Psychological consequences of moral labelling in the built environment

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"There is no truth.
There is only perception."
Gustave Flaubert

Abstract

Climate change is strongly linked to human behavior and technologies, and many of the barriers to sustainable behavior are rather psychological than technological. More sustainable technologies and food products have been introduced to combat climate change, most often labeled with morally loaded labels such as "organic" or "environmentally friendly". The purpose of this thesis was, first, to gain knowledge into the psychological consequences of the introduction of eco-friendly technologies in the built environment, specifically how labeling these products "eco-friendly" influences perception and performance; secondly, to identify underlying psychological mechanisms and limits of this eco-label effect. Paper 1 showed that participants generally prefer the taste of consumables labeled eco-friendly compared to conventional labeled alternatives, but the study also found that the label-effect is limited to certain products and certain judgmental dimensions. Results in this study also showed that people believe that eco-labeled products have positive effects on mental abilities. In Paper 2 and 3, the focus was to study the effects of eco-labeling in the built environment on performance in cognitively demanding tasks, such as color discrimination and proofreading. At this point, the eco-label effect had been shown across a wide range of products like food, water, and office technologies, and been generalized to a wide range of judgmental dimensions and behaviors (i.e. taste, nutrition health benefits, comfortableness, and mental performance). In Paper 4, results showed that eco-labeling can have effects also on behavior that arguably have very little to do with the labeling itself, by showing that social perception of photographed persons can also depend on the labeling of desktop lamps. A consistent finding across the studies was also that individual differences in environmental concern modulated the magnitude of the effect. The magnitude was larger in people with higher concern for the environment.

Keywords: Eco-label effect, performance, perception, judgment, moral labels, social judgement, lamp, label

Sammanfattning

Klimatförändringen har en stark koppling till mänskligt beteenden och teknologiska lösningar. En stor del av det som hindrar hållbar utveckling är mer psykologisk än teknisk till sin natur. Många hållbara tekniska lösningar och livsmedelsprodukter har införts för att bekämpa klimatförändringar, ofta märkta med moraliskt laddade etiketter som "ekologiska" eller "miljövänliga". Syftet med den här avhandlingen var att bringa mer kunskap om de psykologiska konsekvenserna av införandet av miljövänliga teknologiska lösningar i den byggda miljön, mer specifikt, hur perception och prestation påverkas av att produkter är märkta märkta som miljövänliga. Ytterligare var syftet att identifiera underliggande psykologiska mekanismer och begränsningar gällande eco-label effekten. Studie 1 visar att deltagare oftast föredrar smaken av produkter som är märkta miljövänliga jämfört med konventionellt märkta alternativ, men studien har också fastställt att eco-label effekten är begränsad till vissa produkter och bedömningsdimensioner. Resultatet i Studie 1 visade också att människor tror att miljömärkta produkter har positiva effekter på mentala förmågor. I Studie 2 och 3 var fokus på att studera effekterna av miljömärkning i den byggda miljön på prestationer i kognitiva uppgifter, såsom färgdiskriminering och korrekturläsning. Effekten av miljömärkning har visats gälla för ett brett spektrum av produkter som mat, vatten och kontorsmaterial och kan generaliseras till ett brett spektrum av bedömningsdimensioner och beteenden (dvs. smak, hälsofördelar, bekvämlighet och mentala prestationer). I Studie 4 framgår det också att miljömärkning kan ha effekt på beteende som har mycket lite att göra med miljömärkningen i sig, genom att visa att sociala bedömningar av fotograferade personer också kan bero på etikettering av skrivbordslampor. Konsekvent över studierna var också att individuella skillnader i miljöoro modulerade effektens storlek. Effekten var störst för individer med störst oro för miljön.

Nyckelord: miljöetiketteringseffekt, prestation, perception, bedömning, moraliska etiketter, sociala bedömningar, lampor, etikett

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List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

Paper I
Sörqvist, P., Haga, A., Langeborg, L., Holmgren, M., Wallinder, M., Nöstl, A., & Marsh, J. E. (2015). The green halo: Mechanisms and limits of the eco-label effect. *Food quality and preference*, *43*, 1-9.

Paper II
Sörqvist, P., Haga, A., Holmgren, M., & Hansla, A. (2015). An eco-label effect in the built environment: performance and comfort effects of labeling a light source environmentally friendly. *Journal of Environmental Psychology, 42*, 123-127.

Paper III
Haga, A. (2017). Eco-label effects in the built environment. Does labeling a light source environmentally friendly influence performance and judgement. SAGEopen. (Accepted).

Paper IV
Haga, A. (2018). Morally "loaded" labels influence product perception and social judgement. (Submitted).

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Introduction

Since most of the environmental problems related to climate change are rooted in human behavior (Maloney & Ward, 1973; Saunders, 2003), more scientific knowledge is needed about how to promote pro-environmental behavior and intentions, but also how to identify mechanisms that may hinder pro-environmental behavior (Jackson, 2005). Nearly every interaction in the household involves energy-consumption applications or systems in some way. Energy consumption from a psychological perspective can be described as "the routine accomplishment of what people take to be the normal way of life" (Shove, 2004, p. 117), in other words, energy consumptions is behavior, and reflects here the problematic nature with reducing energy consumption.

The majority of our everyday energy consumption behavior is not a result of conscious and motivated actions (Pierce, Schiano, & Paulos, 2010) instead, everyday consumption seems to be strongly shaped by systems on micro level (e.g., thermostat interfaces) and macro level (e.g., heating, ventilation, air conditioning and infrastructure). Establishing desirable environmentally friendly labels in order to attract environmentally friendly consumption behaviors is one thing that manifests the work to a more sustainable society.

A challenge and important scientific endeavor is hence to identify advantages of producing and marketing of eco-friendly products, and make these products attractive and desirable to consumers. The product label will be crucial for the expectations the consumer will form about the product. How these expectations are met will have consequences on how the product is perceived, memorized and used. For example, disconfirmation of expectations would normally lead to a negative hedonic appraisal of whatever a person happened to be confronted with (Carlsmith & Aronson, 1963). Cardello, Maller, Masor, Dubose, and Edelman (1985) argue that one could increase acceptance of a novel food product simply by providing information about it.

In an era when "green" labeling enter the market of technical equipment and the built environment, it is important to understand the psychological consequences of labeling of these types of artifacts and instruments. To be able to do this, the first study in the thesis begins within an already establish area of eatable products, and from there taking the step into a wider context.

Moreover, to be able to nudge people to more sustainable decisions and implement what is necessary for the climate, we must better understand human behavior in general, consumption behavior in particular, and also, we must know more about product perception. When people identify or evaluate a product, they often use contextual information concerning the product which is often provided by high level of cognition and multiple sensory inputs that are available at that time (Piqueras-Fiszman & Spence, 2015). Non-sensory attributes are shown to be important in the evaluation process (Torjusen et al., 2001; Wandel, 1994). Products labeled with intrinsic values (e.g 'organic' or 'fair

trade') can trigger moral obligations and tend to change people's perception of these products. Environmentally friendly labels signaling socially desirable and healthy characteristics are many times shown to be idealized and perceived more positively compared to products labeled conventional (Grankvist & Biel, 2001; Torjusen et al., 2001). People even show more positive feelings towards green electricity (Nilsson, Hansla, & Biel, 2014).

In this thesis, human behavior and underlying mechanisms in relation to the eco-labeling effect is studied. Effects of labeling artifacts as a sustainable alternative is for the first time shown in the built environment and extended from perception to performance on color vision tasks, ordinary office task like proofreading and how this effect can influence social judgement.

Theoretical Backdrop

Individuals, companies and governments are getting more engaged in environmentally sustainable behaviors, whilst options of environmentally friendly product are constantly increasing. Linked to such developments, environmental concern and sustainable behavior has come to be a popular and growing area of research (Saunders, 2003).

However, while much of the previous research attempts to pinpoint benefits of purchasing eco-friendly products (Magnusson, Arvola, Hursti, Åberg, & Sjödén 2003), and what kind of people that possesses intensions to purchase such (Hughner, McDonagh, Prothero, Schultz, & Stanton, 2007), less research has focused on understanding psychological mechanisms underpinning these intentions, and why some people do not possess such. If we can understand these underlying mechanisms better, we may have a chance to influence a much wider array of individuals to engage in pro-environmental behavior than currently. However, many hundreds of studies have tried to explain the relation between environmental knowledge, awareness and pro-environmental behavior but no satisfactory understanding is yet delivered (Kollmuss & Agyeman, 2002).

One possible reason for why a scientific understanding has not come any further, may be that the issue at hand is overly complex, involving a plethora of interacting factors (e.g. institutional, economic, social and cultural factors, but also more individual factors like motivation, knowledge, awareness, values, attitudes, emotions, locus of control, responsibilities and priorities; Kollmuss & Agyeman, 2002).

Psychological effects of eco-labeling and underpinning mechanisms for behavior changes

So far, a body of research has shown positive effects of labeling products with environmentally friendly labels. People perceive the characteristics in eco-labeled products to be beneficial compared to conventional labeled products, for example taste, nutrition, health, but also characteristics with no direct relation to the label itself, e.g. concerning the number of calories (Ekelund, Fernqvist & Tjärnebo, 2007; Lee, Shimizu, Kniffin & Wansink, 2013; Wiedmann, Hennigs, Behrens & Klarmann, 2014). In a set of experiments by Sörqvist et al.

