Signaling Can Increase Consumers' Willingness to Pay for Green Products

Theoretical Model and Experimental Evidence

A revised version of this manuscript has been accepted for publication in:
Journal of Consumer Behaviour (2019), 18(3), 233-246
https://doi.org/10.1002/cb.1760

Abstract: Many green products are costlier than their non-green counterparts, for a variety of reasons. This 'green premium' is a key challenge marketers face when targeting consumers with these green products. A potential solution to this issue is provided by signaling theory. According to the theory, green products can have a signaling benefit. This benefit acts as an incentive for consumers to pay a premium for environmentally friendly products that can even out their price disadvantage (the green signaling hypothesis). Previous studies have tested the green signaling hypothesis with hypothetical buying decisions. The research at hand tests the green signaling hypothesis with incentive-compatible purchase decisions in a laboratory setting with student subjects. As predicted, subjects exhibit a higher willingness to pay for green products when the product choice (a non-green product versus a costlier green counterpart) is public rather than private. The results also suggest that green signalers are treated more favorably in social interactions. The main result is that a signaling benefit can even out moderate green premiums. One implication of this is the idea that marketers should design green products that are costlier than their non-green counterparts in a way that renders them clearly recognizable as green. At the same time, marketers should avoid marketing everyday green products with a high green premium.

Keywords: experiment, green consumption, green marketing, environmentally friendly consumption, signaling, trustworthiness

Short title: Signaling Can Increase Consumers' Willingness to Pay for Green Products

Corresponding author: Dr. Joël Berger, University of Bern, Institute of Sociology, Fabrikstrasse 8, 3012 Bern, Switzerland, joel.berger@soz.unibe.ch, +41 (0)31 631 48 11.

Funding. This project was funded by a Swiss National Science Foundation grant (Investigating Signaling Theory Explanations of Pro-Environmental Behavior by Means of Laboratory and Field Experiments [P0EZP1_148998]).

1. Introduction

The demand for green products has been on the rise for several decades (Connolly & Prothero, 2008). Research has identified sociodemographic variables such as age and gender (Laroche et al., 2001), pro-environmental attitudes (Laroche et al., 2001; Lee, 2008; Schlegelmilch et al., 1996) and, more generally, pro-social values (Ackermann et al., 2014) as important drivers of green consumption.

At the same time, research has found that polls overestimate consumers' willingness to pay (WTP) for green products (the so-called attitude–behavior gap: see Gupta & Ogden, 2006; Kollmuss & Agyeman, 2002; Mainieri et al., 1997). Why is it that even among individuals with 'green' attitudes many are not eager to buy green products? While several explanations have been proposed, one of the main reasons is that green products are often costlier (and sometimes of lower quality) than their green counterparts (Puska 2018; United Nations Environment Programme 2005; Kardash, 1974; Sriram & Forman, 1993). As Peattie (2001) puts it, 'the reality is not that these products are unusually expensive, but that conventional products are unrealistically cheap since they are effectively subsidized by the environment.' Other green products are costlier at the time of market entry, because they cannot be produced on a large scale. Moreover, even though some green products save money in the long run (e.g. an energy-saving fridge), they are costlier at the time of purchase (Bruderer Enzler, 2013; Drozdenko et al., 2011; Joshi & Rahman, 2015). For these reasons, in many cases it is not possible to make green products more attractive by adjusting their prices to match those of their cheaper conventional counterparts. However, increasing the net benefit of green products is key to making them more attractive to broader consumer segments (Jackson, 2005; Peattie, 2001; Peattie, 2010).

Even when there are limits to how far the price of a product can be decreased, there is still the possibility of increasing the product's benefit. Signaling theory suggests strategies for how this can be done. This theory addresses interactions involving asymmetric information: one individual, the sender, seeks to convince another individual, the receiver, that he or she possesses a desired quality; however, this quality is not directly observable (Gambetta, 2009; Spence, 1973). Existing research on signaling theory and green consumption suggests that environmentally friendly products are more attractive to consumers when they allow consumers to signal desirable personal traits, such as social status or pro-social values, via product consumption and display, and that signaling can help overcome the attitude–behavior gap (Babutsidze & Chai 2018; Iredale & van Vugt, 2012; Thaler & Sunstein, 2008; Whitfield, 2011). In this case, the signaler can gain advantages in social interactions, and these advantages can act as an additional incentive to pay a premium for environmentally friendly products (Berger, 2017; Griskevicius et al., 2010; Thaler & Sunstein, 2008).

This study expands on existing research in two respects: methodologically and theoretically. First, while existing studies build on purely hypothetical purchase decisions and survey questions about how green consumers are perceived, in the laboratory experiments reported

here, subjects were able to buy real products for real money – a procedure that reduces the gap between the WTP measured in a study and the consumers' actual behavior in the field (Noussair, Robin, & Ruffieux, 2003). Also, it was observed whether green consumers were not only perceived differently, but whether they were actually treated more favorably in social interactions. Second, existing studies conceive green signaling as a variant of status signaling, while this research puts forward a theoretic model of green consumption as a signal of pro-sociality and trustworthiness.

More specifically, the study at hand aims to answer the following questions: Can consumers of green products increase their perceived trustworthiness among observers? Does the benefit of increased trustworthiness raise consumers' WTP for relatively costly green products? The expected contribution of this research to theory and practice is the following: While existing research has mainly focused on the consumption of green goods as a signal of social status, this paper extends signaling theory on green consumption by demonstrating in an incentive-compatible way that consumers not only consume green goods as an investment in social status but also buy green goods as an investment in social capital. Practitioners can exploit both of these green signaling mechanisms to increase their products' desirability among consumers. This can be done by making green products that are costlier than their non-green counterparts clearly recognizable as environmentally friendly (Babutsidze & Chai, 2018; Griskevicius et al., 2010).
However, practitioners should also be aware that the two mechanisms can have different implications for product marketing (Berger, 2017).

2. Theoretical background

2.1 Signaling theory

Signaling theory was developed in two separate fields independently: biology (Zahavi, 1975) and economics (Spence, 1973). The theory addresses interactions with asymmetric information, in which one individual (the sender) intends to convince another individual (the receiver) that he or she possesses a desired, but not directly observable, quality. If the receiver engages in social or economic exchange with the sender, both of them profit – providing that the sender actually possesses the latent desired quality. However, senders who wrongly advertise possession of a particular quality can gain from their sham, and receivers are therefore well advised to rely on some sort of proof that the sender actually possesses this quality. According to the theory, a signal has to be reliable or a reasonable receiver will disregard it and refuse to engage in an exchange with the sender. A signal is reliable if only individuals in possession of the desired quality are capable of incurring, or are willing to incur, the costs of producing the signal. In this case, an observer can distinguish between individuals possessing the desired latent quality (those who send the signal) and those who do not possess the quality (those who do not send the signal). In game theory, this situation is called a type-separating signaling equilibrium (Gambetta, 2009). Note that signaling theory is probabilistic in nature: that is, a

signal can be more or less reliable, depending on the strength of the correlation between the net benefit of a signal and the sender's quality (Przepiorka & Berger, 2017).

The classic example is 'Spencian' labor market signaling. If an applicant wants to convince an employer of their productivity, an employer will demand evidence that they are being productive. Although productivity is not directly observable, there are observable proxies – for example, educational credentials, as the costs of obtaining a university certificate are negatively correlated with productivity. Therefore, a university certificate can be a reliable (i.e. type-separating) signal on the labor market; in other words, it allows the employer to distinguish the productive from the less productive with a certain probability (Spence, 1973).

2.2 The signaling value of consumer goods

Before the dawn of signaling theory, economist and sociologist Thorstein Veblen (1965 [1899]) put forward the related notion of conspicuous consumption. He argued that the consumption and display of costly products (for which cheaper functional counterparts exist) serve as an indicator of wealth to observers. In terms of signaling theory, the luxury premium, if great enough, can be a reliable signal of wealth; high-status individuals (the receivers) therefore welcome costly signalers as new members of their distinguished circle. The cost that makes the signal reliable is the luxury premium – the price difference between the luxury product and its conventional counterpart: for example, between a luxury car and an everyday car. (A restriction to this argument is that, in affluent societies, it is not only the wealthy that can afford luxury goods; in this case, a greater number of signaling devices is required for the signaler to be credible (Chung & Kalnins, 2001)).

