The social dilemma of car sharing – The impact of power and the role of trust in community car sharing

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ABSTRACT
Car sharing represents a promising solution for sustainable transportation. Considering that there are already many cars that are not used to their full capacity, car sharing communities, whereby a group of people share access to a car, represent a sustainable alternative. However, sharing a car within a community results in the challenge of shared contributions and shared requests and thus, constitutes a social dilemma. From a social dilemma perspective, rational individualistic interests collide with collective interests of the sharing group: While each member would be better off contributing as little as possible and using the car as much as possible, it is in the collective interest of the group that each member pays a fair share and uses the resource fairly. This paper analyzes the problem of contributing to a shared car through the social dilemma framework and focuses on two potential factors that might influence drivers’ behavior: power (e.g., sanctions, expertise) and trust mechanisms (i.e., presenting badges) used by the car sharing community. This paper presents the results of two laboratory experiments. Study 1 (N = 183) reveals that power mechanisms, e.g., sanctions, affect the contribution to a shared car. Study 2 (N = 246) replicates the results of Study 1 and further shows that the presence of a trust mechanism (i.e., badge system) shapes the impact of power on contributions. The current research provides valuable insights for research on car sharing and the sharing economy in general and is particularly relevant for the constitution of sharing communities.

1. Introduction
There is a small scale neighborhood-based car sharing organization in Göteborg, Sweden called Majorna (Jonsson, 2007). It has 29 cars and about 300 members. The organization has no employees. Instead, members take turns jointly performing such tasks as washing and maintaining the cars, IT programming, and making decisions about insurance, car replacement, and whether to accept new members. (Belk, 2014a, p. 8)

This vignette demonstrates an alternative form of transportation: Instead of everyone owning a car, a group of people share access to a car via a sharing community. Such car sharing communities (e.g., 20Minuten, 2016; Hamburger Abendblatt, 2019; Pomali, 2020) answer the call for more sustainable mobility solutions.

Even now, humankind has exceeded the ecological limits of our planet (c.f. Steffen et al., 2015). Over the last decades, a progressive increase in public concern for ecological sustainability has resulted in a paradigm shift moving pro-environmental behavior from a fringe to a mainstream issue (Kalafatis et al., 1999) and fueled the discussion about the shared usage of resources as a pathway to sustainability (see discussion on the sharing economy by Heinrichs, 2013). Mobility is one of the three areas accounting for most of the greenhouse gas emissions worldwide (Hertwich & Peters, 2009). One initiative that plays an important role in reducing exhaust gases and pollution is the shared usage of cars (c.f. Hamari et al., 2016; Pizzol et al., 2017). Private car sharing represents a more sustainable alternative as the majority of private vehicles are not used to their full capacity. Data in 2014 show that the average parking time per day was 22 hours (see survey results in six European countries, Pasaoglu et al., 2014) and in 2018, people spent on average around an hour a day traveling in Great Britain, including only 36 minutes by car (as a driver or passenger) (Department for Transport, 2019). This constitutes a resource saving potential that could be exploited through higher adoption rates of car sharing.

Private car sharing can be organized via sharing communities, whereby a group of people share access to a car, which is owned by the community. This is illustrated by the vignette at the beginning of the article, which portrays a “sharing community” for cars. Relating to the definition of a community-based economy as part of the sharing economy by Acquier et al. (2017), we define a car sharing community as a group of people whose members grant each other access to underutilized cars, whereby all community members are responsible for organization and maintenance of the shared...
car and thus, have to contribute physical and financial resources to ensure the maintenance of the shared car.

Sharing a car within a community allows private individuals to benefit from having a car without the same costs and responsibilities of individual car ownership. However, sharing a car within a community results in the challenge of shared contributions and shared requests and thus, constitutes a social dilemma: First, all group members should contribute to the shared car, for instance, by paying into a fund for maintenance or by washing the car, as well as keeping it clean or refueled so the next driver can use it. Financial contributions might be organized via an informal membership fee or on a voluntary basis, but most of the time, the members decide alone and without constraints about their actual contribution to the shared car. For the whole community it would be best if all members contribute a certain share consistently and in equal measure in order to be able to provide the service. However, some members of the sharing group might take advantage of it by contributing less than required, e.g., by not refueling the car.

Second, the group members cannot decide when to use the car independently of each other. In car sharing communities, a certain number of people share access to the same car, thus, they have to coordinate the usage of this car. Sharing a car within a community is only sustainable if all group members contribute enough to ensure the maintenance of the car and the sum of all members' requests of using the car do not exceed a certain limit. Thus, sharing a car within a community represents a social dilemma. According to Dawes (1980), a social dilemma is defined as a situation in which a person profits from selfish behavior (e.g., by not contributing to a shared good), unless too many people in the community decide to behave selfishly, in which case the whole community loses (e.g., as the shared good can no longer be provided). In case of community car sharing, contributing to the shared car (e.g., maintenance) is costly to the individual, but helps all drivers (e.g., Cubitt et al., 2011) and ensures sustainable consumption of the good. If too many drivers decide to defect and free ride, the shared car can no longer be provided, and therefore everyone in the car sharing community is worse off.