(2013) it was shown that just telling the participants that a product was of organic origin was enough to be rated as tastier compared to the objectively identical alternative without any information about origin. Participants were asked to taste two different cups of coffee from the same pitcher, but in lure participants received information that one cup contained eco-friendly coffee and the other one contained conventional coffee. Through the set of experiments, a bias for eco-labeled coffee was revealed, especially for those participants who held a positive attitude toward sustainable behavior. The reason why this phenomenon occurs is still unclear.

Sörqvist et al. (2013) also found that social desirability does not appear to underpin the effect of labeling on taste perception, because the eco-label effect was just as strong in participants who knew their responses were being monitored as in participants whose responses were not being monitored. Thus, the results are not supportive of a social desirability account of the eco-label effect.

In contrast, some studies argue for an "intrinsic desirability account" meaning the eco-label effect is stronger for people with a positive attitude toward organic labeled products (Lee et al., 2013; Sörqvist et al., 2013; Wiedmann et al., 2014) as these people probably are the ones who think that organic products are superior to conventional alternatives. The intrinsic desirability account can probably also motivate people to put more effort in a task by the same reasoning.

However, most of the scientific research in this area has focused on labeling of food products and less on labeling of technologies and artefacts in the built environment, offices, industrial environment and such environments. Furthermore, people have the capacity to mobilize resources when situations demand it, for example can motivational factors influence people's mindset (Geers, Weiland, Kosbab, Landry, & Helfer, 2005). Similar performance-enhancing effects tend to arise when people believe they have been exposed to something that influences their behavior, even if they actually have not. For example, arbitrary information like how well one has slept (Draganich & Erdal, 2014), and bogus priming that makes people more confident in their knowledge (Weger & Loughan, 2013), can enhance cognitive performance. This phenomenon resembles the placebo effect (an outcome that is not attributed to a specific treatment but rather to an individual's mindset) studied extensively in the context of medicine (Benson & Friedman, 1996) and the explanations for this phenomenon are diverse. Some placebo effects can be explained by desire, motivation, and expectations, while others can be better explained with regard to classical conditioning and response biases (Price, Finniss & Beneditti 2008).

Because of this, an effect of eco-labeling could possibly be found in the context of behavioral performance measures, similar to self-reports such as taste and health estimates. The mechanism underpinning the label effect on performance could be similar to the placebo effects found from other studies providing participants with misleading information.

How effective a placebo treatment is depends on expectations, partly shaped by experiences. Positive past experience along with instruction can enhance the outcome and subsequently lead to higher placebo efficacy. This

should be manifested in subjective valuation and in activation of brain structures responsible for placebo-related effects (Geuter, Eippert, Attar, & Büchel, 2012).

For example, information of price and other characteristics not only changes the subjective expectancies and perception, it also changes neural activity in the ventromedial part of the prefrontal cortex (vmPFC) affecting pleasantness related to consumption enjoyment experience of flavor (Plassmann, O'Doherty, Shiv, & Rangel, 2008). Expectation is also shown to changes neural activities in the anterior part of the insula when experience pain relief induced by verbal information of price levels of placebo treatments (Geuter et al., 2012). Neural activities underpinning expectations and perception in consumption and product evaluation, is important information for understanding the inherent power of expectation on consumption and evaluation.

However, a critical question is if biases, rationalization and self-deception involved in the intrinsic desirability account, are the foundation causing the effect or it these effects are hardwired in the brain by expectancies. If the last explanation is the rightful, maybe that also can explain behavior changes in more cognitive tasks such as proofreading and color discrimination. In a study by Plassmann, Chandon, Wadhwa, Linder and Weber (2012) they found that organic labels increased brain activity in the area encoding flavor pleasantness (i.e. the orbitofrontal cortex), which was consistent with the subjective ratings. This indicates that subjective ratings are consistent with neurological activities related to label effects (i.e., price tag, organic labels) probably modulated by motivation and/or expectations.

According to interpersonal attribution theory, people can for example make decisions and judgement to protect themselves from guilt or shame which is the motivational factor for the decision ahead (Weiner, 2000). This can reflect a situation where a person with high standards for protecting the environment facing a situation where to evaluate or choose between organic or conventional products. Choosing the conventional alternative could probably cause cognitive dissonance or create a feeling of guilt, and the person is therefore motivated to choose the organic alternative. Even believing in superior characteristics in a desired product and therefore a need to fulfill the expected superiority of the product could also lead to increased effort. Expectancy theory comprises a set of decision theories of work motivation and performance (Vroom, 1964).

The common denominator for these theories is expectancy, describing the essence which holds the motivation (M) of an individual to perform at a particular level of effort. The first part essential for motivation is the individual's expectancies that a specific reward will follow from exerted effort and secondly, the perceived desirability (valences) of the specific rewards or outcomes associated with performing at that level of effort (Behling, Schriesheim and Tolliver, 1975, p. 449). Thus the theory assume that a subject will perform a behavior and the level of effort exerted on the basis of the subjective probability estimate that the effort will lead to certain outcomes (Effort → Outcome, or E → O) and the values (V) that he or she places on those outcomes. Hence, an individual's motivation can be expressed as

$$M = \sum[(E \rightarrow O)(V)].$$

From the preceding statements, it is apparent that "expectancy" refers to a momentary belief about the likelihood that a particular act will be fulfilled by a particular outcome, and that "valence" refers to an affective orientation toward a particular outcome (Vroom, 1964). People act to optimize expected valence. This criterion, according to the theory, can explain how motivation builds up from an expected outcome to confirm the superior characteristics within a desired product or to avoid an unwanted outcome of cognitive dissonance.

Values and individual differences

To be able to predict and influence pro-environmental behavior and intentions, it is important to understand individual differences in environmental concern, beliefs and values. Many people believe they have a responsibility for the environment and behave in line with these responsibilities because they believe it is socially desirable (Gupta, Maiti & Jankowska, 2007). Other studies have found that reasons to why people behave environmentally friendly by choosing organic products can be derived to personal health benefits (Tregear, Dent, & McGregor, 1994; Wandel & Bugge, 1997). Scales of environmental concern (EC) or value orientation (VO) are often used to define different types of values. Pro-environmental attitudes and behavior are linked to some specific value types named self-transcendence (ST) and self-enhancement (SE) value orientation (Nordlund & Garvill, 2002; Stern, Dietz, & Guagnano, 1998), where self-transcendence refers to social-altruistic value orientation. Moreover, self-enhancement and self-transcendence are in some ways contrast to each other, where self-enhancement refers to egoistic value orientations and are related to a concept of pro-self-value orientation (cf. Van Lange et al., 1997). Furthermore, self-enhancement refers to power and achievement. The aim with power is to achieve control and dominance over other people and resources, and with achievement, you can get personal success by demonstrating competence to social standards (Schwartz, 1992, p.8). According to Schwartz (1992) ST and SE values are in conflict, and measures of SE tend to be negatively correlated to environmental concern (Schultz, 2001). In addition to these value types, biospheric values driven by care for the biosphere, animals and nature itself (Attfield, 1981; Naess, 1986) has become important in measures of environmental concern. We can point at three value types that concern environmental problems and which influence pro-environmental intentions and behaviors: egoistic, altruistic and biospheric. Egoistic values concern people who engage in pro-environmental actions in order to protect themselves and their own interests, and think that environmental changes threaten them personally (Stern & Dietz, 1994). On the other hand, people with altruistic values experience a sense of moral obligations and act on these norms when they think negative consequences are likely to occur to others, and take these actions when they think they can prevent these consequences. Biospheric value orientations are the third value type, and it considers costs and benefits of any ecosystem or

ultimately the Biosphere. Stern and Dietz (1994) postulate that for some individuals, biospheric values may constitute a moral imperative and have a role in behavior analogous to the role of social altruistic values in Schwartz model of moral norm-activation. That means personal moral norm in both altruistic and biospheric values can operate on the same activation mechanism of humans.

In view of how pro-environmental behavior varies with individual differences in environmental concern, the magnitude of the eco-label effect may also vary with these individual differences, in particular if an "intrinsic desirability" underpins the eco-label effect. Another possible variable that may be related to the magnitude of the eco-label effect is schizotypy. Schizotypy underpins imaginative thinking and misperception and since eco-labeling appears to distort taste perception, one open hypothesis is that individual differences in schizotypy could be related to individual differences in the effects of eco-labeling, in particular on taste estimates.

Scope of thesis

The overarching purpose of this thesis is to study the effects of eco-labeling on perception (e.g., taste, health and comfort), on performance in cognitively demanding tasks (color vision and office related task such as proofreading), and on social judgments (e.g., when people make personal assessments of others). The thesis delineates the boundaries and generalizability of the eco-label effect with regard to judgmental dimensions and products characteristics and to test whether eco-label effects, consistently found in the context of food products, can be found also for labeling of products in the built environment. Finally, the purpose is also to study whether the effects of eco-labeling is related to individual differences in environmental concern and related constructs (schizotypy, social desirability).