Social subgroups, however, differ with regard to social norms and values, and thus with regard to the question of which products are acceptable as status signals (Bourdieu, 1984; Brick et al., 2017; Sexton & Sexton, 2014). For example, among members of the rather liberal staff at a university humanities department, one may be less likely to gain sympathy by driving a Porsche Cayenne, but perhaps more so by driving a Tesla (Congleton, 1989; Dastrup et al., 2012; Johnson, Bowker, & Cordell, 2004; Puska et al. 2016). Values do not only vary across social groups: they also change with progressing economic development, from materialist to post-materialist; therefore, norms against displaying luxury might spread (Glazer & Konrad, 1996; Koller et al., 2011). As such, the display of costly green luxury goods might become more important than the display of conventional luxury goods (Inglehart, 1995; Johnson and Chattaraman, 2018). To give an example, as drivers of conventional luxury cars, Tesla drivers prove that they can afford to 'waste' money, although in a way that does not conflict with increasingly established norms against the display of wasteful consumption (Adams & Raisborough, 2008; Whitfield, 2011).

Some authors argue that the logic of costly signaling is not restricted to luxury goods. From the perspective of signaling theory, a person who is displaying a green everyday good that is somewhat costlier than its non-green counterpart (e.g., a rucksack made from recycled material)

can signal that he or she can afford to pay this 'green premium' (Costa, Zepeda & Sirieix, 2014; Elliott, 2013; Griskevicius et al., 2010). According to signaling theory, it is not the absolute cost of a product that counts, but the product's premium (whether a luxury premium or a green premium) relative to a typical conventional product (Delgado, Harriger, & Khanna, 2015; Przepiorka & Berger, 2017). Griskevicius et al. (2010) demonstrate this point in a laboratory experiment. Individuals who were psychologically primed for social status preferred costlier green everyday products, such as batteries or soaps, to more affordable conventional products than those in the control group, and those primed for status bought green products more often when buying decisions were public rather than private. These results illustrate that social status is a potential motive for buying green everyday products that are costlier than their non-green counterparts.

However, green premiums and luxury premiums cannot be equated, since demonstrative green consumption does not merely signal social status: it can also signal pro-social values and cooperativeness because only a person who cares about the environment, and thus about the public, is willing to pay a premium for a green good, for which a cheaper non-green counterpart exists (Whitfield, 2011). For example, a buyer of a low-emissions hybrid car is willing to pay a premium in order to reduce global CO2 emissions (Delgado, Harriger, & Khanna, 2015; Thaler & Sunstein, 2008).

From this perspective, green signaling is a special case of pro-social signaling. Another type of pro-social signaling is public donations (Glazer & Konrad, 1996; Harbaugh, 1998). Pro-social signalers are perceived as more pro-social and trustworthy and, as a consequence, are more often chosen as exchange partners and allies (Bereczkei et al., 2010; Klapwijk & van Lange, 2009; Willer, 2009). The reason for this is that potential allies tend to infer that the signaler may also extend their benevolence to them, so public pro-social behavior could be an even more efficient way of investing in social capital (i.e., bonding) than pure status signaling (Gintis et al., 2001). Therefore, individuals who have an incentive to be perceived as trustworthy in public (such as politicians) engage in demonstrative cooperative behavior (Posner, 2000). Indeed, in hypothetical scenarios, subjects perceive consumers of green products to not only have a higher status but also to be more pro-social than consumers of identical conventional products (Kohlová and Urban, 2018; Puska, 2018).

Importantly, although status signaling and pro-social signaling share certain features, they are not the same processes. Both the motives of the signaler and the reaction of the observer might differ and, in fact, status signalers can be perceived as less pro-social and less trustworthy (Berger, 2017).

Based on the pro-social signaling model, in the following paragraphs testable hypotheses are generated. (The theoretic model that is used to derive the hypothesis regarding green signaling is a special case of a model discussed in more detail elsewhere (Przepiorka & Berger, 2017)).

2.3 Hypotheses

The pro-social-signaling mechanism assumes that WTP for green products correlates with pro-social values (1), and that pro-social values correlate with trustworthiness (2) (see Przepiorka & Berger, 2017, for a more detailed discussion of this.) It is only when pro-social individuals behave cooperatively and trustworthily toward their interaction partners that they are preferred as allies or exchange partners. Similarly, it is only when WTP for green products is correlated with pro-social values (and thus, with trustworthiness) that green products can function as a signal of trustworthiness (Przepriorka & Berger, 2017; Gambetta, 2009). When conditions (1) and (2) are satisfied, the display of green products can be explained by the consumer's desire to signal pro-social values, and as an investment in trustworthiness (Berger, 2017; Przepiorka & Berger, 2017; see also Gintis et al., 2001, for a similar argument). The evidence for assumption (1) is mixed (see Ackermann et al., 2014, for a brief overview), while there is strong evidence for assumption (2) (e.g. Ashraf et al., 2006; Albert et al., 2007; Blanco et al., 2011; Gambetta & Przepiorka, 2014).

The research at hand empirically tests the green pro-social signaling mechanism. More precisely, Study 1 addresses the link between green consumption and pro-social values, and the link between green consumption and trustworthiness, while Study 2 addresses whether green signalers are behaving more trustworthily if they are trusted more frequently, and (finally) whether consumers are indeed more willing to pay a premium for a green product if it has a signaling benefit (in other words, if observers know whether someone has chosen a green or a non-green product).

Study 1 puts the following hypotheses to the test:

H1: A person's WTP for green products positively correlates with their pro-social values.

H2: A person's WTP for green products positively correlates with their trustworthiness.

Other motives for buying green

Consumers also buy green products for other reasons than to benefit the environment or to signal latent qualities. In the case of edibles, it is known that individuals believe organic products to be healthier, and it is for this reason that many consumers are willing to pay a premium for them. Buying green products for health reasons can thus also be motivated by self-interest (Lockie et al., 2002; Michaelidou & Hassan, 2008). With organic edibles, which are used in Study 1, the correlation between an individual's WTP for a green product and their pro-sociality should be weaker than for non-edibles. Therefore, edibles either give no signal or only a weak signal (but see Puska et al., 2016).

H3: The correlation between WTP for green products and pro-social traits is stronger for green non-edible products than for green edible products.

The trust game

In private and economic life, people repeatedly face trust problems – the question of whether or not to trust another person (Coleman, 1990). Should a university student, for example, trust his or her fellow student and team up with them for a joint project? What if they put less effort into the project than they promised to? According to the pro-social signaling model, the student should trust a person who displays a pro-social signaling device – for example, a re-usable coffee mug or a recycled rucksack.

The trust game is a game theoretic formalization of the trust problem (Dasgupta, 1988). It can easily be implemented as a laboratory experiment, and is therefore a well-suited framework for studying signals of pro-sociality and trustworthiness (Camerer, 2006).

The trust game is played sequentially (Figure 1). A first mover (the truster) decides whether or not to place trust in the trustee. If the second mover (the trustee) reciprocates, both truster and trustee gain from the exchange and both are better off compared to a situation in which no exchange had taken place (payoff P).

The dilemma is that there are two types of trustee: a trustworthy and an untrustworthy one. The trustworthy type will reciprocate the first mover's trust, while the untrustworthy type will exploit the first mover's trust (Coleman, 1990).

[Figure 1 about here]

Trustworthy trustees differ from untrustworthy trustees in that they derive an intrinsic benefit b in addition to the payoff R from reciprocating trust, while they feel guilty (c) when abusing trust ($R+b > T-c$) (Riegelsberger, Sasse, & McCarthy, 2005). This intrinsic benefit can, among other possibilities, result from the trustee's pro-social values (Bolton & Ockenfels, 2000; Fehr & Schmidt, 1999). To resume our student example: a cooperative student might feel good as a result of contributing to the joint project. Conversely, the untrustworthy trustee gains no intrinsic benefit b from reciprocating trust, and he or she feels no guilt (c) when abusing trust; thus, the untrustworthy type has an incentive to abuse trust ($T > R$).

The truster faces the dilemma that they will gain from an exchange with a trustworthy trustee, but they will lose from an exchange with an untrustworthy trustee. Given this trust problem, how can the truster decide whether or not to place their trust in the trustee? One solution to the trust problem is signaling. As in the Spencian labor market example (Spence 1973), where an employer will only hire an applicant who has sent a reliable labor market signal in advance, the

truster in the trust game will only place trust in the trustee if the trustee has sent a reliable signal of trustworthiness in advance.

