



Wasting ways: Perceived distance to the recycling facilities predicts pro-environmental behavior



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ARTICLE INFO

Article history:

Received 11 January 2014

Received in revised form 11 July 2014

Accepted 11 July 2014

Available online 1 August 2014

Keywords:

Recycling behavior

Bounded rationality

Pro-environmental behavior

Environmental psychology

ABSTRACT

The present study aims at providing an improved understanding of the environmental factors affecting pro-environmental behavior. To this end, we introduce the economic concept of bounded rationality to the domain of recycling behavior, hypothesizing that the subjective costs of recycling are a better predictor of an individual's tendency to recycle than the objective costs. At the chosen study site, recyclables needed to be disposed of at collection centers distributed throughout the city, allowing for the analysis of recycling-related costs by assessing the distance between participants' residence and the nearest collection center. Results from an online questionnaire completed by $N = 306$ citizens indicate that the perceived distance to the recycling facilities is more closely related to recycling behavior than the actual distance. By means of hierarchical regression analyses, we demonstrate that the perceived distance explains unique variance in recycling behavior while the actual distance conveys only redundant information. Surprisingly, the predictive potential of participants' distance estimates appeared to be significantly larger for recycling behavior than for recycling intention. The implications of our results are discussed with regard to potential opportunities to promote recycling behavior by targeting individuals' biased perception of recycling-related costs.

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1. Introduction

In the context of household recycling, environment and human behavior interact in a bidirectional manner: First, citizens' recycling behavior critically affects the environment. Across the European Union, 38% of municipal wastes are still disposed of at landfills with another 22% being incinerated (Eurostat, 2012). These treatment methods are associated with severe environmental issues such as high air, water, and ground pollution (Gochfeld, 1995; Tangri, 2003). As a consequence, it is crucial to further enhance the rate of recycling, thereby reducing the waste of natural resources. Since the percentage of recycled material in an area largely depends on the proportion of waste recycled in individual households, it is pivotal to identify the factors predicting the tendency to engage in recycling behavior (i.e., the degree to which individuals separately collect and dispose of, e.g., paper, glass, and plastic). Second,

environmental variables critically affect recycling behavior. Within the UK, for instance, the propensity to recycle varies substantially between areas (Davis et al., 2006; Tonglet et al., 2004). To a considerable part, these differences might be attributed to situational factors (i.e., physical variables which may facilitate or inhibit recycling) which emerged to be the strongest predictors for recycling behavior (Davis et al., 2006). Hence, recycling behavior can be facilitated by simple, time and space efficient recycling systems (Davis and Morgan, 2008). Along the same lines, participants surveyed by Chen and Tung (2010) reported a decreased intention to recycle when perceiving a lack of appropriate recycling facilities. Despite the acknowledgment of situational factors, research on recycling behavior has focused on investigating psychological variables, predominantly within the theory of planned behavior (TPB; Ajzen, 1991).

The TPB describes the relation between particular human cognitions and behavioral intentions, which are suggested to exert the most significant influence on actual behavior. Specifically, the model assumes behavioral intentions to be composed of three cognitive constructs: the attitude toward the behavior, subjective norms, and perceived behavioral control. First, according to the TPB, people form the intention to engage in recycling behavior

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depending on their beliefs about its positive and negative consequences (a construct referred to as attitude). Second, the individual is assumed to develop a stronger intention to recycle if significant others are thought to disapprove people who do not separate their waste (subjective norm). Finally, perceived behavioral control, i.e., the belief to be able to control external and internal factors in order to successfully perform recycling behavior, is proposed to influence behavioral intentions and, hence, the tendency to engage in this specific behavior (Ajzen, 1985, 1991). It is important to note that situational factors are assumed to influence recycling behavior only by influencing behavior-specific cognitions. In sensu Ajzen (1985, 1991), the construct of attitude (as measured via items like “Recycling is good”, Tonglet et al., 2004), for instance, is thought to be a weighted aggregate of the costs and benefits of recycling behavior. While such a construct might be predictive of recycling behavior (Chen and Tung, 2010; Davis et al., 2006; Mannetti et al., 2004; White and Hyde, 2012), its high level of aggregation does not allow for conclusions about specific influences of situational factors. Individuals refraining from recycling as a function of negative attitudes might do so, for example, because they believe that recycling does not actually benefit the environment, or because the nearest recycling facility is so far away that it takes them too much time to recycle. As a consequence, rather than investigating the relevance of global attitudinal factors, the present study aims to provide an increased understanding of how a specific, environmental variable (i.e., the distance to the nearest recycling facility) might affect the tendency to engage in recycling. The idea to predict recycling behavior based on the distance between an individual's household and the recycling bins is not a new one. Recycling rates have consistently been reported to decrease with increasing distance to the recycling station (Ando and Gosselin, 2005; González-Torre and Adenso-Díaz, 2005; Klöckner and Oppedal, 2011). However, the distance measures used to predict recycling behavior varied substantially across the studies that investigated this relationship. While Ando and Gosselin (2005) attempted to objectively determine the distance to the recycling bins, subjective distance estimates were used in the studies by González-Torre and Adenso-Díaz (2005) and Klöckner and Oppedal (2011). Objective and subjective measures of environmental variables are likely to differ in the degree to which they determine human behavior (Lin and Moudon, 2010). To systematically account for this difference, we introduce the economic concept of bounded rationality (Kahneman, 2003; Simon, 1955) to the domain of recycling, thereby highlighting its potential to complement the TPB in generating new research hypotheses.