Summary of papers

Research questions

Paper 1

Experiment 1

The purpose of this experiment was to study the mechanisms and limits of the eco-label effect. We explored whether the eco-label effect arises in both "organic" and "conventional" exemplars of the same fruit even though they differ in taste. If, the eco-label effect only arises for conventionally grown bananas, but not for organically grown bananas, then the taste of the product appears to modulate when the eco-label effect becomes manifest.

Experiment 2

In Experiment 2 the purpose was to see if the eco-label effect can arise for other products as well (i.e., grapes and raisins) and to show the effect for a wide range of judgement dimensions i.e., health, calories, vitamins, mental performance and willingness to pay. Experiment 2 also include questionnaires to measure individual differences e.g., social desirability, schizotypy and pro-environmental intentions, to see if any of this could predict the eco-label effect.

Experiment 3

In an attempt to test the seemingly strong robustness of the eco-label effect, water was chosen because it contains no calories, has comparably few taste dimensions, and because it should be harder for participants to imagine why there would be tangible differences between eco-labeled and conventional water. If the eco-label effect disappears for judgments of water, the findings would be difficult to reconcile with the social desirability account of the eco-label effect. If the social desirability interpretation of the eco-label effect is correct, the eco-label effect should arise for the same judgmental dimensions irrespective of product type, as the judgments should reflect what the participants believe is socially desirable rather than reflect the participants' true experiences and convictions about the products.

Paper 2

The purpose of this study was to test whether eco-labeling can have an effect on performance. In that regard, Paper 2 was a follow up on Paper 1, where participants said they believed that eco-friendly products could improve mental performance. A second purpose of the study was to test whether eco-labeling effects could be found in the context of labeling artifacts in the built environment, specifically whether labeling of desktop lamps could influence performance on a color-discrimination task. Finally, the study explored whether individual differences in environmental concern or social desirability would predict the magnitude of the eco-label effect.

Paper 3

The purpose of Paper 3 was to test whether the eco-labeling of light sources can change behavior on a vision-dependent task other than color discrimination. If the effect does generalize to other tasks, such as proofreading, the results would align with the assumption that changes in motivation and effort underpin the eco-label effect. If the effect does not generalize, however, the findings would suggest that the effect acts specifically on color discrimination. A second purpose was to investigate whether the magnitude of the effect is dependent on individual differences in environmental concern (i.e., egoistic, altruistic and biospheric concern).

Paper 4

The purpose for Paper 4 was to see if the eco-label effect is generalizable to social contexts. More specific, the purpose was to explore whether the effects of eco-labeling on subjective ratings are limited to estimates of the light or whether they generalize to estimates of the object that is enlightened by the light source. Participants were requested to make personality judgments of persons from photographs. Individual differences in environmental concern and value orientation were measured in purpose to see whether individual differences could predict the eco-label effect.

Method

Methodological overview

The research method through the whole thesis was based on experimental method using within participants design. To be able to separate top-down (e.g., expectations and motivation) and bottom-up (e.g., objective product properties) processes, which was a main concern for all experiments, an experimental approach was considered to the best method because the label of the products could be manipulated. With the experimental approach the effects of eco-labeling on product perception, judgement and behavior was able to be studied. A within subject design was also necessary to conduct some of the analyses; with this design, a difference score between experimental conditions can be calculated and correlated with measures of individual differences in environmental concern and other constructs. A within subject design also reduced the risk that group differences could influence the outcome. The advantages of using a between subject design is that the subjects cannot explicitly compare what they are exposed to in the different conditions, and therefore an outcome can be expected to depend on the manipulation which separate the different conditions, but there is, however, a risk that irrelevant variables like group differences influencing the results. When using a within participant design this risk is reduced because all participants are in all conditions.

A second methodological issue necessary taking in to consideration is the use of parametric methods with data on ordinal level. The main reason why data from Likert scales, which are ordinal cannot be used for parametric tests are that the samples size is too small, data may not be normally distributed or that we cannot guarantee the true distance between the levels of the scale. Despite this debate, data on ordinal levels is frequently used in parametric tests. The argument, according to Norman (2010), for using parametric tests with ordinal data is that (1) there is no restriction of sample size for parametric tests, for example, that ANOVA only can be used for large samples is wrong, but small samples requires lager effects to reach statistical significance (2) and data for parametric test should have a normal distributed of means, not just a normal distribution, according to The Central Limit Theorem for groups with sample sizes greater than 5 or 10, the means are approximately normally distributed regardless of the ordinal distribution. Finally, how to deal with whether the levels on the Likert scales are equal to each other or not are irrelevant to the analysis because the computer cannot draw conclusions about this issue. If the number is reasonably distributed one can make assumption about their means, but not further assumptions about differences in underlying characteristics from the Likert scale. This, however, does not invalidate the conclusions of the numbers (Norman, 2010).

Materials and design

Paper 1

Bananas, grapes, raisins and water

The material was different in all experiments. Experiment 1 had a mixed design 2(types of banana) x 2(types of label). Two types (eco-friendly and conventional) of bananas were the product used for measure and two types of label (eco-friendly and conventional). Both the organic/eco-friendly and conventional bananas used in this study were of the type called *Canvendish*, because it is the most commonly grown banana specie and chemical differences between organically grown and conventional Cavendish bananas has been documented (Nyanjage et al., 2001). To assure, as far as practically possible, that the two types of banana had reached the same state in the maturation process, the selected eco-friendly and conventional bananas were very similar in color and size, and the slices looked approximately identical. Information of questionnaires that were used in all four studies is stated under rubric; *Questionnaire*.

In experiment 2 and 3 a within participant design was used, were participants tasted two identical products. In experiment 2 half of participants tasted grapes and the other half tasted raisins. Participants, regardless to which products they were assigned, were told it was one eco-friendly and one conventional alternative. In experiment 3 it was the same procedure as in experiment 2 except from the product which in the case was water. Grapes and raisins *Sugraone seedless grapes* from Italy and *Thompson sultana raisins* from California were used in the study. Both are common in Swedish grocery stores. None were eco-friendly in reality. In experiment 3, clear mineral water of the Norwegian brand *Imsdal* was used as the test product. The brand was never revealed to the participants.

Paper 2

Lamp and color discrimination task

This study explored the eco-label effect on cognitive demanding tasks. The main materials were desktops lamps and a color discrimination test. A classic incandescent lamp (Osram Classic P) with 40 W input power was used in this study and the Farnsworth-Munsell 100 Hue Test (Farnsworth, 1957) was used to assess color discrimination performance (Mayr, Köpper, & Buchner, 2013). The experiment hade a within participant design, participants were faced with trays of colored caps in two types of conditions, in one condition the lamp was labeled eco-friendly and in the other condition the lamp was labeled conventional but in reality it was the same type of lamp. Their assignment was to arrange the randomly placed color caps into a proper sequence of gradual color transition (e.g., from red to yellow).

Paper 3

Lamp and proofreading task

The experiment hade the same design as Paper 2, but here a proofreading task was used as vision-dependent task and the lamp was a Osram Classic ECO Superstar, 30 W. The proofreading task was adopted from Halin, Marsh, Haga, Holmgren, and Sörqvist (2013) and was done by paper and pencil. Two texts from the Swedish reading comprehension portion of the Swedish Aptitude Test for Higher Education were used as proofreading texts in the experiment. One text had 640 words and included totally 65 errors; the other text had 592 words and included 60 errors. There were two types of errors: Semantic/contextual errors consisted of either a function word that was replaced with a content word, or a content word that was replaced with another content word. The other type of error was visual/spelling errors, which consisted of words with either missing letters or substituted letters. Half of the errors in each category were function words and the other half were content words.

Paper 4

Lamp and social judgement task

This study hade the same desktop lamp and experimental design as Paper 3. Participants were presented with a paper-and-pencil questionnaire and a set of facial photographs. Their task consisted of three phases. In the first phase, they rated how well they could see the picture in front of them (henceforth called "visibility"), on a scale ranging from 1 (not at all well) to 11 (very well). In the next phase, they rated eight personality traits for the photographed person (only one picture from the set). The personality ratings were made on a scale from 1 to 6 and with dichotomous endpoints (i.e., responsible vs irresponsible; selfish vs unselfish; not environmentally friendly vs environmentally friendly; cold vs warm; dishonest vs. honest; wasteful vs economic; ruthless vs charitable; uninterested vs clever) (Asch, 1946). And in the final phase, the participants rated how comfortable it had been to work under the illumination of the lamp, on a scale ranging from 1 (not at all comfortable) to 11 (very comfortable).

Questionnaire

Paper 1

Taste

Experiment 1 where designed to measure taste. Participants were asked to rate the taste of each of the bananas, respectively, on the same scale 1-11, by answering the question: "How good do you think the banana tastes?". Each taste estimate was made immediately after tasting each slice, respectively. The taste order of the four banana slices was counterbalanced between participants.

Sensory, nutrition and value-related judgement

Experiment 2 was designed to further test the limits of the eco-label effect. First, we tested whether the effect would become manifest in a wider range of

judgmental dimensions than in previous. In Experiment 2, the eco-label effect was tested to see if it could be generalized to judgments on benefits for mental abilities and aimed to characterize the health related halo effect in eco-labeled products by using one general dimension (i.e., healthiness) and two specific dimensions (i.e., vitamins/minerals and calories). The main purpose of introducing judgments on benefits for mental abilities was to address whether the eco-label effect also kicks in for judgments that depend more on abstract preconceptions and beliefs prior to the experiment (like benefits for mental abilities) than on tangible product characteristics.