The pro-social-signaling mechanism implies that a green product can be a signal of trustworthiness. More precisely, a green product is a reliable signal of trustworthiness if its green premium (s) (the cost of the green product minus the cost of an identical conventional product) is great enough, so that the following inequality holds:

$$T - s < P \quad (1)$$

If this is the case, it does not pay for an untrustworthy trustee to invest in the signal and thus wrongly advertise trustworthiness to exploit the truster. For this reason, buying green is a reliable signal of trustworthiness, and the truster will rely on this information.

H4: If the green premium is sufficiently high, the truster is more likely to trust when the trustee has bought a green product than a conventional product.

However, if the green premium is too small in relation to the gain the signaler can receive when they wrongly advertise trustworthiness ($T - s > P$), the green good is no reliable signal of trustworthiness. In this case, the truster's decision regarding whether or not to place trust in the trustee does not depend on the trustee's product choice (green vs. non-green).

H5: If the green premium is too low, the truster's decision regarding whether or not to place trust in the trustee does not depend on the trustee's product choice.

While it is plausible that certain people intentionally invest in relatively costly green products to signal trustworthiness, the green pro-social-signaling mechanism is more broadly applicable if we assume that not everybody who buys a green product strategically thinks ahead and weighs green premiums with the benefits of increased success in a social exchange. Even when it is not bought for strategic reasons, an object such as a green product can carry information for observers. In sociological literature, the notion of a natural signal (or, alternatively, a sign) has been introduced to distinguish unintentional signaling from strategic signaling (e.g., Gambetta, 2009; Gambetta & Przepiorka, 2014). For example, a pro-social act (such as a donation to charity) can carry information about a person's kindness and trustworthiness, if the donor has not been aware that this act will be used as an indicator of kindness and can therefore lead to later benefits. In fact, it has been shown empirically that unconditional kindness correlates with trustworthiness (Ashraf et al., 2006; Gambetta & Przepiorka, 2014).

This logic applies to the problem at hand, as follows: the display of a green product that is not costlier than its conventional counterpart can still be an indicator of the trustee's trustworthiness if the truster has reason to believe that the trustee has not bought the product for strategic reasons (Przepiorka & Berger, 2017).

H6: If the trustee does not anticipate that a trust game will follow, a 'cheap' green choice is a reliable signal of trustworthiness.

A further hypothesis of special interest for marketers is that a signaling opportunity increases the consumer's WTP for green goods. As discussed before, this is because trustworthy types gain from signaling their type, and because of this they are more willing to pay a premium for green products. A green product can serve as a signaling device if it is observable, and if it is clearly recognizable, as green.

H7: If the green product can be used as a signaling device, more consumers will be willing to pay a green premium for this product.

To test H7, in this experiment the receiver will know whether the sender has chosen a green or a non-green product in the natural signal condition, while this information is not provided in the control condition. In the real world, green products must be clearly distinguishable from their non-green counterparts to be suitable as signaling devices. This holds true for products that are typically used in public (e.g., cars or bags) and products that can be conspicuously used at home (e.g., soap or dishwashers). Of course, products that are hardly ever visible (e.g., batteries) are not suitable as signaling devices.

The following two sections discuss the two studies devised to test these hypotheses. The purpose of Study 1 is to test H1–H3, while Study 2 addresses H4–H7.

3 Study 1: WTP for green products correlates with pro-sociality and trustworthiness

3.1 Subjects

Subjects (N=108, 59% female, mean age = 22) were randomly chosen from a subject pool of students enrolled either at the University of Zurich or ETH Zurich who had volunteered to take part in experiments for an hourly payoff of approximately 30 CHF (approximately 31 USD at the time the experiments were conducted). Although a student sample is probably not representative of the typical buyer of green products, such a sample is usually well suited for a first test of a theory. It is easier to detect a causal effect in a relatively homogeneous sample (Falk & Heckman, 2009). A natural next step is then to question how robust an effect is (Bardsley et al., 2010). Moreover, students are able to quickly understand even relatively abstract instructions (Guala, 2012). Over a broad range of experiments, student samples produce largely the same results as other samples (Charness & Fehr, 2015). More to the point, while the absolute magnitudes of treatment effects found in experiments usually differ across sub-populations, the treatments usually have the same relative effect across sub-populations.

Put differently, if conspicuous products are more attractive to consumers, and thus they are willing to pay more for such products, this effect should occur among students as well as among university teachers – although the increase will probably occur on a higher level among teachers than among students (see Camerer, 2006, for a comparison of standard economic experiments across various subject pools). The computerized laboratory study was conducted at the ETH Decision Science Laboratory using z-Tree software (Fischbacher, 2007).

3.2 Design and procedure

Before the experiment started, the subjects read the instructions and completed a comprehension check; questions answered incorrectly were clarified. This procedure guaranteed that the instructions were clear for all subjects.

The experiment proceeded as follows. In a first step, every subject's DWTP was determined. A subject's DWTP was the difference between their WTP for a green product and their WTP for an identical non-green product over a series of eight product pairs (eight green, eight conventional).

For this purpose, 16 products (a conventional and a green product for each of the following items: a chocolate bar, a bottle of lemonade, toothpaste, soap, washing up liquid, a pair of socks, shower gel and a pack of cotton buds) were presented to every subject in a random order. A relatively broad selection of everyday products that are useful for students was selected; some of the products were the same as the products used in hypothetical purchase decisions in a similar study (Griskevicius et al., 2010). No product pictures or brand names were presented and the products were only described, including a statement explaining whether they were conventional or green (see Appendix for an example). As such, the information on each product version (conventional/green) was identical, except regarding whether it was green or conventional.

Each subject stated the maximum price they were willing to pay for each of the 16 products. In addition, a random price was generated for any given product. At the end of the experiment, one of the 16 products was randomly selected for each subject. If the subject's WTP was greater or equal to the random price for the selected product, they actually received the product and paid this price. If the subject's maximal price undershot the random price, they did not buy the product. The subjects were aware that they might receive one randomly selected product in the end.

This procedure, called the Becker–DeGroot–Marschak mechanism (BDM) (Becker et al., 1964), is standard in experimental economics (Guala, 2005) and allows for eliciting an individual's WTP in an incentive-compatible way. No subject has an incentive to overstate or understate their maximum price, because subjects who overstate their maximum price pay too much for the product, while subjects who understate their maximum price do not receive the product, even though they were perfectly willing to buy the product at this price. The most

similar study to the present study which has applied BDM is a study that aimed to measure consumer's WTP for organic and fair-trade products (Didier & Lucie, 2008).

The advantage of BDM in comparison to just interrogating people on their WTP is that the method is closer to a real-world purchase situation (i.e., the products are actually costly), and BDM therefore reduces social desirability (i.e., the premiums consumers are willing to pay are not as severely overstated as in survey studies) (Noussair, Robin & Ruffieux, 2003). In a meta-analysis, List and Gallet (2001) summarize that simply interrogating consumers on their WTP leads to unrealistic results: WTP values are up to twice as high as when measured with BDM.

In a second step, every subject's social value orientation (SVO) was measured using the standard procedure suggested by Murphy et al. (2011) and implemented for z-Tree by Crosetto et al. (2012). The SVO slider measure is an incentive-compatible way to measure an individual's pro-social values. A subject divides a sum of money between herself and another subject in the room several times, facing a different trade-off each time. The result is an SVO score, with higher scores indicating more pro-social values. The scores can be divided into competitive, self-interested, pro-social and altruistic categories.

In a third step, every subject's environmental value orientation (EVO) was measured using the procedure suggested by Ackermann et al. (2014). The basic idea is the same as for the SVO, but the receiver of the transferred money is not another subject but a pro-environmental non-governmental organization (NGO). The EVO slider measure is based on the dimensions of climate, flora and wildlife. A suitable NGO was chosen for each of these three domains, and the donated money was then transferred to the respective NGO. The subjects did not learn the name of the NGO during the experiment. Both the SVO measure and each dimension of the EVO measures consisted of five decisions (15 decisions in total). Out of these 15 decisions, one was randomly selected, and the sum of 9 CHF was split between the subject and the NGO in a proportion as suggested by the subject. This random lottery incentive procedure is standard in experimental economics (Cubit et al., 1998). Its advantage is that substantial amounts of money are divided, while a relatively large number of decisions can simultaneously be observed in an incentive-compatible way.