Drawing on the discussion above, the question arises as to how car sharing within a community should be organized to guarantee that everyone is contributing enough to the shared car so that the car sharing community represents a sustainable traffic solution. The main objective of the current article is thus to investigate the social dilemma of car sharing, building on psychological research that has identified power (e.g., sanctions for misbehavior) and trust (e.g., badge system) as drivers of contribution. Although previous research has contributed to deepening the knowledge of trust in the sharing economy (e.g., Celata et al., 2017; Cheng et al., 2020; Ert et al., 2016; Ooi et al., 2003), most of the existing research has examined B2C or P2P (i.e., consumers lend out their cars to each other via a mediating platform) sharing models, not differentiating between different forms of power and trust. In their comparison of the perception of B2C and community sharing models, Hofmann et al. (2017) argue that in cases when communities do not wield any type of power and, additionally, consumers hold very low trust, the communities will quickly collapse because no force is present to hold the community together. We apply the social dilemma theory (Dawes, 1980; Kollock, 1998; Zeng & Chen, 2003) to study the impact of power and trust on community car sharing and aim to investigate power and trust as key mechanisms to foster contribution to a shared car.

2. Theoretical background
In the following, we describe car sharing and define car sharing communities, before we frame car sharing as a social dilemma and review literature on power and trust as impact factors on cooperative behavior.

The current article builds on the definitions of Nobis (2006) and Katzev (2003) and defines car sharing as a service that enables a group of people to share access to a car with others. Car sharing represents a very successful business idea: Related to the growing sharing economy (e.g., Cheng et al., 2020), car sharing has gained considerable popularity in North America and Europe over the past decades. In 2010, car sharing services were offered on five continents (Asia, Australia, Europe, North America, and South America) (Shaheen & Cohen, 2013). The most prominent examples of car sharing are world-wide companies offering car sharing services, like zipcar (Duncan, 2011; Sundararajan, 2013), DriveNow (Kopp et al., 2015; Miramontes et al., 2017), or car2go (Namazu et al., 2018). Such car sharing providers enable consumers to access a vehicle for short-term daily use (Shaheen et al., 2012), whereby the cars are owned by the company (business-to-consumer (B2C); Cohen & Kietzmann, 2014; Lamberton & Rose, 2012). However, the potential to solve the problem of an overcrowded city is limited, as additional cars from different car sharing companies may not reduce the usage of cars at all. The current research thus focuses on car sharing communities in contrast to previous research on B2C car sharing offers. We define car sharing communities as a community that shares the following characteristics: (1) members of a community have access to a commonly shared car for their own use; (2) members contribute to the community car with financial or physical resources; (3) members request the usage of the shared car; and (4) use the car for a limited time period (c.f. Hofmann et al., 2017). Excluded from the definition is the shared use of vehicles in arrangements such as carpooling, ridesharing services (Shoshany Tavory et al., 2020), or taxi services like Uber (Ravenelle, 2017), as the relationship with fellow drivers in car sharing services differs distinctly from those in ridesharing services. In contrast to those services, car sharing drivers have to behave decently when driving the car themselves and contribute to the car’s maintenance.

2.1. Car sharing as a social dilemma
Participating in a car sharing community can be conceptualized as a social dilemma (c.f. Dawes, 1980). The community
shares a resource, i.e., a car, and the members need to contribute to the shared car (e.g., pay a monthly fee or refuel the car) so that the community can maintain the resource. From a social dilemma perspective, rational individualistic interests collide here with collective interests: While each member would be better off contributing as little as possible and using the car as much as possible, it is in the collective interest of the group that each member pays a fair share and uses the resource fairly (Hofmann et al., 2019).

Some research on social dilemmas distinguishes between give-some (GS) dilemmas and take-some (TS) dilemmas, as well as the hybrid of both dilemmas, the give-or-take-some (GOTS) dilemma (Budescu & McCarter, 2012). In GS dilemmas, people decide whether they withhold resources for private use or give resources to contribute to a shared good. In contrast, TS dilemmas capture consumption from a shared resource (Van Dijk & Wilke, 2000): People can decide how much they consume a shared resource and thus, whether they refrain from overconsuming or not. Car sharing can be described as a GOTS dilemma, as members of a sharing community on the one hand decide how much they are willing to give, i.e., contribute, to maintain the shared car and on the other hand, how much they want to take, and thus, consume the car.

Not every member of the car sharing community sticks to the rules and brings the car back in good condition and at the agreed time. They exploit the community by overusing the good or by preventing further usage by other members, request a car more than they contribute and thus, freeride in the social dilemma (c.f. Marwell & Ames, 1981). Research on social dilemma has identified both power mechanisms, in terms of sanctioning and control, and trust as drivers of contributing to a shared good (c.f. Bijlsma-Frankema & Costa, 2005; Mulder et al., 2006). Likewise, in the sharing economy, power measures are discussed to ensure appropriate conduct and contribution (Hofmann et al., 2017; Jiang & Tian, 2015; Schor & Fritzmaurice, 2015), supplementing trust (Belk, 2014b; Ert et al., 2016; Ert & Fleischer, 2019).