First, the participants answered the following questions on scale ranging from 1 to 9 (1 - definitely the eco-friendly alternative, 9 - definitely the conventional alternative): "Which product tasted better?", "Which product do you think is healthier?", "Which product do you think contains less vitamins/minerals?", "Which product do you think holds more calories?", and "Which product do you think is best for your mental performance?". Second, the participants wrote down how much they were willing to pay, in Swedish Krona, for the products they tasted. They made one estimate for a package of eco-friendly grapes/raisins and one estimate for a package of conventional grapes/raisins.

Pro-environmental consumer behavior

Later in the experiment, the participants answered questions regarding their pro-environment consumer behavior (Sörqvist et al., 2013), on a scale from 1 – 9 (endpoints labeled): "How often do you purchase eco-friendly alternatives?" (endpoints: never, always), "How important is it to you to purchase eco-friendly alternatives?" (endpoints: not at all, very), "Do you feel guilt when you don't purchase eco-friendly alternatives?" (endpoints: never, always), and "Do you intend to buy an eco-friendly alternative next time you go shopping?" (endpoints: certainly not, certainly). The mean values of the answers to those questions were used to create an index of pro-environment consumer behavior. How often people purchase eco-friendly products at the grocery store—tend to predict the magnitude of the eco-label effect (Lee et al., 2013; Sörqvist et al., 2013).

Social desirability scale

Later, a validated short version of the Marlowe-Crowne Social Desirability Scale, which included 10 statements, was used to assess social desirability tendencies (Rudmin, 1999). The participants were asked to respond "true" or "false" to each statement. For half of the statements, a "true" response indicates the socially desirable option (e.g., as for the statement "I have never intentionally said anything with the intention to hurt someone") and for the other half, a "false" response indicates the socially desirable option (e.g., as for the statement "sometimes I get angry at people who ask me for favors"). The answers were used to create a variable of individual differences in social desirability tendencies (ranging from 0 – 10, where higher values represent higher tendencies to conform to a socially desirable behavior). The social desirability scale

was design to investigate the potential mechanisms underpinning the eco-label effect.

Schizotypy

The Unusual Experiences scale from Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE) was adapted to measure positive schizotypy (Mason, Linney, & Claridge, 2005). This comprised 12 items such as "When in the dark, do you often see shapes and forms even though there is nothing there?". The responses were used to create a variable of individual differences in schizotypal traits (ranging from 0 – 12, where higher values represent more substantial schizotypal traits). When exploring the possible mechanisms underpinning the eco-label effect, we also considered individual differences in schizotypal traits. Positive schizotypy includes magical thinking (or ideation: analogous to delusional beliefs) and hallucinatory experiences. Hallucinatory experiences are perceptual experiences that occur in the absence of a stimulus despite having the qualities of a tangible perception. Such experiences can be auditory, olfactory, visual, tactile and gustatory (Bentall, 2003). Relevant to the current research is that Schizotypy could be associated with "chemosention" i.e., unusual olfactory and gustatory experiences; see Bell, Halligan, & Ellis, 2006.

Paper 2

Comfortableness

In this study, participants rated how they experienced doing a color discrimination task lit by ether a desktop lamp labeled environmentally friendly or conventional. Participants answered on a scale ranging from 1 (not at all comfortable) to 11 (very comfortable), how comfortable it was to work under the illumination of each of the two light sources respectively. Thereafter, the participants responded to three different scales (see below).

Pro-environmental consumer behavior

The pro-environment consumer scale was identical to the scale in Paper 1.

Social desirability scale

This scale was identical to the one used in Paper 1.

Environmental concern scale

This scale measure what value type a person persist. Biospheric, altruistic, and egoistic environmental concerns were assessed with the following question (Schultz, 2001; Swedish version adapted from Hansla, Gamble, Juliusson, & Gärling, 2008): "*How concerned are you that today's environmental problems will affect…?*" The participants responded to each of 12 consequences on a seven-point scale ranging from 1 (not concerned) to 7 (very concerned). Reliable measures were obtained by averaging ratings of egoistic consequences ("myself", "my lifestyle", "my health" "my future", altruistic consequences

("all human beings", "people close to me", "future generations", and "my children", and biospheric consequences ("all living things", plants", "animals", and "life at sea.

Paper 3

The questionnaire for comfortableness and environmental concern measures in this study was the same as in Paper 2.

Paper 4

The questionnaire in this study was the same as in Paper 3, plus a scale that measured *value orientation.* The value orientation scale included the following question: "What are your guiding principles in life?". The participants responded to each of 12 consequences on a seven-point scale from 1 (not concerned) to 7 (very concerned). Reliable measures were obtained by averaging ratings of egoistic principles ("social power", "wealth", "authority" "influential", "ambitious"), and biospheric principles ("respecting the earth", "unity with nature", "protecting the environment", "preventing pollution"), and altruistic principles ("equality", "a world at peace", "social justice", "helpful"). Thereafter, the two altruistic dimensions, the two biospheric dimensions and the two egoistic dimensions were averaged to obtain three more general indexes of altruistic orientation, biospheric orientation and egoistic orientation, respectively.

Summary of variables across the studies

All dependent and independent variables including predictors and individual differences for all experiment and papers in the thesis can be found in table 1.

Procedure

Paper 1

The data collection was made in a corridor at University of Dalarna for the first two experiments in Paper 1. The experimental leader was located in the corridor with all the products to be tasted clearly organized at a table so participants could see which product that was labeled conventional and eco-friendly. Data for all three products in the in experiment 1 and 2 was collected at different locations and at the university and at different dates. When participants started the test they were given a form were they signed the judgements of the product they tasted. In experiment 3 the data collection was located in a laboratory room and participants came one by one and rated the product in the same way as in the other two experiments. The only difference between the experiments was the location of the data collection, and the products to be judged.

Table 1. The table shows the independent and dependent variables used in all four studies, on the bottom are the five different scales used for all studies in the thesis.

Independent variables	Paper 1	Paper 2	Paper 3	Paper 4
Banana label	x			
Raisin label	x			
Grape label	x			
Water label	x			
Lamp label		x	x	x
Dependent measures				
Taste	x			
Calories	x			
Mental health	x			
Vitamins	x			
Comfortableness			x	x
Visibility		x	x	x
Performance		x	x	
Social judgement				x
Predictors/Individual difference measures				
Pro-environmental behavior	x	x		
Schizotypy	x			
Social desirability	x	x		
Environmental concern		x	x	x
Value orientation				x

Paper 2

The data collection was located to the laboratory at University of Gävle. Participants came to the laboratory and were assigned to a room where they sat alone during the experiment. There was a small room with a desk and a desktop lamp as the only light source in the room. After participants performed the first part of the experiment the experimental leader changed the whole lamp armature from the conventional labeled lamp to the eco-friendly lamp or vise verse depending on the counterbalancing. After the color discrimination test was performed in the two conditions participants were asked to fill the questionnaire for individual differences.

Paper 3

The procedure for this study was the same as in Paper 2 except the task at hand. Here participants performed a proofreading task.

Paper 4

The procedure for this study was the same as in Paper 2 and 3 except the task at hand. Here participants performed a social judgement task.

Results summary

Paper 1

In this paper the robustness of the eco-label effect and whether the eco-label effect appears for product with different characteristics was tested. In Experiment 1 the effect arises for both "organic" and "conventional" exemplars of the same fruit (see Figure 1 and Table 2). In Experiment 2, the effect appears to be similar in magnitude across products despite differences in characteristics like sweetness, moisture, texture and other characteristics. Moreover, the same effect appears in undoubtedly separated judgmental dimensions, including sensory judgments (e.g., taste), nutrition judgments (e.g., calories and health) and value-related judgments (e.g., willingness to pay) (see Table 3). The individual differences analyses showed that higher pro-environmental consumer index was associated with greater preference for the eco-friendly alternative for judgement dimensions like health benefits, vitamin/mineral content, mental performance benefits and willingness to pay (Table 4). In Experiment 3, it appears that for some products like water the eco-label effect are absent for some dimensions (e.g., taste and calorie judgments) but still remains for other dimensions (e.g., judgments of willingness to pay, benefits to health and mental performance; see Table 5). The individual difference analyses showed that none of the correlations with judgement dimensions was significant, except for willingness to pay, which suggests that people with higher pro-environmental consumer index were willing to pay more for the eco-friendly alternative (Table 6).
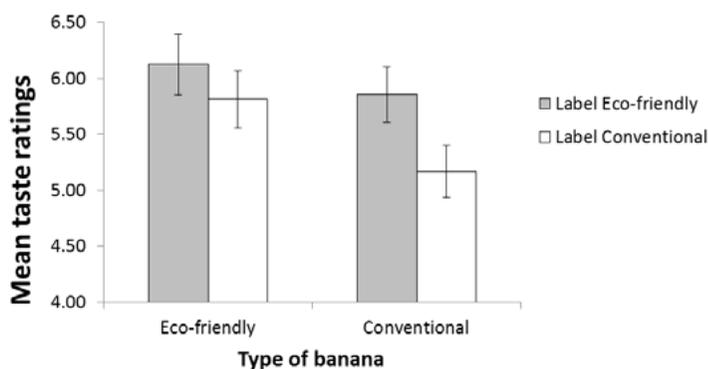

Figure 1. Average taste ratings for all four banana categories: eco-labeled eco-friendly bananas, conventional-labeled eco-friendly bananas, eco-labeled conventional bananas and conventional-labeled conventional bananas. Error bars represent standard error of means.