In a fourth step, a trust game (without a signaling option and with payoffs T=.75, R=.50, P=.25, S=0; payoffs in CHF) was played with the aim of testing H2, which states that WTP for green products correlates with trustworthiness. Subjects were randomly grouped into pairs. Both subjects then took a decision as both truster and trustee, before being randomly allocated to one of these roles. Finally, the trust game was played in accordance with the strategy choices they had made. This so-called strategy method generates a larger amount of data because all subjects make a decision for both roles. The strategy method leads to qualitatively identical results to a situation in which the trust game is played conventionally, although the level of trustworthiness is generally somewhat lower (Casari & Cason, 2009).

After finishing all these tasks, the subjects were informed about whether they had bought any of the products and, if so, for what price, and which NGO would receive their donation. They were then informed about the result of the trust game.

As a last step, the subjects filled in a brief questionnaire on an environmental attitude scale (Diekmann & Preisendörfer, 2003), their motives behind buying green products, the subject's beliefs about the motives of the other subjects for buying green products, and some demographic background information.

3.3 Results

Throughout, the WTP for green products was higher than the WTP for conventional products, with an average DWTP ranging from 17% (cotton buds) up to 27% (lemonade) of the price of the conventional product. Table A1 in the appendix lists statistics for all of the products.

The main result, as predicted by H1, is that DWTP correlates significantly with SVO (see Table 1). As stated by H3, the correlation is weaker for edibles. As the questionnaire reveals, most subjects attribute other buying motives than environmental consciousness to most other people when it comes to edibles and toothpaste (see Table A1 in the appendix). These results corroborate H1 and H3. Pro-social values are one driver, although not the only driver, for buying green. DWTP correlates even more strongly with EVO and with a pro-environmental attitude scale. Finally, in accordance with H2, the DWTP of trustworthy subjects (M=.73, SE=.07) exceeds the DWTP of untrustworthy subjects (M=.48, SE=.11, p=.054).

[Table 1 about here]

4 Study 2: Signaling increases consumers' WTP for green products

Study 1 supports H1 and H2. Subjects with a high WTP for green products also score higher on SVO, and those with a high SVO behave more trustworthily in the trust game than those with a low SVO. An important follow-up question is whether individuals facing a trust dilemma also perceive a high WTP for green products as a signal of trustworthiness, and whether the subject's WTP for the same green products is greater if the subject's choice of product – green or conventional – is disclosed (which is a precondition for the green product having a signaling value).

4.1 Subjects

Subjects (N=256, 55% of them female, mean age = 22) took part in Study 2. The sampling procedure, average payoff and location were the same as in Study 1.

4.2 Design and procedure

Study 2 consisted of two parts. In the first part, the subjects chose one of several products (soap, dish washing detergent, cotton buds, socks) – products for which the subjects in the first experiment assumed mostly pro-environmental reasons as a purchase motive – and they were then asked to choose between receiving a conventional version of the product for free, or a green version of the product at a cost (the green premium). In the second part, they played a trust game. All the subjects were aware that a trust game would follow in the second part of the experiment, but only in two of the four experimental conditions were they informed that their decision (conventional product for free, or green product for a premium) would be revealed. In these latter cases, the other party only learned whether an individual had chosen a green or a non-green product, but not what kind of product they had chosen. For this reason, the fact that some products (e.g. socks) are not usually very visible in real life was irrelevant in this experiment. Moreover, products used in private can also have a signaling value. For example, a host can signal their pro-social value to their dinner party guests via a conspicuously green soap placed prominently in the bathroom.

4.3 Experimental conditions

To test the green pro-social-signaling mechanism, four experimental conditions were implemented (see Table 2). In the *control condition*, a trust game (payoffs in CHF: T=3.90, R=2.30, P=1.40, S=0.50) was played, where the trustee's choice (conventional product vs. green product) was concealed. In all of the other conditions, the trustee's choice was revealed.

In the *costly signal condition*, the green premium of s=2.60 CHF is costly enough that it would not pay for untrustworthy trustees to invest in a green product, thereby wrongly advertising trustworthiness with the aim of exploiting a truster (i.e. $T–s < P = 3.90 \text{ CHF} - 2.60 \text{ CHF} < 1.40 \text{ CHF}$). In this case, only trustworthy trustees will invest in signals; the trusters should thus place their trust in a trustee with a higher probability if the trustee sends a green signal, compared to when the truster has not sent a green signal (in game theoretic terminology, a separating equilibrium emerges, because an observer can distinguish trustworthy trustees from untrustworthy trustees based on their signaling behavior) (Gintis 2009, chapter 8).

If the green premium is not sufficiently high ($T–s > P$), buying the green product version is not a reliable signal and the trusters will not rely on the trustee's product choice (*cheap signal condition* with s=1 CHF).

However, as discussed, a cheap signal can also be a reliable indicator of trustworthiness if the consumer did not buy the green product strategically as a signaling device (i.e. if the consumer was not aware that a social exchange situation with signaling option would follow after the consumer choice). To test this prediction, in the *natural signal condition* (s=1 CHF), the subjects were not aware that a trust game would follow when they decided between a conventional and a green version of the product.

All subjects were randomly paired and, to generate more data, they took a decision as both truster (place trust/place no trust) and trustee (reciprocate trust/abuse trust). Before a subject took a decision as truster, they were informed of whether the trustee had chosen a green or a non-green product.

4.4 Results

Trust

Figure 2 summarizes the proportion of interactions in which the truster placed trust in the trustee across conditions, separately for conventional and green trustees. Unsurprisingly, in the control condition, both conventional and green trustees are trusted equally often (30% vs. 25%, χ^2=.141, p=.708) – there is no indicator for the truster to tell them apart. Contrarily, in the costly signal condition, as compared to the conventional trustees, the green trustees are trusted much more frequently (27% vs. 52%, χ^2=4.111, p=.043). In line with the model, a high premium for the green version of a product indeed increases trustworthiness – a finding that supports H4. However, when the signaling costs are too low and the signal is thus not reliable, green consumption does not enhance trustworthiness. In the cheap signal condition, conventional trustees and green trustees are trusted to an equal degree (46% vs. 45%, χ^2=.000, p=.987), as predicted by H5. Consistent with the notion that natural signals can also be reliable, 40.0% of the green signalers (but only 29.4% of the conventional trustees) are trusted. This tendency does not, however, reach statistical significance (χ^2=0.792, p=.373). As such, H5 is not supported by the data.

[Figure 2 about here]

Trustworthiness

The model predicts that individuals who choose the green option will be more trustworthy (i.e., will reciprocate trust instead of exploiting trust), with the exception of the cheap signal condition, where buying green is not a reliable signal for trustworthiness. In contrast to placing trust, where the results are largely as predicted, the results with respect to trustworthiness are rather mixed.

In the control condition, where the product choices are concealed and thus only intrinsic motives are relevant, conventional consumers (39% trustworthy) and green consumers (50% trustworthy) do not significantly differ with respect to trustworthiness (χ^2=.728, p=.394; see Figure 3). This is surprising, since in Study 1 the green consumers behaved more trustworthily. In the costly signal condition, the tendency for green consumers to be more trustworthy is more pronounced but does not reach statistical significance (61% vs. 42% trustworthy, χ^2=2.22, p=.136). In the cheap signal condition, the difference between conventional consumers (32%

trustworthy) and green consumers (52% trustworthy) only narrowly fails to reach statistical significance (χ^2=2.46, p=.117), while in the natural signal condition the difference is relatively pronounced (conventional: 29% trustworthy, green 53% trustworthy, χ^2=3.78, p=.052).

[Figure 3 about here]

Conspicuousness

The effect of conspicuousness is of specific interest for marketers because it might increase the consumers' WTP. A consumer can only use a green product as a signaling device if the product is distinguishable from its conventional counterparts (i.e., if it is conspicuously green). In this experimental setting, a product is conspicuously green when the truster is informed about the trustee's product choice (conventional vs. green) and when the trustee knows that truster will be informed (this is the case in the cheap signal condition and in the costly signal condition).