### 2.2. Power

The execution of power, especially in terms of sanctions, has received much attention across disciplines (e.g., Fehr & Fischbacher, 2004; Gurerk et al., 2006). Power is defined as the potential and perceived ability of a party to influence another party’s behavior (c.f. French & Raven, 1959; Gangl et al., 2015). Netter et al. (2019) stress that monitoring and sanctions represent core organizational characteristics of sharing models and point out that sanctions can be an approach to coercing members to do what they are expected to do. Notably, the influence of power mechanisms is a relatively new topic in the context of car sharing. Research on B2C car sharing as well as research on sharing communities suggest that power can enhance contributions within a car sharing community. A study on B2C car sharing by Bardhi and Eckhardt (2012) revealed that consumers evaluate monitoring positively as they expect others to act opportunistically, e.g., not giving a GPS receiver that they found in the car to the lost and found. Research on community sharing tools (Hartl et al., 2016) and community gardens (Tidball & Krasny, 2007) further underlines the importance of sanctions and control mechanisms to ensure that all sharers follow the rules within the sharing community.

To extend previous research on power and sharing, we adopt the theory of the bases of social power and distinguish between influence through coercion and influence through legitimation, expertise, information allocation and identification processes (c.f. Gangl et al., 2015; Raven, 1993; Raven et al., 1998). Thus, on the one hand, car sharing communities can apply coercive power by announcing sanctions, such as a fine or even exclusion from the sharing community. On the other hand, sharing communities can rely on their expertise and give information on how to behave properly (legitimate power). Both coercive and legitimate power have proven to promote contribution to a public good and reduce exploitation in different contexts (e.g., Hartl et al., 2015). Based on the above theoretical background, the current article tests the following hypotheses:

**H1a:** Regulating car sharing using coercive power enhances cooperation (i.e., contribution and request) within a car-sharing community.

**H1b:** Regulating car sharing using legitimate power enhances cooperation (i.e., contribution and request) within a car-sharing community.

### 2.3. Trust

Trust plays a key role in social interactions. To trust someone is widely defined as being “vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor” (Mayer et al., 1995, p. 712). Accordingly, trust has been identified as an important mechanism to resolve social dilemmas (Van Lange et al., 2017), as well as an important concept in research on the sharing economy (Cheng et al., 2020; Hua et al., 2020).

In the current research, we follow the often used distinction between trust based on rational cognitive processes and trust based on automatic-affective processes (c.f. Lewis & Weigert, 1985; McAllister, 1995; Tyler, 2003) by drawing on the conceptualization of trust by Castelfranchi and Falcone (2010), differentiating between reason-based trust and implicit trust. Reason-based trust is based on rational considerations according to the following criteria: shared goals, dependency, internal factors, and external factors (Castelfranchi & Falcone, 2010). Thus, members of a car sharing community trust the community if they have the feeling that they pursue the same goal, e.g., ensuring sustainable transportation. Further, they trust if they depend on the community or perceive the others as competent, willing and harmless (internal factors). Moreover, external factors, such as other institutions that provide the sharing community with the opportunity to fulfill its goals (e.g., the legal possibility to buy a community car), lead to trust.
Implicit trust, on the other hand, is defined as an unintentional, automatic reaction originating from associative and conditioned learning processes (Castelfranchi & Falcone, 2010). Implicit trust might be activated by cues, e.g., such as trusting the tax authority as it represents an official institution (c.f. Gangl et al., 2015). Both reason-based and implicit trust are important in the context of sharing: If members of a sharing community do not trust others to contribute their share, they might reduce their own contributions to the group to avoid playing the “sucker” (Kerr, 1983), i.e., carrying free riders. On the other hand, the more members of a sharing community trust the community to contribute fairly, the more they are willing to contribute themselves.

H2a: Trust in the community shapes cooperation (i.e., contribution and request) within a car-sharing community additionally to the application of power.

When organizing car sharing, communities might establish cues that enhance trust. In the current research, we argue that presenting badges that symbolize that members behaved cooperatively in the past can act as a cue to initiate implicit trust, following Ert and Fleischer (2020, p. 630) who describe the “Airbnb certification system (the “Superhost” badge) as yet another important trust cue in the market”. Building on literature on cues (Riegelsberger, 2003; Tanner & Maeng, 2012), labels (Atkinson & Rosenthal, 2014; Tonkin et al., 2016), and awards as signals of otherwise unobservable individual characteristics (Frey & Neckermann, 2010), we argue that badges, which are presented to make past desired behavior visible, act as a cue to trust the person, i.e., one can expect the person to contribute in the future. The current research focuses on badge systems because they are well known measures applied to encourage desirable behavior (i.e., contribution to a shared good) among users of P2P platforms (Teubner et al., 2017). For instance, AirBnB awards hosts with a “superhosts” badge if they meet particular benchmarks specified by the platform (i.e., high response rate, consistent 5-star evaluations, a certain number of bookings per year, and rarely canceled confirmed reservations) (Hamari, 2017; Teubner et al., 2017). Badge systems can be easily implemented in car sharing communities as well, e.g., by placing a badge next to the name on a newsletter, signing list, or other form of listing of the community’s members. Notably, as sharing communities differ from P2P sharing in important characteristics, e.g., as members of a sharing community are all providers and users of the shared good at the same time, badge systems might affect cooperation differently. Therefore, the effect of a badge system in a sharing community is particularly examined in the present study.