Table 2. Results from the 2(Type of banana: eco-friendly vs. conventional) × 2(Label: eco-friendly vs. conventional) repeated measures analysis of variance. (N = 49)

Effect	df	F	p	η_p^2
Type	1, 47	4.94	.031	.10
Label	1, 47	8.06	.007	.15
Type × Label	1, 47	0.99	.325	.02

Table 3. Means (and standard errors) for judgments of grapes and raisins across several dimensions. A negative mean value indicates higher ratings for the eco-labeled product on that particular judgmental dimension (e.g., taste) whereas a positive mean value indicates higher ratings for the conventional-labeled product. t statistic of product means represents a test against 0 as comparison value (one-sample t-test). t statistic of difference between product means is between subjects.(N = 48 in each group). * Significant at alpha = .05.

Variable	Product					Difference product means
	Grapes		Raisins			
	M (SE)	t	M (SE)	t		t
Judgmental dimension						
Taste	-1.37 (.33)	-4.17*	-1.44 (.30)	-4.76*		0.14
Health	-2.37 (.29)	-7.99*	-2.75 (.21)	-12.87*		1.03
Vitamins/Minerals	-1.56 (.26)	-6.02*	-1.88 (.23)	-8.26*		0.91
Calories	0.02 (.16)	0.13	0.67 (.26)	2.56*		2.11*
Mental performance	-1.39 (.25)	-5.26*	-0.96 (.27)	-3.49*		0.91
Willingness to pay	-9.60 (1.23)	-7.79*	-6.58 (1.47)	-4.47*		1.57
Predictor						
Social desirability scale	4.87 (0.32)		5.78 (0.32)			
Schizotypy	4.62 (0.41)		3.67 (0.37)			
Consumer behavior	5.21 (0.16)		5.37 (0.16)			

Table 4. Intercorrelations among the variables in Experiment 2.

Variable	1.	2.	3.	4.	5.	6.	7.	8.
Grapes group								
1. Social desirability tendencies	-							
2. Pro-environment consumer index	-.20	-						
3. Schizotypy	-.27	-.09	-					
4. Taste	-.08	-.05	-.04	-				
5. Health	.13	-.24	.23	.12	-			
6. Vitamins/minerals	.04	.07	-.17	-.03	.52*	-		
7. Calories	.01	.30*	-.10	.09	-.15	.09	-	
8. Mental performance	.009	-.30*	-.09	.04	.29*	.31*	.09	-
9. Willingness to pay	-.01	-.38*	.01	.22	.05	-.01	-.34*	-.15
Raisins group								
1. Social desirability tendencies	-							
2. Pro-environment consumer index	.02	-						
3. Schizotypy	-.21	.15	-					
4. Taste	.14	-.12	.13	-				
5. Health	.23	-.33*	.16	.23	-			
6. Vitamins/minerals	-.19	-.35*	.08	.15	.36*	-		
7. Calories	-.23	.10	.05	.16	-.20	.05	-	
8. Mental performance	.01	-.15	-.13	.40*	.32*	.17	-.04	-
9. Willingness to pay	-.11	-.35*	.05	.03	-.03	-.15	.13	-.02

Table 5. Means (and standard errors) for judgments of water across several dimensions. A negative mean value indicates higher ratings for the eco-labeled product on that particular judgmental dimension (e.g., taste) whereas a positive mean value indicates higher ratings for the conventional-labeled product. *t* statistic of product means represents a test against 0 as comparison value (one-sample *t*-test). $N = 48$.
* Significant at alpha = .05.

Variabel	Water	
	M (SE)	*t*
Judgmental dimension		
Taste	-0.38 (.26)	-1.44
Health	-1.13 (.29)	-3.93*
Vitamins/Minerals	0.04 (.28)	0.15
Calories	-0.08 (.21)	-0.40
Mental performance	-0.79 (.25)	-3.13*
Willingness to pay	-3.25 (.45)	-7.16*
Predictor		
Social desirability scale	5.07 (0.30)	
Schizotypy	4.74 (0.43)	
Consumer behavior	5.32 (0.26)	

Table 6. Intercorrelations among the variables in Experiment 3.

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Social desirability tendencies	-							
2. Pro-environment consumer index	.04	-						
3. Schizotypy	-.08	-.12	-					
4. Taste	.002	-.04	-.03	-				
5. Health	-.10	-.03	-.16	-.04	-			
6. Vitamins/minerals	.11	.07	-.04	.20	.16	-		
7. Calories	-.27	-.03	-.14	.05	-.40*	.01	-	
8. Mental performance	.05	-.08	-.07	.17	.41*	.07	.07	-
9. Willingness to pay	.03	-.36*	-.23	.29*	.38*	.27	-.24	-.18

Paper 2

As can be seen in Figure 2, working under the lamp that was labeled "environmentally friendly" was rated as more comfortable in comparison with working under the lamp that was labeled "conventional". The experiment reported herein is the first to demonstrate a similar phenomenon for artifacts in the built environment.

Moreover, the participants performed better on the color discrimination task when working under the lamp that was labeled "environmentally friendly" compared to participants working under the lamp labeled "conventional" (Figure 3). Individual differences in environmental concern, but not pro-environmental consumer behavior and social desirability indexes, were related to the magnitude of the eco-label effect on performance (Figure 4).
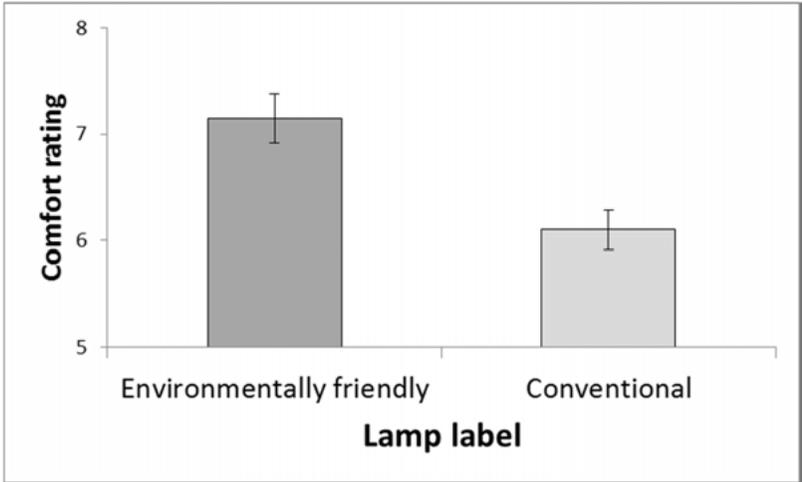
Figure 2. Mean comfort ratings assigned to the light from a classic, not environmentally friendly light source that was either labelled as "environmentally friendly" or "conventional". Error bars represent standard error of means.
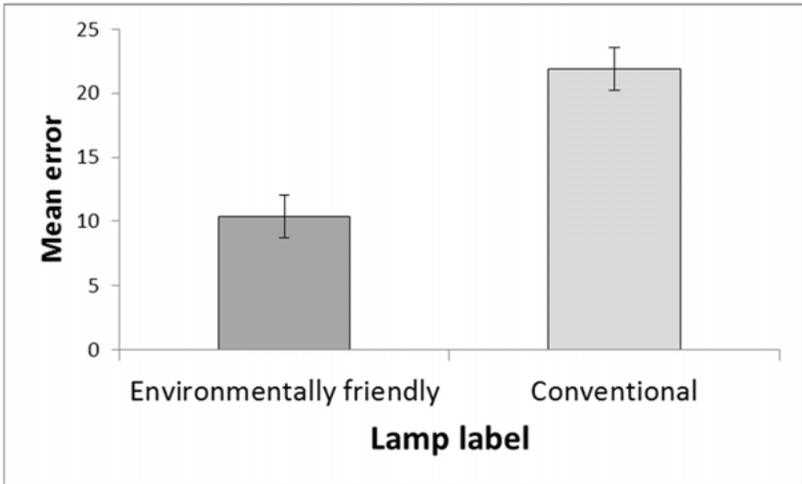

Figure 3. Mean error on a color discrimination task performed adjacent to a classic, not environmentally friendly light source that was either labelled as "environmentally friendly" or "conventional". Error bars represent standard error of means.
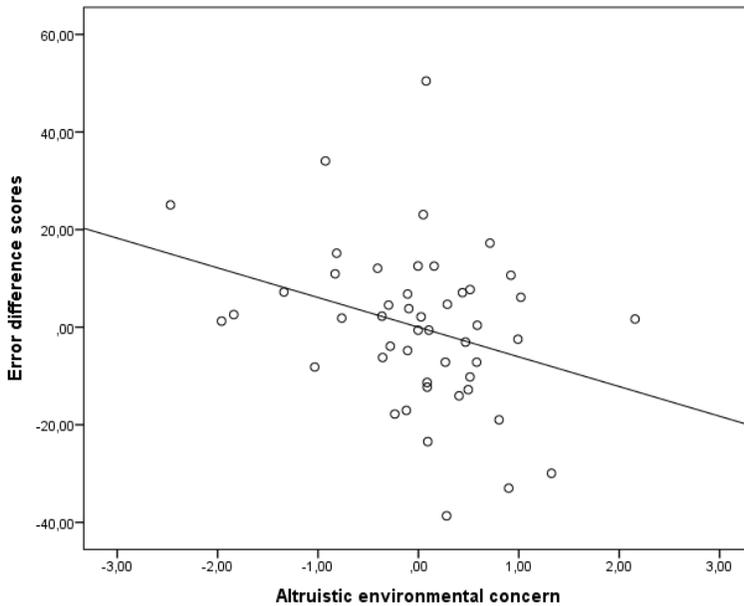
Figure 4. The figure shows the partial relationship between error difference scores on the color discrimination test (errors in the "environmentally friendly" lamp label condition minus errors in the "conventional" lamp label condition) and altruistic environmental concern. Higher altruistic values are associated with a tendency to perform better (make fewer errors) in the "environmentally friendly" lamp label condition compared with the "conventional" lamp label condition.