The effect of conspicuousness can be assessed in two ways. First, the control condition and the costly signal condition can be compared. In both conditions, the green premium amounts to 2.60 CHF, but only in the costly signal condition does the truster learn of the trustee's choice. Second, the natural signal condition and the cheap signal condition can be compared. In both, the green premium amounts to 1 CHF, but only in the cheap signal condition are the trustees aware that their choices will be disclosed to their interaction partners. In contrast, in the natural signal condition, they are not aware that their choices will be disclosed.

There are considerable differences in the proportion of green choices across the four experimental conditions (see Figure 4). While there is only a small difference in the proportion of subjects choosing the green product between the control condition (31% green choices) and the costly signal condition (36% green choices, χ^2=.0.315, p=.575), there is a substantial difference when comparing the natural condition (47% green choices) and the cheap signal condition (66%, χ^2=4.571, p=.033).

[Figure 4 about here]

A probable explanation for the different effects of the conspicuousness of the costly signal and the cheap signal is provided by the low-cost hypothesis of environmentally friendly behavior (Diekmann & Preisendörfer, 2003). The low-cost hypothesis states that soft incentives can foster environmentally friendly behavior, but only if the cost difference between the green and the non-green alternative is relatively low.

5. Discussion

Many green products are costlier than their non-green counterparts, specifically at the time of market entry. This green premium is a key challenge for marketers (Peattie, 2010). Existing studies suggest that consumers have a higher WTP for green products if the products can clearly be recognized as green. The reason is that green consumers are perceived as having a higher status and as more pro-social (e.g. Griskevicius et al.; 2010; Puska 2018; Kohlová and Urban, 2018). However, existing studies methodologically rely on hypothetical purchase decisions and they theoretically conceive green consumption primarily as a form of status signaling.

This paper expands existing research, both methodologically and theoretically. Methodologically, it puts the signaling explanation of green consumption to the test with incentivized purchase decisions and actual behavior, thereby extending the validity of existing studies based on hypothetical decisions and questionnaire data. Theoretically, two green signaling mechanisms are distinguished: green consumption as a signal of social status, on the one hand, and pro-sociality, on the other hand. Moreover, the pro-social signaling explanation of green consumer behavior is put to the test.

5.1 Main results

The results show that, first, as assumed, WTP for green products correlates with pro-social values and trustworthiness, although less so in the case of organic eatables, which are also bought for their health benefits. Second, individuals with a high WTP for green products are trusted with a higher probability in the trust game. As predicted, this 'halo of trustworthiness' is an incentive for consumers to invest in relatively costly green products instead of cheaper non-green counterparts. When purchase decisions (costly green vs. cheap non-green) are disclosed, more subjects are willing to pay a green premium (thereby investing in their perceived trustworthiness) than when purchase decisions are private. However, this effect only emerges for moderate green premiums. For high premiums, visibility (disclosed vs. private decisions) does not significantly increase the proportion of subjects choosing a green product version – a result that can be explained by reference to the low-cost hypothesis of environmentally friendly behavior (Diekmann & Preisendörfer, 2003).

5.2 Implications

Implications for signaling theory

As a first contribution to signaling theory, this research extends the validity of previous findings based on hypothetical buying decisions (Griskevicius et al.; 2010; Puska, 2018, Kohlová and Urban, 2018). In two laboratory studies, participants were actually able to buy products and they then engaged in social interactions. The main finding is that adding a signaling benefit can indeed increase consumers' WTP for green products. As such, signaling explanations of green consumption are corroborated.

As a second contribution to the theory, this study conceives green consumerism as a signal of pro-sociality and trustworthiness, instead of as a signal of status. Indeed, our results suggest that participants buy green products in order to increase their trustworthiness and, as a consequence, they are treated more favorably in social interactions. Given that research exists that suggests that status signals can decrease perceived pro-sociality and trustworthiness (Berger, 2017), it is questionable that green products are typically both signals of status and signals of pro-sociality, as suggested by some scholars (e.g. Griskevicius et al., 2010).

A further theoretical implication concerns signaling costs. While signaling theory has traditionally emphasized the monetary costs of making signals reliable, more recent contributions argue that cheap signals can also be reliable (Gambetta & Przepiorka, 2014; Przepiorka & Berger, 2017). The present research supports this notion for the case of green products.

Implications for marketers

This research has several implications for marketers. A first implication is that signaling benefits only compensate moderate premiums (up to around 50%). When the premium is too high (a premium of 100% or more), according to the results, a signaling benefit cannot even out the disadvantage of the high premium. As such, too high premiums should be avoided, or are only suitable for niche products targeting affluent consumers.

A second implication is that marketers of green products that are costlier than their non-green counterparts should design green products so that observers can clearly recognize these products as green. In this case, the signaling benefit of the green product can increase the attractiveness of the costly green product and balance out its higher price. A precondition is that the green product has no non-green twin. An example is the Toyota Prius, the first hybrid car, which had no conventional, purely fuel-powered, counterpart. According to Thaler and Sunstein (2008), the Prius would not have been such a success if a fuel-powered counterpart had existed to deprive the Prius of its signaling benefit. The present study supports their hypothesis.

A third implication is that marketers should have a plan regarding whether their product should be perceived as a "green" status-signaling device or as a pro-social signaling device. The desire to signal status and the desire to signal pro-sociality are not the same buying motives. In an extreme case, a status signal can even counteract a signal of pro-sociality (see Berger, 2017). A consequence is that it might well be the case that different people have a taste for green luxury signaling devices (e.g. a Tesla) and green everyday products (e.g. a rucksack made of recycled materials) and, possibly, a hybrid product of both luxury and everyday green might not be attractive for either group. However, this point is only a conjecture and needs to be investigated systematically.

A fourth implication is that organic eatables put a restriction on the green pro-social-signaling model. Observers tend to believe that consumers of organic eatables are largely motivated by health concerns rather than by environmental concerns and pro-social values. For eatables, a better strategy might be for marketers to emphasize their health and hedonic aspects, rather than designing them as signaling devices.

A fifth implication is that, like marketers, officials who aim to influence consumer behavior can also exploit signaling. For example, energy consumption could be reduced if households with a low energy consumption receive a sticker they can put on their post box; and canteens could serve climate-friendly meals on green-colored tablets.

5.3 Limitations and future research

A limitation of this research is external validity. First, the purchase decisions were conducted in a tightly controlled laboratory setting. While laboratory studies allow for a clear measurement of causal effects, the degree to which the findings generalize to different field contexts and product types is an open question (Guala, 2012). Second, both studies were conducted with university students, which raises the question of how other sub-populations would behave in response to the experimental treatments (Levitt & List, 2007). Typically, the effects found in studies with university students are also observed in the field, although the magnitude of the effects can differ across contexts and sub-populations (Camerer, 2006). For example, different sub-populations can vary in their WTP for conspicuously green products, depending on their wealth and sub-group-specific norms and values. More to the point, since the spending power of students is below average, correlations between WTP and pro-social values could be weaker than in a sample with individuals with a higher average income (but see Johnson & Chattaraman, 2018). Moreover, the upper bound of the green premium consumers are willing to pay should be higher in more wealthy consumer segments. Ultimately, these questions (generalizability across contexts and sub-populations) are empirical in nature; to address them, a promising next step would be to conduct a field study with real-world purchase decisions and more heterogeneous subjects.

Literature

Ackermann, K.A., Fleiß, E., Fleiß, J., Murphy, O.R. & Posch, A. 2014. Save the planet for humans' sake: the role between social and environmental value orientations. Working Paper No. 2, Faculty of Social and Economic Sciences, University of Graz.

Adams, M. & Raisborough, J. 2008. What can sociology say about fair trade? Class, reflexivity, and ethical consumption. *Sociology*, 42, 1165–1182.

Albert, M., Güth, W., Kirchler, E. & Maciejovsky, B. 2007. Are we nice(r) to nice(r) people? An experimental analysis. *Experimental Economics*, 10, 53–69.

Ashraf, N., Bohnet, I. & Piankov, N. 2006. Decomposing trust and trustworthiness. *Experimental Economics*, 9, 193–208.

Babutsidze, Z. & Chai, A. 2018. Look at me Saving the Planet! The Imitation of Visible Green Behavior and Its Impact on the Climate Value-Action Gap. *Ecological Economics*, 146, 290-303.