H2b: The application of badge systems enhance contribution to a shared car.

2.4. Overview of studies

In the following, we present two laboratory experiments to test the stated hypotheses on the impact of power and trust. Experiments represent an ideal method for studying social dilemmas (c.f. Van Lange et al., 2013) and have already been successfully applied to study drivers’ behavior (Fujii, 2010; Suntitayos et al., 2011). The following experiments were designed in a way that they allow us to specifically analyze the situation of sharing a car within a community: Within a car sharing community, drivers have to decide how much they want to give, i.e., contribution to the shared car, and how much they want to take, i.e., requested hours of using the shared car. For this purpose, we adapted a give-or-take-some game (GOTS-game) in Study 1 (Budescu & McCarter, 2012; McCarter et al., 2011): In a GOTS game, a group of participants decide in a first stage, individually, how much they would want to contribute to a shared pool (“give-some”) and in a second stage, how much they would want to request from the shared pool (“take-some”). In Study 1, participants were invited to a laboratory, were randomly assigned to groups of car sharers and individually decided via computer how much they wanted to contribute to the shared car and for how many hours they would request it. By applying a GOTS game Study 1 meets the call for more empirical research examining hybrid social dilemmas between take-some and give-some dilemmas (Budescu & McCarter, 2012; McCarter et al., 2011).

Study 2 builds on the results of Study 1 and focuses primarily on the impact of a badge system on the contribution to a shared car. Therefore, the study focuses only on the “give-some” stage and follows a public good game (Fischbacher et al., 2001). In this game, a group of participants decide how much from their endowment they want to contribute to a public good. Thus, in Study 2 participants were invited to the laboratory and individually decided how much they wanted to contribute to a shared car via a computer screen.

Both studies extend previous research in several ways: First, since the sharing economy is a relatively new phenomenon with an enormous potential, there is a strong need to investigate advantages and disadvantages of the sharing economy. The current research addresses this research gap by investigating the problem of contribution to a shared good, focusing on power and trust in the sharing economy. In order to gain new insights into the sharing economy, the current research draws on empirical evidence from the social dilemma theory.

Second, the current research demonstrates the use of a laboratory experiment for investigating the dilemma of contributions to a shared car. A fictitious car sharing community is used in the experiment. Notably, in the current studies participants were remunerated according to their decision in the experiment; thus, their behavior in the experiment, i.e., how much they contributed to the shared car and how much they requested to use the shared car, had an impact on their financial outcome.

Finally, the current studies contribute to research on trust in car sharing by investigating the effect of a trust measure, i.e., a badge system on contribution to a shared community car. Although sharing platforms often install badge systems in addition to review systems, social science research has focused primarily on the latter (e.g., Ert et al., 2016) and has
not examined the effect of badge systems on behavior within sharing communities.

### 2.4.1. Ethic statement

All studies reported here were conducted in respect to the Declaration of Helsinki (revised 1983) and local guidelines of the Faculty of Psychology, University of Vienna. The studies are part of a project proposal approved by two international scientific peer-reviewers from the field for the Austrian Science Fund (FWF; Grant number P29693-G29). Both reviewers stated that the project does not give rise to any ethical issues. According to the Austrian Universities Act 2002 (UG2002), only medical universities are required to appoint ethics committees if undertaking medical research. Therefore, no ethical approval from another ethics committee was required for the present studies. For the current studies, the majority of participants are part of a research subject pool and recruited via an online data bank of the Department of Applied Psychology, for which they had to provide their written consent to be contacted for participating in research studies. All participants were invited to the laboratory of the Faculty and gave their verbal consent to participate in the study. Information about the duration, the tasks, the payment, and the confidentiality was provided to participants prior to the study. All participants voluntarily took part in the studies and could withdraw at any time with no consequences. The data was collected anonymously and no harming procedures were used.

### 3. Study 1

#### 3.1. Method

**3.1.1. Participants**

Participants were recruited on a voluntary basis through leaflets as well as word of mouth. A total of 183 individuals (71.6% women; \( M_{\text{age}} = 25.56, SD_{\text{age}} = 6.32 \)) participated. Of these, the majority of participants (82.5%) reported earnings of less than 1,000 Euro per month, and about a third of the participants had a university degree (36.1%), whereas 61.7% had a high school degree, and 2.1% had other degrees. Forty-three percent of the participants reported having experience with the sharing economy.

**3.1.2. Experimental design and procedure**

In order to test the hypotheses regarding whether power impacts contribution to car sharing, an experiment was built on a GOTS-game (McCarter et al., 2011) in which participants paid for a shared car (Give-Some) that could be consumed in a second step, according to registered requests of car usage (hours of car use) (Take-Some). The hours of car usage depended on the sum of contributions from all members of the car sharing community. If the contributions are enough to meet the requests, a common bonus is provided (McCarter et al., 2011).