Table 7. Intercorrelations (Pearson r´s) amongst the predictor variables. *N* = 48.
p < .001

Variable	1.	2.	3.	4.
1. Egoistic environmental concern	-			
2. Altruistic environmental concern	.66*	-		
3. Biospheric environmental concern	.48*	.61*	-	
4. Social desirability scale	.09	.17	.17	-
5. Pro-environment consumer scale	.18	.16	.15	-.18

Paper 3

The results suggest that the eco-label effect on performance is not restricted to color discrimination, because participants who possess higher biospheric environmental concern performed better on a proofreading task when working under a desktop lamp labeled "environmentally friendly" compared to when the same lamp was labeled "conventional" vis à vis participants with lower biospheric environmental concern (Figure 5). Moreover, without taking individual differences in environmental concern into consideration, participants rated the lamp labeled "eco-friendly" as more comfortable than the lamp labeled "conventional" (Table 8). The individual differences analysis show that biospheric

environmental concern was associated the differences in missed errors, suggesting that people higher in bispheric environmental concern made fewer errors in the eco-labeled lamp condition (Table 8).
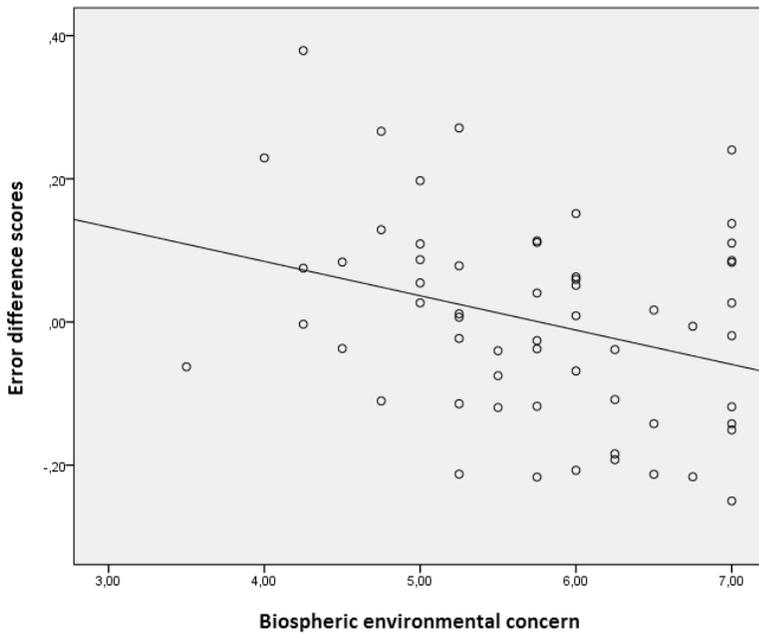

Figure 5. The figure shows the relationship between biospheric environmental concern and the number of errors the participants failed to detect in the proofreading task. Specifically, the y-axis shows the difference scores between the two experimental lamp label conditions, for errors missed among the text lines the participants managed to read.

Table 8. Intercorrelations amongst the dependent and independent variables in Paper 3. The table shows correlations between three environmental concern dimensions (egoistic, altruistic and biospheric), comfort ratings in eco-friendly lamp label condition (EC) and in the conventional lamp label condition (CC), the difference score for the difference between comfort in EC and comfort in CC, missed errors in the proofreading task in both EC and CC respectively, and the difference score for the difference between missed errors in EC and missed errors in CC. (N = 59).
* $p < .05$. ** $p < .001$

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Egoistic	-							
2. Altruistic	.64*	-						
3. Biospheric	.42**	.61**	-					
4. Comfort in the EC	.33*	.36**	.34*	-				
5. Comfort in the CC	.03	-.00	.08	.45**	-			
6. Differences in comfort	.28*	.33**	.24	.49**	-.56**	-		
7. Missed errors in EC	-.03	-.03	-.20	-.29*	-.23	-.05	-	
8. Missed errors in CC	-.06	.02	.02	-.18	-.17	-.00	.74**	-
9. Differences in missed errors	.03	-.07	-.31**	-.19	-.11	-.07	.49**	-.22

Paper 4

For comfort ratings and visibility, the results showed that participants rated the light in the "environmentally friendly" lamp label condition as more comfortable than the light in the "conventional" lamp label condition, and they thought the visibility was better in the "environmentally friendly" lamp label condition. When data from the whole sample was considered, without taking the individual differences in environmental concern into account, there was no eco-label effect on personality judgements.

However, the eco-label effect (i.e., the difference between the two lamp label conditions) on personality judgements varied with individual differences in altruistic environmental concern/value orientation (Table 9). Most notably, the positive correlation between personal judgement and altruistic environmental concern/value orientation indicates that the eco-label effect was stronger for participants with higher altruistic environmental concern/value orientation. The difference between the two conditions was reversed for participants low in altruistic environmental concern/value orientation.

Figure 6 shows that participants with high altruistic environmental concern/value orientation gave the photographed persons more positive evaluations when the lamp was labelled "environmentally friendly" in comparison to when the lamp was labelled "conventional". In contrast, participants with low altruistic environmental concern/value orientation gave the photographed persons less favorable evaluations when the lamp was labeled "environmentally friendly" compared to when the lamp was labeled "conventional".

Table 9. Intercorrelations amongst the variables in Paper 4. The table shows correlations between three indexes of environmental concern/value orientations and the difference scores between the "environmentally friendly" lamp label condition and the "conventional" lamp label condition across three dependent variables (comfort ratings, visibility and personality judgments). (N = 44)
** p < .001

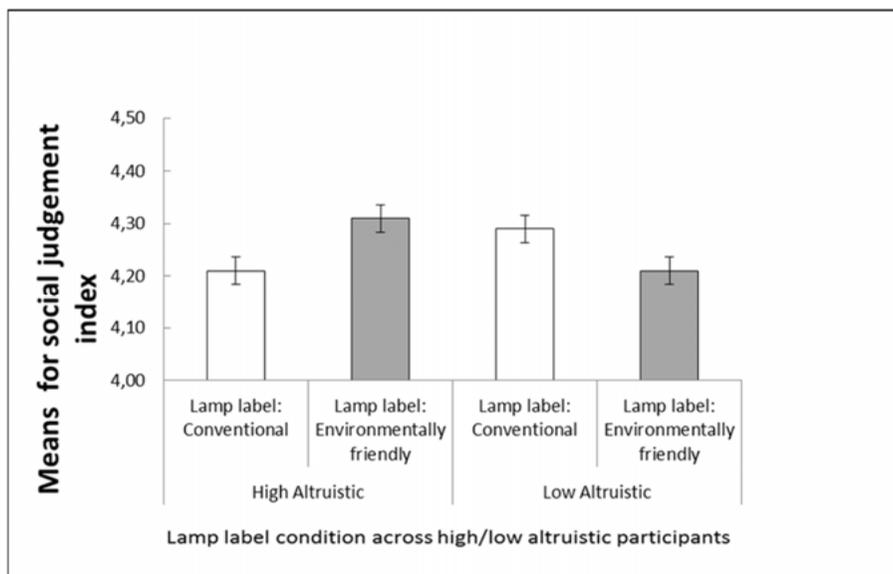| Variable	1.	2.	3.	4.	5.
1. Egoistic (adjusted)	-				
2. Altruistic (adjusted)	-.42**	-			
3. Biospheric (adjusted)	-.83**	-.15	-		
4. Differences in personality judgements	-.20	.47**	.08	-	
5. Differences in comfort	-.10	.01	.12	-.10	-
6. Differences in visibility	-.11	.08	.10	-.03	.76**

Figure 6. Participants with high altruistic environmental concern/value orientation assigned more positive personality traits to photographed people when the photographs were enlightened by a lamp that was labeled "environmentally friendly" than when the lamp was labeled "conventional". The opposite was found for participants with low altruistic environmental concern/value orientation. Error bars are standard error of means.