Bardsley, N., Cubitt, R., Loomes, G., Moffatt, P., Starmer, C., Sugden, R. 2010. *Experimental Economics. Rethinking the Rules*. Princeton: Princeton University Press.

Becker, G., DeGroot, M. & Marschack, J. 1964. Measuring utility by a single-response sequential method. *Behavioral Science*, 9, 226–232.

Bereczkei, T., Birkas, B. & Kerekes, Z. 2010. Altruism towards strangers in need: costly signaling in an industrial society. *Evolution and Human Behavior*, 31, 95–103.

Berger, J. 2017. Are luxury brand labels and 'green' labels costly signals of social status? An extended replication. *PLOS ONE* 12: e0170216.

Blanco, M., Engelmann, D. & Normann, H.T. 2011. A within-subject analysis of other-regarding preferences. *Games and Economic Behavior*, 72, 321–338.

Bolton, G.B. and Ockenfels, A. 2000. A Theory of Equity, Reciprocity, and Competition. *The American Economic Review*, 90, 166-193.

Bourdieu, P. 1984. *Distinction. A Social Critique of the Judgement of Taste*. London: Routledge.

Brick, C., Sherman, D.K. & Kim, H.S. 2017. 'Green to be seen' and 'brown to keep down': Visibility moderates the effect of identity on pro-environmental behavior. *Journal of Environmental Psychology*, 51, 226-238.

Bruderer Enzler, H. 2013. Considerations of future consequences as a predictor of environmentally friendly behavior. Evidence from a general population study. *Environment and Behavior* 47: 618-643.

Camerer, C.F. 2006. *Behavioral Game Theory. Experiments in Strategic Interaction*. New York: Russell Sage Foundation.

Casari, M. & Cason, T.N. 2009. The strategy method lowers measured trustworthy behavior. *Economic Letters*, 103, 157–159.

Charness, G. & Fehr E. 2015. From the lab to the real world. *Science* 350: 512-513.
Chung, W. & Kalnins, A. 2001. Agglomeration effects and performance: a test of the Texas lodging industry. *Strategic Management Journal*, 22, 269–988.
Coleman, J. 1990. *Foundations of Social Theory*. Cambridge, MA: Harvard University Press.
Congleton, R.D. 1989. Efficient status seeking: externalities, and the evolution of status games. *Journal of Economic Behavior and Organization*, 11, 175–90.
Connolly, J. & Prothero, A. 2008. Green Consumption. *Journal of Consumer Culture*, 8, 117–145.
Costa, S., Zepeda, L., & Sirieix, L. 2014. Exploring the social value of organic food: A qualitative study in France. *International Journal of Consumer Studies*, 38, 228–237.
Crosetto, P., Weisel, O. & Winter, F. 2012. A flexible z-Tree implementation of the social value orientation slider measure (Murphy et al. 2011) – manual. Jena Economic Research Paper 62. Friedrich Schiller University, Jena.
Cubit, R.P., Starmer, C. & Sugden, R. 1998. On the validity of the random lottery incentive system. *Experimental Economics*, 1, 115–131.
Dasgupta, P. 1988. Trust as a commodity. In D. Gambetta (ed.), *Trust: Making and Breaking Cooperative Relations* (pp. 49–72). Oxford: Blackwell.
Dastrup, S.R., Zivin, J.G., Costa, D.L., Kahn, M.E., 2012. Understanding the solar home price premium: electricity generation and green social status. *European Economic Review* 56, 961–973.
Delgado, M. S., Harriger, J. L., & Khanna, N. (2015). The value of environmental status signaling. *Ecological Economics* 111, 1–11.
Didier, T. & Lucie, S. 2008. Measuring consumer's willingness to pay for organic and Fair Trade products. *International Journal of Consumer Studies*, 32, 479–490.
Diekmann, A. & Preisendörfer, P. 2003. Green and greenback. The behavioral effects of environmental attitudes in low-cost and high-cost situations. *Rationality and Society*, 15, 441-472.
Drozdenko, R., Jensen, M. & Coelho, D. (2011). Pricing of green products: Premiums paid, consumer characteristics, and incentives. *International Journal of Business, Marketing, and Decision Sciences*, 4, 106-116.
Elliot, R. (2013). The taste for green: The possibilities and dynamics of status differentiation through "green" consumption. *Poetics*, 294–322.
Falk A. & Heckman J. J. 2009. Lab experiments are a major source of knowledge in the social sciences. *Science* 326, 535-538.
Fehr, E. & Schmidt, M. 1999. A Theory of Fairness, Competition, and Cooperation. *The Quarterly Journal of Economics*, 114, 817-868.
Fischbacher, U. 2007. z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10, 171–178.
Gambetta, D. 2009. Signaling. In P. Hedström & P. Bearman (eds.), *The Oxford Handbook of Analytical Sociology* (pp. 168–194). Oxford: Oxford University Press.
Gambetta, D. & Przepiorka, W. 2014. Natural and strategic generosity as signals of trustworthiness. *PLOS ONE* 9(5): e97533.

Glazer, A. & Konrad, K.A. 1996. A Signaling Explanation for Charity. *The American Economic Review*, 86, 1019–1028.

Gintis, H. 2009. *Game Theory Evolving. A Problem-Centered Introduction to Modeling Strategic Interactions.* Princeton: Princeton University Press.

Gintis, H., Smith, E.A. & Bowles, S. 2001. Costly signaling and cooperation. *Journal of Theoretical Biology*, 213, 103–119.

Griskevicius, V., Van den Bergh, B. & Tybur, J.M. 2010. Going green to be seen: status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology*, 98, 392–404.

Guala, F. 2005. *Experimental economics. Rethinking the rules*. Cambridge: Cambridge University Press.

Gupta S. & Ogden, D.T. 2006. The attitude–behavior gap in environmental consumerism. *APUBEF Proceedings*, Fall 2006.

Harbaugh W.T. 1998. The Prestige Motive for Charitable Transfers. *American Economic Review* 88: 277–282.

Inglehart, R. 1995. Public support for environmental protection: objective problems and subjective values in 43 societies. *Political Science and Politics*, 28, 57–72.

Iredale, W, van Vugt, M. 2012. Altruism as showing off: a signalling perspective on promoting green behavior and acts of kindness. In: S. Craig Roberts (ed.), *Applied Evolutionary Psychology* (173-185). Oxford: Oxford University Press.

Gambetta, D. 2009. Signaling. In P. Hedström & P. Bearman (eds.), *The Oxford Handbook of Analytical Sociology* (pp. 168–194). Oxford: Oxford University Press.

Jackson, T. 2005. Motivating Sustainable Consumption: *A Review of Evidence on Consumer Behaviour and Behavioural Change*. London: Policy Stud. Inst.

Johnson, C.Y., Bowker, J.M. & Cordell, H.K. 2004. Ethnic variation in environmental belief and behavior: an examination of the New Ecological Paradigm in a social psychological context. *Environment and Behavior*, 38, 5–21.

Johnson, O., Chattaraman, V. 2018. Conceptualization and measurement of millennials' social signaling and self-signaling for socially responsible consumption. *Journal of Consumer Behavior*. First published 21 November 2018. https://doi.org/10.1002/cb.1742.

Joshi, Y. & Rahman , Z. 2015. Factors affecting green purchase behavior and future research directions. *International Strategic Management Review*, 3: 128-143.

Kardash, W.J. 1974. Corporate responsibility and the quality of life: developing the ecologically concerned consumer. In K. E. Henion & T. C. Kinnear (eds.), *Ecological Marketing* (pp. 5–10). Chicago: AMA.

Klapwijk, A. & van Lange, P.A.M. 2009. Promoting cooperation and trust in 'noisy' situations: the power of generosity. *Journal of Personality and Social Psychology*, 96, 83–103.

Kohlová, M.B. & Urban, J. 2018. Green consumption signals altruism and elevated social status. *Psyarxiv*, 10.17605/OSF.IO/2VGEX.

Koller, M., Floh, A. & Zauner, A. 2011. Further insights into perceived value and consumer loyalty. *Psychology & Marketing*, 28, 1154–1176.

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.

Laroche, M., Bergeron, J. & Barbaro Forleo, G. 2001. Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, 18, 503–520.