In the experiment, the described power of the community organizing the shared car varied, resulting in a 2 (low vs. high coercive power) x 2 (low vs. high legitimate power) between subjects design, conducted with the software z-tree (Fischbacher, 2007). The rules presented clearly how contributions (Give-Some) and requests (Take-Some) work in the community and what the consequences of exploitation are. In a laboratory experiment, over ten rounds, they contributed to a fictitious, shared car and were then able to use this fictitious, shared car.

**3.1.2.1. Procedure.** The graphical display of the procedure can be found in Figure 1. All participants were asked to imagine living in a building with up to 20 flats, whereby the other participants represent residents from the other flats. They were informed that at a meeting, all residents decided to buy several community cars for the house community, which would be financed jointly and available for use for all residents. Weekly payments would cover the repayment of acquisition costs, insurance costs and necessary repairs. Everyone can use the community cars, but everyone is also responsible for maintenance. The service is organized weekly; the car is available from Monday to Thursday.
Everyone can only book one community car. This community car is shared every week anonymously with three other, randomly selected members of the house community.

After this introduction to the experiment (see Figure 1), participants received one of four versions of the following vignette (combining low and high coercive power and low and high legitimate power):

The rules for the usage of the car were developed and set up by a small part/all of the residents. In a community meeting it was decided that the observance of the rules of use in the community are rarely/frequently monitored. The community meets rarely/frequently to discuss emerging issues and problems. Persons who do not follow or violate the rules of use will be leniently/severely punished by the community. The community has obviously thought very little/carefully about how the usage of the community cars can function optimally. If users violate the rules for the eleventh time, they do not even/in any case have to expect to be excluded by the community. The community designs the use in a way that the residents hardly/ completely feel that they belong to the house community. Whether the rules of use for the community cars are respected is seldom/frequently checked.

In order to ensure that participants understood the rules of the experiment, we included a pay-off calculation example in the instruction (see Figure 1). Participants had to answer questions according to the example and to calculate the overall gain in the particular situation. Participants than contributed in ten rounds to a fictitious, shared car (“Please enter how much you pay for the use of the community car this round”), received the information of the sum of all contributions and were then able to make an request for using the shared car (“Please enter how many hours you want to use the community car or reserve it for yourself”). All participants took actions privately, anonymously and without communicating with the other participants. If the sum of the four requests from the shared car did not exceed the sum of all four contributions to the shared car, then the participants received what they had requested and additionally also a bonus of 75% of the sum of the contributions. If the request of all four participants was higher than the sum of the contributions, then the participants did not receive their request or a bonus and what they had contributed was lost for the participants.

After the experimental part, participants had to fill in a questionnaire. As a manipulation check, we asked about participants’ perceptions of the community’s coercive power (four items; e.g., “The community enforces its claims using controls and punishment”) and legitimate power (22 items; e.g., “The community is valued by the members for their work”).

Further, we measured participants’ implicit trust (e.g., “I trust the community in most cases automatically”) and reason based trust (e.g., “I trust the community because their goals seem plausible to me”) in the community to examine interaction climate (e.g., “The climate within the community is characterized by mutual trust”). The perception of power, as well as trust was assessed using scales from Hofmann et al. (2017).

In addition, we measured several control variables: Participants answered scales on environmental consciousness (10 items; e.g., “I always advise others to keep the environment clean”) and green consumerism (12 items; e.g., “I drive my car within speed limits to rationalize petrol consumption.”, Alsmadi, 2007), risk-seeking (6 items; e.g., “I enjoy being reckless,” Colquitt et al., 2006), trustfulness (4 items; e.g., “I trust in what people say.”, adapted from Cattell, 2001), and affiliation (9 items; “Just being around others and finding out about them is one of the most interesting things I can think of doing,” Hill, 1987).

All responses were indicated on a seven-point Likert scale ranging from 1 (‘I totally disagree’) to 7 (‘I totally agree’). Cronbach’s α of all scales were satisfying (α ranging between .79 and .94).

The experiment lasted on average 45 minutes and, at the end of the experiment, participants were remunerated based on their behavior (participants received on average 6.03 EUR (SD = 3.77) or 6.64 USD (SD = 4.15), respectively). The participants’ payoffs in the experiment were calculated on the basis of the contributions and requests, and the points earned in a randomly chosen round were converted to Euros.

3.2. Results

3.2.1. Preliminary data analyses

To check whether the manipulation of intensity of coercive power and legitimate power was successful, a MANOVA was performed. The results showed that the manipulation was successful as low (cplow) and high (cphigh) levels of coercive power (p < .001, ηp² = .27; cplow: M = 2.12, SD = 1.22; cphigh: M = 3.90, SD = 1.76) and low (lp low) and high (lp high) levels of legitimate power were in line with the manipulation (p = .001, ηp² = .06; lp low: M = 3.80, SD = 1.19; lp high: M = 4.41, SD = 1.18). The manipulation of coercive power had no significant effect on the perception of legitimate power (p = .16) and the manipulation of legitimate power had no significant effect on the perception of coercive power (p = .16).