General Discussion

Summary of results

The eco-label effect can be found not only in the context of edibles (e.g., fruits, water), but also for labeling of artifacts in the built environment, such as desktop lamps in office environments. Furthermore, the effect influences a wide range of judgmental dimensions, like taste, comfortableness and visibility. Labeling also influences performance on cognitively demanding tasks, like color discrimination and proofreading, and it influences other behavioral dimensions such as social judgements. Thus, while past research has almost exclusively tested the effects of eco-labeling on product perception in the context of food, the present thesis demonstrates the robustness and great generalizability of the eco-label effect to a much wider range of behaviors and contexts. The thesis also shows that individual differences in environmental concern, pro-environmental behavior and value orientation are important mechanisms underpinning the eco-label effect. Specifically, higher values in these dimensions tend to be associated with a greater magnitude in the eco-label effect, suggesting that people with more concern with the environment are more susceptible to the effects of eco labeling. Conversely, people with low commitment with regard to sustainable behavior can show a reversed effect of eco-labeling, such that eco-labeling can have a negative effect on perception and performance among these individuals. This finding is important, as people not engaged in pro-environmental behavior are perhaps the ones most important to target with interventions to further promote sustainable behavior in the population.

What causes the eco-label effect?

Many studies have shown that price tag, brand images or expectations about the quality and efficacy of a product can influence and even override sensory experience of the product (Ariely & Norton, 2009; Plassman & Wager, 2013). One example is that lower price tags signal lower quality (Gerster, 1985; Huber & McCann 1982). The reason why this can happen is that cognitive concepts are there to assist the brain in making sense of the world, and they are shaped by experience and social influences.

Do the participants of my studies report that they prefer the eco-labeled products and perform better in conditions where the desktop lamps are labeled environmentally friendly, because they think this would make a good impression on others or such social influences? If the eco-label effect is underpinned by such social desirability, more specifically by impression management, participants should report favorable evaluations of eco-friendly products regardless of product type, because it is the socially desirable thing to do. This hypothesis was not supported by the results from Paper 1, as the effect did not arise for a number of judgmental dimensions in judgments of water. If the eco-label effect is indeed underpinned by social desirability, there should also be a relation between individual differences in tendencies to act in socially desirable ways and the magnitude of the eco-label effect. This hypothesis was not

supported either. Taken together, the present thesis appears to rule out social desirability as a viable explanation of the eco-label effect. Even though social desirability influences behavior and make people, for example, choose or just prefer eco-friendly alternatives (Félonneau & Becker, 2008; Oerke & Bogner, 2013), it turs out that social desirability is not underpinning the eco-label effect.

Instead, desire or motivation appears to be stronger mechanisms driving the eco-label effect. In view of this intrinsic desirability account of the effect, people believe in superior intrinsic properties of eco-labeled products and the eco-label effect is the result of wishes, expectations or moral righteousness. This account receives support from the individual difference analyses, which show that concern for the environment modulate the magnitude of the effect.

One complementary reason why the eco-label effect occurs can be self-deception and distorted perceptions founded by such motivation (e.g., people wish eco-labeled products to be superior, because it is regarded as important, and unconsciously confirm this desire). However, the intrinsic desirability account can hardly explain all findings in the present thesis. There was no effect of labeling on the taste of water. One possibility is that the participants are relying on ''common sense''. That is, the reason why people refrain to assigning different taste values to eco-labeled and conventional water could be that it seems unreasonable, even though they wish the eco-labeled products had superior characteristics even in an unrealistic case like water preferences.

Motivation can also explain why eco-labeling has an effect on performance (e.g., color discrimination task, proofreading). Possibly participants who believe that an eco-friendly labeled lamp have advantaged properties (e.g., better illumination) invest more effort to the task. In turn, they confirm the superiority in eco-labeled products, especially people with higher environmental concern/values, creating a self-fulfilling prophecy. Expectations should also play a role with regard to the effects of labeling on performance. Expectations are fundamental to motivation, the mechanisms that induces a will to perform a specific behavior with a hope that a certain outcome will follow. As motivation is linked to increased brain activity in areas important for expectations, these mechanisms are probably also responsible for the effects of changes in perception and performance due to product labeling. The motivation behind the increased task effort may come from the potential of the label that creates a cognitive match between the product label and consumers ecological motives, with purpose to maintain a desired moral self-concept, and shields pro-environmental consumer's moral self-concept.

Social judgment is harder to link to the superior effect of the quality of the lamp as judging other people by traits are arguably not dependent on illumination or lamp characteristics, in contrast to for example color discrimination. A possibility is that the eco-labels are indicators, triggering inherent moral obligations in a person with high environmental concern/values and therefor the individuals act more altruistically in the sense that they judge others more positively. Briefly, the moral obligations in people with environmental concern or altruistic values spill over from environmental concern to other contexts (e.g., social judgement). This idea resembles the findings from a number of studies

which have revealed links between personalizations of a space and perceived characteristics of the occupants in that space. Maslov and Mintz (1956) asked participants to rate photographed persons when the participants either sat in a beautiful, normal and an ugly room. The judges in beautiful rooms rated the pictures higher on dimensions of energy and well-being than judges in the ugly room. This is somewhat similar to the results in Paper 4 in this thesis, where participants concerned for the environment rated photographed persons as more positive in the presence of the eco-labeled lamp compared to the lamp with a conventional label. Moreover, in a follow-up study by Mintz (1956), he found that experimenters who conducted interviews in the various rooms stayed longer in the beautiful room and reported more positive mood states, and the study also showed that the effect lasted at least up to three weeks in the beautiful room. Maybe Maslow and Mintz findings as well as the findings in Paper 4 is underpinned by the pleasant cues in the surrounding, triggering more favorable ratings of the photographed persons. Consistent with this, another study revealed that the judged level of formality and friendliness of a room is believed to characterize their occupants (Canter, West, & Wools, 1974). Maybe this is an example of a weighting bias; the tendency to attribute either too much or too little weight to cues that are available for judgment (Sütterlin & Siegris, 2014).

Reactance

The present thesis shows behavioral and perceptual consequences of product labeling, in particular that eco-labeling have some advantages for people concerned for the environment. One the other hand, the thesis also found that eco-labeling can have a negative effect in people with low concern for the environment, with regard to their product judgements and to them performing cognitively demanding tasks. A possible explanation for this can be the *reactance theory* (Brehm, 1966). According to this theory, when freedom to act is threatened and there is a pressure by external factors to change one's behaviors or attitudes, the circumstances can produce a resistance to act. On this view, an eco-label can backfire with consequence that it makes a person to do the opposite of what they believe is expected of them. This theory could possibly explain why people with low concern for the environment prefer conventional labeled products to eco-friendly labeled products and even perform worse on different types of cognitively demanding tasks in an "eco-friendly" condition compared to a conventional condition.

Implications for future research

The present thesis does not offer immediate solutions to climate change and sustainability issues, but it may at least tell us something about human behavior in general and maybe it can help us understand how to nudge people into a more sustainable lifestyle, for example by promoting eco-friendly consumer behavior and pro-environmental purchase choices in grocery stores. To this end, we need to get a deeper understanding of what is causing the eco-label effect and if it differs between products and contexts that are not addressed in

this thesis. More research on everyday life and other applied settings and over longer time periods is needed. For example, it would be valuable to investigate whether eco-labeling changes behavior and performance over time. Another interesting endeavor for future research would also be to try to measure motivation directly, to test how this is contributes to the effects of eco-labeling on performance. This can, for example, be done with pupilometry by which effort/motivation is indexed by the size of the pupils of the participants' eyes as they conduct the cognitive tasks in the two label conditions.

A valuable implication for future research that can be derived from the current thesis is that research on products that are signaling some kind of responsibility should consider controlling for effects of expectations. Many studies in the environmental realm have shown an advantage in taste and health aspects for eco-labeled products (Schultz, Muller, & Schwartz, 2012; Lotz, Chrisandl, & Fetchenhauer, 2013), and products labeled environmentally friendly are believed to have advantages for mental performance. However, as the current thesis shows, simply comparing eco-friendly and conventional products without controlling for the effects of the product's labels can bias the participants' responses. Because of this, it is important to consider the effect of product labels when studying differences between eco-friendly and conventional products, either by manipulating the label experimentally or by making sure that the origin of the product is unknown to the participants.

Conclusion

Consequences of eco-labeling have shown bidirectional effects. People who vary in environmental concern, pro-environmental behavior and value orientation seem to respond differently to eco-labeling. From this it appears safe to conclude that motivation and expectations influences the magnitude of the eco-label effect. Perhaps the most important conclusion form the present thesis is, however, that the eco-label effect is robust, replicable and generalizes across a wide range of contexts and behavioral dimensions, including—which have never been shown before—an effect of eco-labeling in the built environment on performance.

References

Ariely, D., & Norton, M. I. (2009). Conceptual consumption. *Annual review of psychology*, *60*, 475-499.

Attfield, R. (1981). The good of trees. *The Journal of Value Inquiry*, *15*, 35-54.

Behling, O., Schriesheim, C., & Tolliver, J. (1975). Alternatives to expectancy theories of work motivation. *Decision Sciences*, *6*, 449-461.