Lee, K. 2008. Opportunities for green marketing: young consumers. *Marketing Intelligence & Planning*, 26, 573–586.

Levitt, S.D. & List, J.A. 2007. What Do Laboratory Experiments Measuring Social Preferences Reveal About the Real World? *Journal of Economic Perspectives*, 21, 153–174.

List, J.A., & Craig, A.G. 2001. What Experimental Protocol Influence Disparities Between Actual and Hypothetical Stated Values? *Environmental and Resource Economics*, 20, 241–254.

Lockie, S., Lyons, K., Lawrence, G. & Mummery, K. 2002. Eating 'green': motivations behind organic food consumption in Australia. *Sociologica Ruralis*, 42, 23–40.

Mainieri, T., Barnett, E., Valdero, T., Unipan, J. & Oskamp, S. 1997. Green buying: The influence of environmental concern on consumer behavior. *The Journal of Social Psychology*, 137, 189–204.

Michaelidou, N. & Hassan, L.M. 2008. The role of health consciousness, food safety concern and ethical identity on attitudes and intentions towards organic food. *International Journal of Consumer Studies*, 32, 163–170.

Murphy, R.O., Ackermann, K.A. & Handgraaf, M.J. 2011. Measuring social value orientation. *Judgment and Decision Making*, 8, 771–781.

Noussair, C., Robin, S., & Ruffieux, B. 2003. A comparison of hedonic rating and demand-revealing auctions. *Food Quality and Preference* 15, 393–402.

Peattie, K. 2010. Green consumption: behavior and norms. *Annual Review of Environment and Resources*, 35, 195–228.

Peattie, K. 2001. Golden goose or wild goose? The hunt for the green consumer. *Business Strategy and the Environment*, 10, 187–199.

Posner, E.A. 2000. *Law and social norms*. Cambridge, MA: Harvard University Press.

Przepiorka, W. & Berger, J. 2017. Signaling theory evolving: signals and signs of trustworthiness in social exchange. In B. Jann & W. Przepiorka (eds.), *Social Dilemmas,* Institutions, and the Evolution of Cooperation (pp. 373–392). Berlin: De Gruyter.

Puska, P. 2018. Does Organic Food Consumption Signal Prosociality?: An Application of Schwartz's Value Theory. *Journal of Food Products Marketing*, DOI: 10.1080/10454446.2018.1522286.

Puska, P., Kurki, S., Lähdesmäki, M., Siltaoja, M., Luomala, H. 2016. Male-Male Status Signaling through favoring Organic Foods: Is the Signaler Perceived and Treated as a Friend or a Foe? *Psychology & Marketing* 33: 843–855.

Riegelsberger, J., Angela Sasse, M., & McCarthy, D. 2005. The mechanics of trust: A framework for research and design. *International Journal of Human-Computer Studies,* 62, 381–422.

Sexton, S.E. & Sexton, A.L. 2014. Conspicuous conservation: the Prius halo and willingness to pay for environmental bona fides. *Journal of Environmental Economics and Management*, 67, 303–317.

Schlegelmilch, B.B., Bohlen, G.M. & Diamantopoulos, A. 1996. The link between green purchasing decisions and measures of environmental consciousness. *European Journal of Marketing*, 30, 35–55.

Sriram, V. & Forman, A.M. 1993. The relative importance of products' environmental attributes: a cross cultural comparison. *International Marketing Review*, 10, 51–70.

Spence, M. 1973. Job market signaling. *Journal of Economics*, 87, 355–74.

Thaler, R.H. & Sunstein, C.R. 2008. *Nudge: Improving Decisions About Health, Wealth, and Happiness*. New Haven, CT: Yale University Press.

United Nations Environment Programme. 2005. Talk the walk. Advancing sustainable lifestyles through marketing and communications. UN Global Compact Office and Utopies. 1–52 (https://www.unglobalcompact.org/library/277).

Veblen, T. 1965[1899]. *The Theory of the Leisure Class*. London: Macmillan.

Whitfield, J. 2011. Green status. *Nature Climate Change*, 1, 323–325.

Willer, R. 2009. Groups reward individual sacrifice. The status solution to the collective action problem. *American Sociological Review*, 74, 23–43.

Zahavi, A. 1975. Mate selection – a selection for a handicap. *Journal of Theoretical Biology*, 53, 205–214.

Appendix

WTP and green products

[Table A1 about here]

Example: conventional and green product descriptions (Study 1)

Conventional lemonade

- Conventional lemonade
- Taste: lemon
- 500 ml plastic bottle

Organic lemonade

- Organic lemonade
- Taste: lemon
- 500 ml plastic bottle

Note: The original language was German. Translation by the author.

Tables

Table 1: Correlation between DWTP and scales for pro-social and pro-environmental preferences and attitudes

Product	SVO	EVO	Environmental attitude scale
Chocolate	.106	.309**	.096
Lemonade	.157	.281**	.173+
Toothpaste	.210*	.215*	.201*
Cotton buds	.169+	.276**	.258**
Soap	.329***	.281**	.203*
Shower gel	.175+	.271**	.292**
Washing up liquid	.259**	.318***	.361***
Socks	.261**	.251**	.288**
DWTP all	.343***	.421***	.357***
DWTP subset	.392***	.400***	.392***

Notes: +p<.1, *p<.05, **p<.01, ***p<.001. SVO: social value orientation. EVO: environmental value orientation. DWTP all: average WTP for green product versions minus average WTP for conventional product versions. DWTP subset: average green premium of the four products used in Study 2. Environmental attitude scale: α =.834.

Table 2: Experimental conditions

Experimental condition	Green premium (CHF)	Signaling	N	% choosing the green option
Control	2.60	No	64	31.3
Costly signal	2.60	Yes, with announcement	64	35.9
Cheap signal	1	Yes, with announcement	64	65.6
Natural signal	1	Yes, without announcement	64	46.9

Table A1: WTP and motives for buying green

Product	Conv. version M (SD)	Green version M (SD)	DTWP M (SD)	DWTP is X% of total price	Self: green motive (%)	Others: green motive (%)
Chocolate	1.51 (1.77)	1.99 (1.87)	.48 (.65)	24.1	64.1	34.3
Lemonade	1.66 (1.71)	2.28 (1.90)	.62 (.72)	27.2	31.5	20.4
Toothpaste	2.20 (1.83)	2.81 (2.14)	.61 (1.05)	21.7	44.0	23.2
Cotton buds	1.81 (1.80)	2.19 (2.00)	.38 (.56)	17.4	84.1	68.5
Soap	2.18 (1.81)	2.97 (2.23)	.79 (1.17)	26.6	62.5	57.1
Shower gel	2.85 (2.05)	3.57 (2.49)	.72 (1.11)	20.2	56.4	42.6
Washing up liquid	2.50 (2.12)	3.33 (2.38)	.82 (.92)	24.6	80.3	42.6
Socks	3.01 (2.39)	3.72 (2.68)	.71 (1.35)	19.1	61.9	52.8

Notes: Prices in CHF. DWTP = WTP green product minus WTP conventional product. Self: green motive – percent of subjects indicating environmental reasons for choosing a green version of this product. Others: green motive – percent of subjects believing most other subjects are motivated by environmental reasons in choosing a green version of this product.