1.1. Bounded rationality

Classic economic theory relies on the assumption of an “economic man”, who is able to accurately assess the costs and benefits associated with behavioral alternatives and, hence, to choose the alternative with maximum utility (Simon, 1955). During the second half of the last century, however, evidence from several fields of behavioral science has accumulated suggesting that the human capacity to process information and to decide rationally is crucially limited (Camerer, 1999; Kahneman, 2003; Simon, 1955; Todd and Gigerenzer, 2003). Human perception of costs, benefits, and risks is systematically biased (Kahneman and Tversky, 1979) and subject to framing effects (Tversky and Kahneman, 1981) illustrating that rational models of choice behavior are “psychologically unrealistic” (Kahneman, 2003, p. 1449). Specifically, people tend to overweigh low probabilities and to be more sensitive to negative as opposed to positive outcomes (Tversky and Kahneman, 1992). As a consequence, modeling human choice behavior as a function of objective costs and benefits might be less promising than focusing on the subjective utility of behavioral alternatives (Kahneman

and Tversky, 1979). Applying these behavioral economic principles to the domain of recycling behavior, we assume that behavior is rather under the control of subjective beliefs concerning the environmental advantages associated with recycling than determined by actual benefits. Likewise, the same assumption applies to the costs accompanying pro-environmental behavior.

1.2. The present study

In the German city of Braunschweig where this study has been conducted, recycling used to require a considerable amount of time (and also physical effort) since packaging material had to be disposed of at designated collection centers distributed throughout the city (Fig. 1, see Section 2, for a more detailed description). Based upon the theoretical and empirical work outlined above (Kahneman, 2003), the subjective estimate of the distance to the collection centers should be a better predictor of recycling behavior than the actual distance. This latter hypothesis is to be tested in the present study. In addition, hierarchical regression analyses will be performed to investigate whether one or both of the distance estimates assessed in our study accounts for variance in recycling behavior over and above the variance explained by non-specific control variables. As control variables, demographics and Big Five personality traits (Costa and McCrae, 1992) were selected to provide a comprehensive and cost-effective account of more general individual differences. Most crucially, the actual and the perceived distance will be added to the regression model at separate steps. By this means, we aim to clarify whether these two distance estimates predict unique or redundant variance in the outcome variable.

As studies dedicated to the prediction of recycling behavior often focus on behavioral intention (Chen and Tung, 2010; Mannetti et al., 2004), we decided to extend our analysis to include this construct as a second outcome measure. This allows us to investigate whether the two distance estimates are differentially related to recycling intention and actual recycling behavior.

Contrasting the actual and perceived distance to the recycling facilities with regard to their predictive potential may result in major implications for urban planning policies designed to promote recycling behavior. If, for example, recycling behavior is a function of the linear distance between a citizen's household and the nearest recycling station, it is likely to be encouraged by optimizing the density of recycling facilities. If, however, recycling behavior is rather determined by the perceived distance, interventions aiming to alter the biased perception of individual recyclers in a more favorable direction might be more promising.

2. Methods

2.1. Sample

Data were collected in and around the city of Braunschweig, Lower Saxony, Germany, via a questionnaire that was accessible online. The online questionnaire was activated from January 17 to March 14 in 2013. Participants were recruited by way of email lists, social networks, and several Internet platforms (i.e., campus and environmental forums). Psychology students of the Technical University of Braunschweig were offered course credit while everyone had the chance to win one out of five Internet shopping vouchers worth €20 each. A total of 306 valid questionnaires were completed. We excluded 24 participants whose values on at least one of the variables *perceived distance* and *actual distance* exceeded 2 km, as such values can be considered unrealistic given the density of recycling centers in Braunschweig. Of the final sample ($N=282$) 62% were female. The mean age of the

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