Benson, MD, H., & Friedman, Ph. D, R. (1996). Harnessing the Power of the Placebo Effect and Renaming It "Remembered Wellness". *Annual Review of Medicine*, *47*, 193-199.

Brehm, J. W. (1966). A theory of psychological reactance. Oxford, England: Academic Press.

Canter, D., West, S., & Wools, R. (1974). Judgements of people and their rooms. *British Journal of Clinical Psychology*, *13*, 113-118.

Cardello, A. V., Maller, O., MASOR, H. B., Dubose, C., & Edelman, B. (1985). Role of consumer expectancies in the acceptance of novel foods. *Journal of Food Science, 50*, 1707-1714.

Carlsmith, J. M., & Aronson, E. (1963). Some hedonic consequences of the confirmation and disconfirmation of expectances. *The Journal of Abnormal and Social Psychology*, *66*, 151.

Draganich, C., & Erdal, K. (2014). Placebo sleep affects cognitive functioning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *40*, 857.

Ekelund, L., Fernqvist, F., & Tjärnemo, H. (2007). Consumer preferences for domestic and organically labelled vegetables in Sweden. *Acta Agriculturae Scand Section C*, *4*, 229-236.

Félonneau, M. L., & Becker, M. (2008). Pro-environmental attitudes and behavior: Revealing perceived social desirability. *Revue internationale de psychologie sociale*, *21*, 25-53.

Geers, A. L., Weiland, P. E., Kosbab, K., Landry, S. J., & Helfer, S. G. (2005). Goal activation, expectations, and the placebo effect. *Journal of personality and social psychology*, *89*, 143.

Gerstner, E. (1985). Do higher prices signal higher quality?. *Journal of marketing research*, 209-215.

Geuter, S., Eippert, F., Attar, C. H., & Büchel, C. (2012). Cortical and subcortical responses to high and low effective placebo treatments. *Neuroimage*, *67*, 227-236.

Grankvist, G., & Biel, A. (2001). The importance of beliefs and purchase criteria in the choice of eco-labeled food products. *Journal of Environmental Psychology*, *21*, 405-410.

Gupta, K. R., Jankowska, M. A., & Maiti, P. (Eds.). (2007). *Global environment: problems and policies* (Vol. 1). Atlantic Publishers & Dist.

Halin, N., Marsh, J. E., Haga, A., Holmgren, M., & Sörqvist, P. (2014). Effects of speech on proofreading: Can task-engagement manipulations shield against distraction?. *Journal of Experimental Psychology: Applied*, *20*, 69.

Huber, J., & McCann, J. (1982). The impact of inferential beliefs on product evaluations. *Journal of Marketing Research*, 324-333.

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of consumer behaviour*, *6*, 94-110.

Jackson, T. (2005). Motivating sustainable consumption. *Sustainable Development Research Network*, *29*, 30.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research*, *8*, 239-260.

Lee, W. C. J., Shimizu, M., Kniffin, K. M., & Wansink, B. (2013). You taste what you see: Do organic labels bias taste perceptions?. *Food Quality and Preference*, *29*, 33-39.

Lotz, S., Christandl, F., & Fetchenhauer, D. (2013). What is fair is good: Evidence of consumers' taste for fairness. *Food quality and preference*, *30*, 139-144.

Magnusson, M. K., Arvola, A., Hursti, U. K. K., Åberg, L., & Sjödén, P. O. (2003). Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite*, *40*, 109-117.

Maloney, M. P., & Ward, M. P. (1973). Ecology: Let's hear from the people: An objective scale for the measurement of ecological attitudes and knowledge. *American psychologist*, *28*, 583.

Mayr, S., Köpper, M., & Buchner, A. (2013). Comparing colour discrimination and proofreading performance under compact fluorescent and halogen lamp lighting. *Ergonomics*, *56*, 1418-1429.

Maslow, A. H., & Mintz, N. L. (1956). Effects of esthetic surroundings: I. Initial effects of three esthetic conditions upon perceiving "energy" and "well-being" in faces. *The Journal of Psychology*, *41*, 247-254.

Mintz, N. L. (1956). Effects of esthetic surroundings: II. Prolonged and repeated experience in a "beautiful" and an "ugly" room. *The Journal of Psychology*, *41*, 459-466.

Naess, A. (1986). The deep ecological movement: Some philosophical aspects. *Philosophical inquiry*, *8*, 10-31.

Nilsson, A., Hansla, A., & Biel, A. (2014). Feeling the green? Value orientation as a moderator of emotional response to green electricity. *Journal of Applied Social Psychology*, *44*, 672-680.

Nordlund, A. M., & Garvill, J. (2003). Effects of values, problem awareness, and personal norm on willingness to reduce personal car use. *Journal of environmental psychology*, *23*, 339-347.

Norman, G. (2010). Likert scales, levels of measurement and the "laws" of statistics. *Advances in health sciences education*, *15*, 625-632.

Nyanjage, M. O., Wainwright, H., Bishop, C. F. H., & Cullum, F. J. (2001). A comparative study on the ripening and mineral content of organically and conventionally grown Cavendish bananas. *Biological agriculture & horticulture*, *18*, 221-234.

Oerke, B., & Bogner, F. X. (2013). Social desirability, environmental attitudes, and general ecological behaviour in children. *International Journal of Science Education*, *35*, 713-730.

Pierce, J., Schiano, D. J., & Paulos, E. (2010, April). Home, habits, and energy: examining domestic interactions and energy consumption. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1985-1994). ACM.

Piqueras-Fiszman, B., & Spence, C. (2015). Sensory expectations based on product-extrinsic food cues: an interdisciplinary review of the empirical evidence and theoretical accounts. *Food Quality and Preference*, *40*, 165-179.

Plassmann, H., Chandon, P., Wadhwa, M., Linder, N., & Weber, B. (2012). The Low Intensity of Light: Behavioral and Fmri Insights Into the Effects of "Light" and "Organic" Claims on Flavor Processing. *ACR North American Advances*.

Plassmann, H., O'Doherty, J., Shiv, B., & Rangel, A. (2008). Marketing actions can modulate neural representations of experienced pleasantness. *Proceedings of the National Academy of Sciences*, *105*, 1050-1054.

Plassmann, H., & Wager, T. D. (2014). 12 How Expectancies Shape Consumption Experiences. *The interdisciplinary science of consumption*, 219.

Price, D. D., Finniss, D. G., & Benedetti, F. (2008). A comprehensive review of the placebo effect: recent advances and current thought. *Annu. Rev. Psychol.*, *59*, 565-590.

Saunders, C. D. (2003). The emerging field of conservation psychology. *Human Ecology Review*, *10*, 137-149.

Schultz, J. P., Muller, D., & Schwarz, N. (2012). The "fair trade" effect: Health halos from social ethics claims. *Social Psychological and Personality Science*, *3*, 581-589.

Schultz. P. W. (2001). The structure of environmental concern: concern for self, other people, and the biosphere. *Journal of Environmental Psychology, 21*, 327-339.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in experimental social psychology*, *25*, 1-65.

Shove, E. (2004). Efficiency and consumption: technology and practice. *Energy & Environment*, *15*, 1053-1065.

Sütterlin, B., & Siegrist, M. (2014). The reliance on symbolically significant behavioral attributes when judging energy consumption behaviors. *Journal of Environmental Psychology*, *40*, 259-272.

Sörqvist, P., Hedblom, D., Holmgren, M., Haga, A., Langeborg, L., Nöstl, A., & Kågström, J. (2013). Who needs cream and sugar when there is eco-labeling? Taste and willingness to pay for "eco-friendly" coffee. *PLoS One*, *8*, e80719.

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues, 50*, 65-84

Stern, P. C., Dietz, T., & Guagnano, G. A. (1998). A brief inventory of values. *Educational and psychological measurement*, *58*, 984-1001.

Torjusen, H., Lieblein, G., Wandel, M., & Francis, C. A. (2001). Food system orientation and quality perception among consumers and producers of organic food in Hedmark County, Norway. *Food quality and preference*, *12*, 207-216.

Tregear, A., Dent, J. B., & McGregor, M. J. (1994). The demand for organically grown produce. *British Food Journal*, *96*, 21-25.

Van Lange, P. A., De Bruin, E., Otten, W., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: theory and preliminary evidence. *Journal of personality and social psychology*, *73*, 733.

Vroom, V. H. (1964). Work and motivation. 1964. *NY: John Wiley &sons*, *45*.

Waber, R. L., Shiv, B., Carmon, Z., & Ariely, D. (2008). Commercial features of placebo and therapeutic. *Jama*, *299*, 1016-7.

Wandel, M. (1994). Consumer concern and behaviour regarding food and health in Norway. *International Journal of Consumer Studies*, *18*, 203-215.

Weger, U. W., & Loughnan, S. (2013). Mobilizing unused resources: Using the placebo concept to enhance cognitive performance. *The Quarterly Journal of Experimental Psychology*, *66*, 23-28.

Wiedmann, K. P., Hennigs, N., Henrik Behrens, S., & Klarmann, C. (2014). Tasting green: an experimental design for investigating consumer perception of organic wine. *British Food Journal*, *116*, 197-211.

Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educational psychology review*, *12*, 1-14.

Papers

Associated papers have been removed in the electronic version of this thesis.

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