Figures

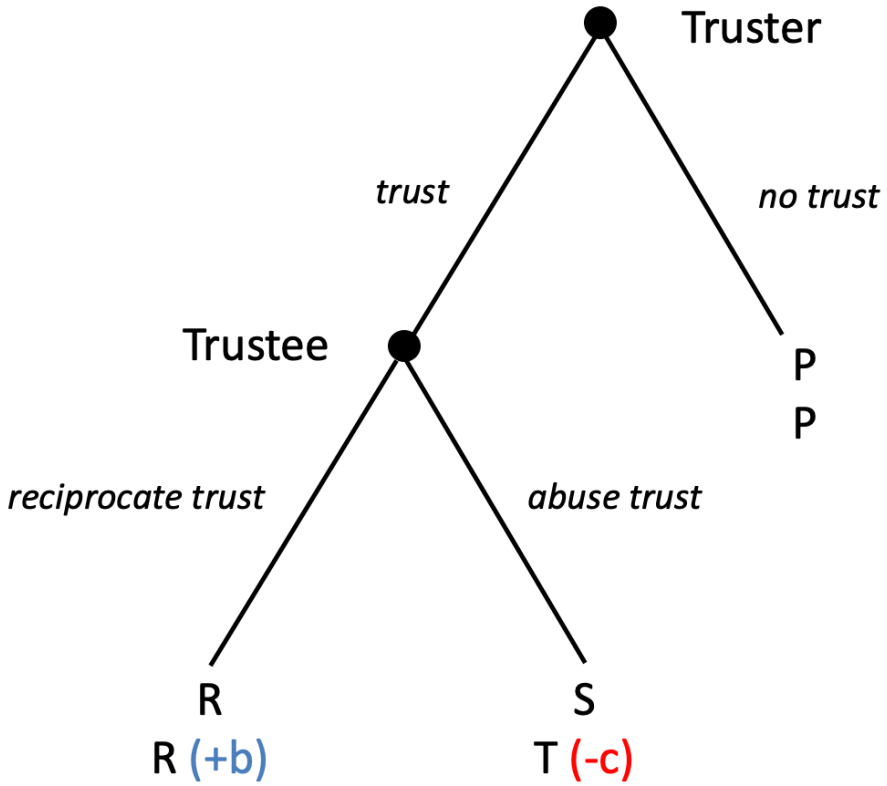

Figure 1: The trust game. Trustworthy trustees derive an intrinsic benefit b when reciprocating trust, and they suffer from intrinsic punishment when abusing trust (c), while untrustworthy trustees do not have these 'psychological' incentives. For trustworthy trustees, the payoff structure is R+b > P > T-c. For untrustworthy trustees, the payoff structure is T > R > P. The trusters' payoff structure is R > P > S.

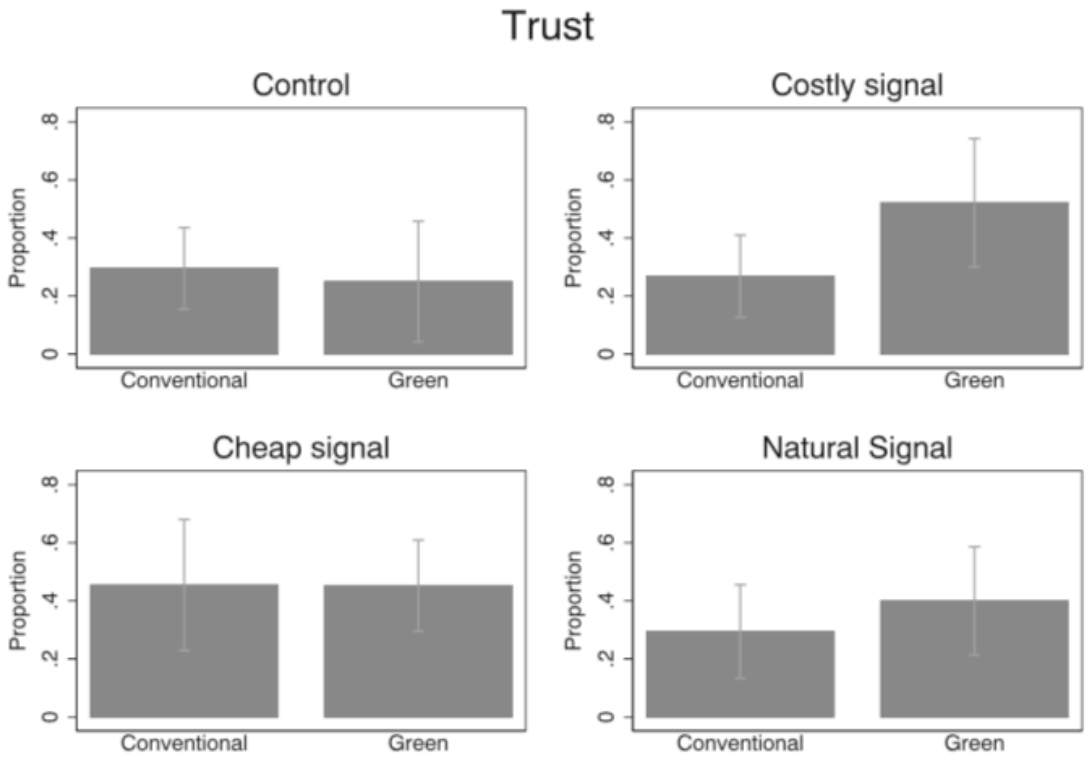

Figure 2: Proportion of trusters placing trust conditional on the trustee's product choice and experimental condition

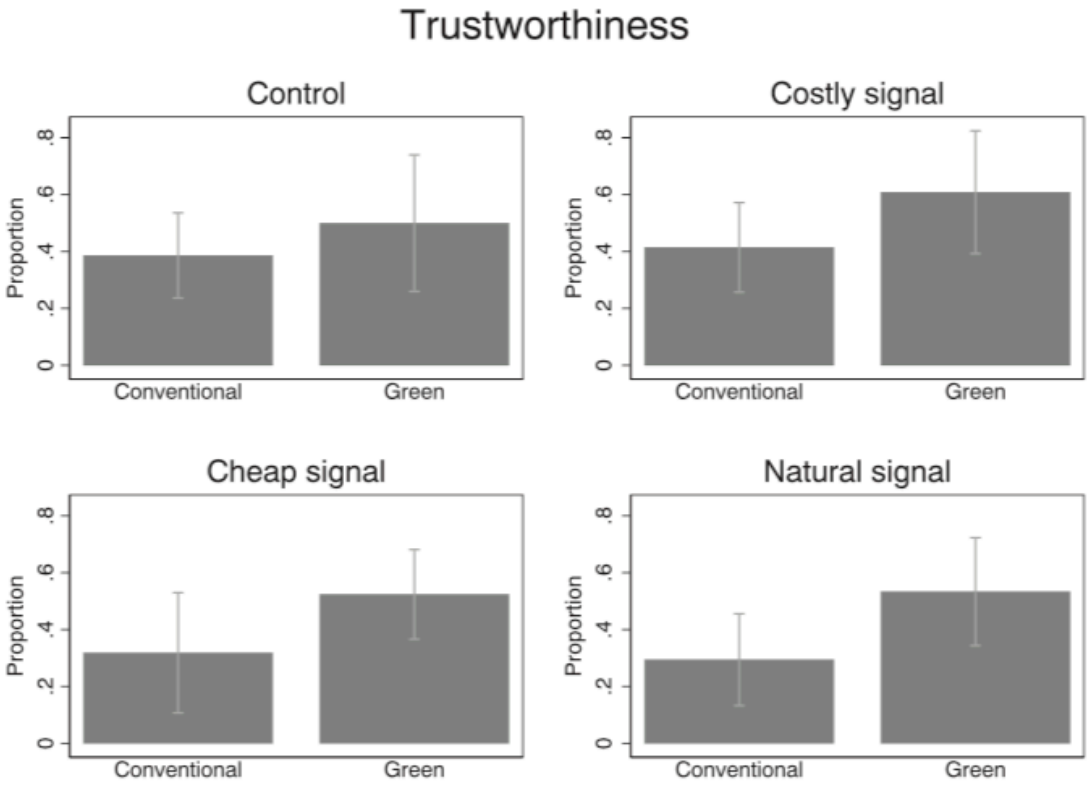

Figure 3: Proportion of trustworthy trustees conditional on the trustee's product choice and experimental condition

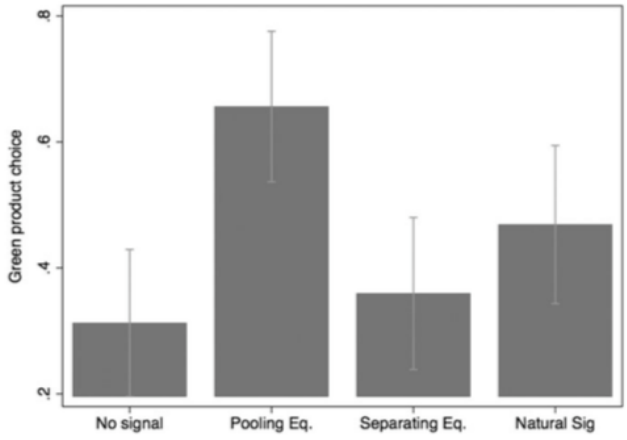

Figure 4: Proportion of green choices across experimental conditions