals who have higher environmental knowledge are more likely to engage in pro-environmental behaviour. In turn, those individuals who are less educated regarding environmentally friendly behaviour indicate a lower attitude towards green topics. Thus, education matters when talking about pro-environmental behaviour. Environmental education, such as explaining the suffering of the environment due to human behaviour, will increase higher attitudes towards pro-environmental topics. More concretely, if attitudes want to be changed, education, and obtained knowledge, play a crucial role.

Limitations

First off, several methodological issues need to be mentioned. One drawback in our research is the sample. The sample size and the sampling method might have influenced the results. Initially, based on our pre-calculated power analysis we were aiming for a sample size of at least 159 responses. Due to self-set exclusion criterion 42 of the initially 125 obtained responses needed to be excluded. Still, statistical inference can be made with 83 cases. Nevertheless, this has a high effect on the presented results, for the non-significant, as well as for the significant ones. A higher response rate might have been able to detect small differences, especially relevant for Hypothesis 1 and 2. In addition, the used sample resulted in a convenience sample. Initially, it was aimed for a random sample by approaching individuals in the city centre of Groningen. Nevertheless, the adaptation to new Covid-19 measures led to the distribution of the questionnaire in the personal circle. Related studies obtained a bigger sample ($N > 500$) and recruited randomly (Westin et al., 2020; Yang et al., 2020). Thus, the sample size, as well as, the sampling method need to be kept mind when discussing the results.

Furthermore, weaknesses of the manipulation need to be mentioned. Firstly, the manipulation itself might have been not strong enough. In the three framing conditions some

sentences in the text were presented to frame the individuals. In addition, all participants were shown the same picture of a cargo-bike, independent of their group (Appendix A). Different pictures, in line with the framing of the condition could have strengthened the manipulation. As done previously, by Westin et al., (2020) where the picture was in line with the framing used, and no picture was presented for the control group (Westin et al., 2020).

Secondly, the manipulation check was administered by asking the participants: "What were the main benefits of such systems mentioned in the text?". Belatedly, it was realised that this question can rather be seen as an attention check compared to the initiated manipulation check. The presented question can only demonstrate if the participant payed attention to the previously shown text of cargo-bikes. A manipulation check should have enquired the participants opinion about main benefits of cargo-bikes. Similarly, Westin et al. (2020) conducted an experimental research and focused on goal framing groups. The manipulation check was administered by asking participants of each condition what the focus of the previous presented manipulation was. Again, this might have rather been seen as an attention check than a manipulation check. Alternatively, the manipulation check could have been formulated as: "What are in your opinion the main benefits of using a cargo-bike sharing system?".

Lastly, in order to prevent a too lengthy questionnaire, to measure ecological worldview in the questionnaire, only ten of the 15 questions were used from the NEP to measure ecological worldview. This resulted in a Cronbach's alpha of .616, which is acceptable, but not optimal. The original revised NEP with all 15 items by Dunlap et al., (2000) reports a decent alpha of .83. Related research reports $\alpha = .78$ (Gkargkavouzi et al., 2018), and $\alpha = .84$ (Moghimehfar et al., 2020) for the NEP scale. Hence, the internal consistency of the used scale in this study might be suffering. In conclusion, future research should assess all 15 questions to allow for highest internal consistency possible.

Additionally, it needs to be acknowledged that the regression analysis was performed even though the normality assumption was not met. Thus, as mentioned earlier, interpretation of the results should be done with caution.

Further Research

This research had good intentions and qualities. As mentioned in the limitations section, some improvements should be implemented in future research. Consequently, a randomized, and bigger sample should be obtained. The manipulation should be strengthened though implementing framed pictures, and the manipulation check should be worded as an actual manipulation check. Lastly, the variable ecological worldview should be measured with the whole scale.

Apart from those minor changes, it is still of high interest in answering similar hypotheses in regard to pro-environmental behaviour. As stated in the paragraph Cargo-Bikes, the transportation purposes for cargo-bikes were numerous: food, drinks, materials, and children (Becker & Rudolf, 2018; Riggs, 2016), which lead to the conclusion that the primary use for cargo-bikes might potentially be moderated by demographic variables. Therefore, future research could look at variables such as age, gender, or education, to obtain a deeper insight for which population environmentally friendly vehicles, like cargo-bikes, are appealing.

Goal Framing Theory has been identified as the best theory in predicting green attitudes (Wang et al., 2021). Therefore, future research should look more closely at this theory and use framing more actively. More insight into the use of experimental studies with Goal Framing Theory could allow a better understanding for the persuasion of environmentally friendly attitudes. This can be done by replicating our research with hedonic and biospheric framing, and a control group, and additionally, adding the gain frame might give more insight into the different framings; similar to Westin et al. (2020), who looked at

hedonic, biospehric, gain framing and a control group. Framing might not only be influential on attitude, but also on intention (Gallagher & Updegraff, 2011).