3.2.2. Contribution. To test whether coercive and legitimate power (H 1) as well as trust (H 2a) impacts contribution to the shared car, a repeated measure regression is conducted

| Table 1. Summary of regression analyses predicting contribution and request within a car sharing community. | Contribution | Request |
|---|---|---|
| predictors | β | p | β | p |
| Legitimate power | .05 | .359 | .014 | .775 |
| Coercive power | .16 | .004 | - .035 | .462 |
| LPxCp | -.13 | .013 | .010 | .842 |
| Implicit trust | -.01 | .810 | -.090 | .086 |
| Reason-based trust | .00 | .946 | -.046 | .384 |
| Control variables | Environmental Consciousness | -.28 | <.001 | .053 | .504 |
| Green consumerism | -.13 | .043 | -.019 | .760 |
| Risk seeking | -.04 | .503 | .047 | .356 |
| Trustfulness | .11 | .039 | .071 | .272 |
| Affiliation | .02 | .788 | -.054 | .312 |
| Experience | -.01 | .628 | -.043 | .343 |
Figure 2. Study 1: Contribution (in percentage of the endowment) for the four conditions over the ten rounds. Note. CP = coercive power; LP = legitimate power.

Figure 3. Study 1: Requests (in percentage of the shared pool) for the four conditions over the ten rounds. Note. CP = coercive power; LP = legitimate power.
using STATA with the manipulation of power as a predictor variable and ten rounds of contribution as the dependent variable, additionally controlling for reported trust, values, environmental consciousness, risk seeking, and collaborative consumption experience, \( F(11, 182) = 6.08, p < .001 \), \( R^2 = .14 \) (see Table 1).

The analysis reveals a significant main effect of coercive power, \( \beta = .16, t(182) = 2.93, p = .004 \), and a significant interaction effect of coercive and legitimate power, \( \beta = -.13, t(182) = -2.51, p = .013 \), but no significant main effect of legitimate power (\( p = .359 \)). The results show that low coercive and low legitimate power resulted in the lowest level of contribution (see Figure 2). Concerning trust, the analysis revealed that neither reported reason-based trust nor reported implicit trust are related to the contributions (\( p > .576 \)).

3.2.3. Requests. To test whether the manipulation of coercive and legitimate power and trust are related to the requests for using the shared car, again, a repeated measure regression was conducted using STATA, \( F(11, 182) = 0.56, p = .856 \), \( R^2 = .01 \). The analysis reveals no significant main effect of coercive power (\( p = .462 \)) or legitimate power (\( p = .775 \)) and no significant interaction effect (\( p = .842 \)). The analysis reveals a tendency of implicit trust, \( \beta = .08, t(182) = 1.73, p = .086 \). Figure 3 shows that over the ten rounds, participants in every condition requested around 25 percent of the available hours of the shared car.

Study 1 shows that the manipulation of a car sharing community organization as wielding coercive and legitimate power impacts contributions to the shared car. Requests were not affected by power, but the results show a tendency for implicit trust to be related to the requests. Building on the results of Study 1, Study 2 aims to further develop the relationship between power and trust in car sharing by providing information in the public goods game similar to a badge system on sharing platforms and, thus, further examine the impact of power and trust on contribution to a shared car.

4. Study 2

4.1. Method

4.1.1. Participants

Participants were recruited on a voluntary basis through leaflets as well as word of mouth. A total of 246 individuals (61.8% women; \( M_{\text{age}} = 24.73, SD_{\text{age}} = 5.96 \)) participated. Of these, the majority of participants were employed (59.8%), with 82.6% reporting earnings of less than 1,000 Euro per month. About a third of the participants had a university degree (27.6%) and 69.5% had a high school degree. Half of the participants (51.2%) reported having experience with the sharing economy.

4.1.2. Experimental design and procedure

Again, participants took part in a laboratory experiment and contributed to a fictitious, shared car over eleven rounds (the first round was a training round and not part of the analysis). The base of Study 2 was built on a public good game, which is a classic laboratory paradigm for studying collective action problems (e.g., Rand et al., 2009). For an overview of the experimental procedure see Figure 4.

In the experiment, the actual amount of contributions were doubled and benefits were returned to all participants equally. Again, coercive and legitimate power of the
organizing community varied. Additionally, a badge system was implemented for half of the participants, resulting in a 2 (low vs. high coercive power) x 2 (low vs. high legitimate power) x 2 (badge system vs. no badge system) design. In the "badge system" condition, participants received information about the group members they would share a car with in this round. The information was based on group members' contribution in the last round. Please note that they received past information on group members that they had probably not interacted with in the previous round. Thus, before the next round started, participants received information on which of the others had contributed more than 50% of their endowment in the last round. The information was given by placing a star next to the number of the participant.

The experiment was conducted via z-tree (Fischbacher, 2007). This time, participants did not receive a calculation example, but an additional first round was introduced in order to ensure the understanding of the experiment. This additional round was not taken into consideration for data analysis. Altogether, the participants played eleven rounds. All participants took actions privately, anonymously and without communicating with the other participants. The experiment lasted on average 40 minutes and at the end of the experiment participants were remunerated based on their behavior (participants received on average 9.46 EUR (SD = 1.86)).