Ecological worldview could be further integrated into the model by using it as a mediator for the relationship between goal framing and attitude; further the relationship between ecological worldview and intention could be explored, similar to Moghimehfar et al. (2020).

Also, the chosen environmental context of Goal Framing Theory and ecological worldview could be changed. Future research could look at different vehicles like e-bikes or public transportation; or investigating a different population. This study was conducted in Groningen, a student city. A highly educated society might be more aware of environmental struggles, whereas a different location could give more insight into the population as a whole.

Lastly, future research could explore the intention-behaviour gap more closely in relation to pro-environmental behaviour. Various theories, Goal Framing Theory included, are built on the assumption that an individual's intention will result in a given behaviour, which is not always the case (Davies, 2002). Especially behaviour change is interesting in environmental psychology, since the societies behaviour will ultimately influence the environment, whether positively or negatively. Therefore, the relationship between intention and behaviour in regard to pro-environmental behaviour needs to be understood more deeply, to be able to draw behavioural conclusions based on models like Goal Framing Theory.

After all, the novelty of this research leaves room for various future directions.

Conclusion

The implementation of cargo-bike sharing systems could facilitate an alternative to combustion vehicles and simplify the realization of emission-free city centres. Goal Framing Theory and ecological worldview might play a crucial role in citizen's attitudes and intentions towards those systems. However, based on our results, no framing effects could be detected.

Future research should resolve mentioned limitations to ensure higher validity of the results. Nonetheless, the link between attitude and intention has been replicated for environmentally friendly transportation. Ecological worldview is found to be significantly linked to higher attitudes. Subsequently, environmental education needs to be considered for pro-environmental behaviour changes.

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Appendix A

Scenarios

Scenario 1 - no frame

Have you ever heard of cargo bikes before?

A cargo bike has a cargo area big enough to transport large goods. The cargo area can be located in the front or back of the bike and can be shaped like a box or flat platform. Cargo bikes are used for various purposes such as transporting furniture, groceries, or even children.

The municipality of Groningen is considering introducing a cargo bike-sharing system with various docking stations located at hotspots throughout the inner city. Electric cargo bikes can be picked up and charged at these docking stations accessible to the local communities.

Scenario 2 – hedonic frame

Have you ever heard of cargo bikes before?

A cargo bike has a cargo area big enough to transport large goods. The cargo area can be located in the front or back of the bike and can be shaped like a box or flat platform. Cargo bikes are used for various purposes such as transporting furniture, groceries, or even children.

The municipality of Groningen is considering introducing a cargo bike-sharing system with various docking stations located at hotspots throughout the inner city. Electric cargo bikes can be picked up and charged at these docking stations accessible to the local communities.

Using a cargo bike can be fun: you get to spend time outside with friends and family while comfortably taking various goods along with you, such as food and drinks for a picnic. Cargo-bike sharing systems present a convenient and flexible type of transport, as you do not need to look for a parking spot for your car in the usually busy city center. Also, electronic cargo bikes allow for very comfortable and time-efficient trips.

Scenario 3 – biospheric frame

Have you ever heard of cargo bikes before?

A cargo bike has a cargo area big enough to transport large goods. The cargo area can be located in the front or back of the bike and can be shaped like a box or flat platform. Cargo bikes are used for various purposes such as transporting furniture, groceries, or even children.

The municipality of Groningen is considering introducing a cargo bike-sharing system with various docking stations located at hotspots throughout the inner city. Electric cargo bikes can be picked up and charged at these docking stations accessible to the local communities.

Using a cargo bike is a more sustainable way of transportation: Cargo-bike sharing systems help decrease car use and traffic congestion and thereby help reduce CO2 emissions and water-, air-, and noise pollution. As an alternative to private car use, a cargo bike-sharing system allows for more biodiversity and wildlife to grow since less space for large streets and parking areas for cars is needed. Thus, using such systems can actively contribute to environmental preservation and restoration.

Appendix B

Flyer

university of groningen

BACHELOR THESIS STUDY

ABOUT CARGO BIKE-SHARING SYSTEMS

Your opinion on cargo bike-sharing systems in Groningen matters to us!

We highly appreciate your time and effort to participate!

Do you speak English or Dutch and have 10-15 minutes to spare?

Scan me to participate!

or go to:

https://rug.eu.qualtrics.com/jfe/form/SV_4J9iHL07HhEGAdg