4.2. Results

4.2.1. Preliminary data analyses
Again, to check whether the manipulation of intensity of coercive power and legitimate power was successful, a MANOVA was performed. The results showed that the manipulation was successful as low (cplow) and high (cphigh) levels of coercive power (p < .001, \( \eta_p^2 = .29 \); cphigh: M = 1.98, SD = 1.19; cp low: M = 3.88, SD = 1.76) and low (lplow) and high (lphigh) levels of legitimate power were in line with the manipulation (p < .001, \( \eta_p^2 = .17 \); lphigh: M = 3.44, SD = 1.13; lplow: M = 4.43, SD = 1.04). The manipulation of coercive power had no significant effect on the perception of legitimate power (p = .91) and the manipulation of legitimate power had no significant effect on the perception of coercive power (p = .41).

4.2.2. Contribution
To test whether coercive and legitimate power and the badge system impact contributions, a repeated measure regression was conducted using STATA, with the manipulation of coercive power, legitimate power and badge system as predictor variables and ten rounds of contribution as the dependent variable, additionally controlling for trust, values, environmental consciousness, risk seeking and collaborative consumption experience, F(15, 245) = 4.19, p < .001, \( R^2 = .10 \) (see Table 2).

The analysis reveals a significant main effect of coercive power, \( \beta = .09, t(245) = 2.15, p = .032 \) and significant three-way interaction effect of the badge system, coercive and legitimate power, \( \beta = -.13, t(245) = -2.94, p = .004 \), but no significant main effect of legitimate power (p = .398), of the badge system (p = .453) or other significant interactions (p’s > .367). The three-way interaction effect of the badge system, coercive and legitimate power can be interpreted as follows: The means of contribution over all rounds reveal that when a badge system is not present, the combination of high coercive and high legitimate power results in the highest level of contributions. Thus, the higher the coercive power and at the same time the higher the legitimate power that is wielded, the more participants contributed to the shared car. In case a badge system is present, it is not necessarily the combination of high coercive and high legitimate power that results in the highest level of contribution: Participants contribute more if either coercive or legitimate power is high.

Thus, the badge system shaped the effect of power on contributions (see Figure 5).

Study 2 confirms the result of Study 1 showing that applying power impacts contribution to a shared car. Further, results show that the presence of a badge system shapes the impact of coercive and legitimate power. In the "badge system"-condition in Study 2, the information about participants’ past contribution was displayed in terms of the presence or absence of a "badge", i.e., a star next to the participation number. In a public good game, in which individuals are only able to vary their amount of contribution, but not their requests, a badge system displays whether one behaves in favor of the community.

5. Discussion

New concepts of sharing are on the rise, triggered by the economic crises and increased environmental awareness and facilitated by a number of developments, which simplified sharing of goods with others (Hamari et al., 2016; Hua et al., 2020; Sundararajan, 2013; Tussyadiah & Pesonen, 2016). The current study addresses the issue of cooperation within car sharing communities, which have recently gained popularity (e.g., 20Minuten, 2016; Hamburger Abendblatt, 2019; Pomali, 2020).

The fact that some members within the community might not cooperate is an important issue for car sharing communities. Whether drivers benefit from sharing a car depends on the proper behavior of all users of the shared car, and thus, introduces a social dilemma (Budescu & McCarter, 2012). We apply the classical approach of the social dilemma theory to investigate the phenomenon of car sharing within a community. Two laboratory experiments showed that organizing car sharing using coercive or legitimate power mechanisms has an effect on the contribution to a shared car. This result is in line with previous research showing that sanctions were enforced on misbehavior, e.g., in free-floating bike sharing (Ma et al., 2018), and supports the assumption that monitoring and control mechanisms are important organizational characteristics of sharing models (Netter et al., 2019).
Further, Study 1 contributed to a better understanding of the dynamic of giving and taking by showing that the requests to use the car are not influenced by the experimental manipulation in contrast to the contributions. Participants in every condition requested around 25 percent of the shared pool, which may indicate that when it comes to actually dividing the shared resource participants act according to the equality principle. The equality principle (Jap, 2001) specifies that each party receives an equal share of the payoffs independently of the contribution (i.e., every user of the shared car can use the car for the same amount of hours independent of her/his contribution), compared to the equity principle, which states that the payoff of the members should be related to their contribution.

As badge systems are used in sharing activities as trust cues (Ert & Fleischer, 2020), Study 2 additionally investigated the impact of badge systems on car sharing. The results show that if sharing economy activities are organized using different power mechanisms, a badge system informing about past behavior shapes the effect of power mechanisms on contributions. Although similar badge systems informing about past behavior have already been implemented in P2P platforms, the results are of particular important as characteristics of sharing communities differ from P2P platforms: Sometimes it is easier within a community to identify how much an individual has contributed to the shared car (e.g., in the case of monetary payment to the community budget) and sometimes it is harder to trace the

Figure 5. (a) Study 2: Contribution (in percentage of the endowment) for the four conditions in the reputation condition over the ten rounds. (b) Study 2: Contribution (in percentage of the endowment) for the four conditions in the no-reputation condition over the ten rounds.

Note. CP = coercive power; LP = legitimate power.
contributions back to individual members of the group (e.g., in the case of car maintenance, such as washing a car). Moreover, on a P2P platform, people can choose from different private car providers and may use a badge system to decide which provider to trust. In car sharing communities, members cannot choose between different providers of cars. A badge system in car sharing communities therefore does not help to identify a transaction partner, but members might base their decision on how much to contribute to the shared car on this information.

5.1. Theoretical implications

To the authors’ knowledge, the problem of joint contributions and the application of power in car sharing communities have not been explored much in experiments. However, precious research has demonstrated that laboratory experiments provide valuable insights into traveler’s behavior (Sunitiyoso et al., 2011). The current studies support this research by underlining that evidence and methods from social dilemma research can serve as a base for research on the sharing economy using economic experiments, future research should continue to actively apply social dilemma insights to understand how the organization of groups can impact contributions in consumer decisions.

In the current research, we discuss a badge system as a cue for trust, building on past research on labels and certifications (Atkinson & Rosenthal, 2014; Frey & Neckermann, 2010; Riegelberger, 2003; Tanner & Maeng, 2012; Tonkin et al., 2016). In Study 2, participants received information on whether the other community members earned a badge before they made their decision on how much they wanted to contribute. The information was anonymous; thus, the participants only knew that they would be sharing the car with three other members and received information on how many of those had earned a badge. A badge system may shape contribution to a shared good in several ways: First, one gets information about the behavior of others and if they contributed much in the past, the risk of engaging in car sharing together with the other group members is lower (c.f. Sell & Wilson, 1991). Second, Hamari (2017) argues that badges function as a guidance mechanic, providing an idea of what is expected from the group members. This is of particular relevance when deciding on the criteria of a badge system. If members are rewarded, e.g., for washing the shared car, this signals to other members that washing the car very often is a desirable behavior, which might even have a negative ecological impact. Thus, car sharing communities should be well aware of what kind of behavior they expect from their members and what kind of rules they want to establish for the badge system. Similar to reputation systems, badge systems may also be used to serve as sanctioning system (Jøsang et al., 2007): If a badge is presented visibly, e.g., next to the name of a member on a list, it can certainly act as a reward (in the case of being present) or sanction (in the case of not being present). Thus, badges might increase contribution as they make one’s own past behavior visible to the other group members. Thus, by introducing a badge system, members of the community become aware that their contributions can be traced back and might contribute more in the future to avoid negative consequences, e.g., a bad image or a financial loss. Although previous research underlines the motivational effects of badge systems (e.g., Saxton, 2015; Wallis & Martinez, 2013), a badge system might be attractive for some people, but others may be reluctant to join as they are afraid of being publicly marked as a free-rider. These possible effects of badge systems are certainly an important point to be considered for further research.

5.2. Practical implications

Car sharing communities need to carefully consider how to organize the sharing process so that the community can be sustained. How to enhance contributions to the shared car is certainly an important challenge. The current research reveals that coercive and legitimate power are relevant mechanisms that can enhance contributions. Most interestingly, the results show that when a badge system is not present, the combination of high coercive and high legitimate power results in the highest level of contributions. When a badge system is present, either high coercive or high legitimate power results in high levels of contributions. This suggests that if car-sharing communities decide to refrain from implementing a badge system, they need to invest in both coercive and legitimate power, as only the combination of both enhances contributions. If car-sharing communities on the other hand decide to establish a badge system, they can focus on one form of power, either coercive or legitimate power, as contributions are high as long as one form of power is wielded properly. Communities have to establish rules either based on coercive or legitimate power. Those rules can be communicated in community statutes, or via personal communication in meetings. Newsletters or information available directly in the car (flyer) can be used to remind the community members about the power mechanisms to enhance cooperation.

Table 2. Summary of regression analyses predicting contribution within a car sharing community.

| Predictor variables                          | Contribution | β   | p     |
|---------------------------------------------|--------------|-----|-------|
| Legitimate power                            |              | .04 | .398  |
| Coercive power                              |              | .09 | .032  |
| Reputation system                           |              | .03 | .453  |
| LPxCP                                       |              | -.01| .846  |
| LPxReputation system                        |              | .04 | .367  |
| CPxReputation system                        |              | -.00| .992  |
| LPxCPxReputation system                     |              | -.13| .004  |
| Implicit trust                              |              | .07 | .144  |
| Reason based trust                          |              | .02 | .718  |
| Control variables                           |              |     |       |
| Environmental consciousness                 |              | .02 | .791  |
| Green consumerism                           |              | .02 | .765  |
| Risk seeking                                |              | -.16| <.001 |
| Trustfulness                                |              | .11 | .031  |
| Affiliation                                 |              | .10 | .050  |
| Experience                                  |              | -.05| .287  |
Car sharing communities can further use the badge system to provide anonymous information about past behavior. Badge systems may be a helpful tool in sharing activities, in which no information on the past behavior of the other members is otherwise available, especially when it comes to low connectivity within the group of users of a shared car or individuals engaging in car sharing for the first time. However, as pointed out earlier, badge systems can be used as a cue for trust, if the focus lies on informing a member of the past behavior of others, but they may also function as a sanctioning mechanism, if it is used to publicly honor or dishonor individual members. Whether the badge is displayed anonymously or can be related back to the individual might be crucial. Car sharing communities thus need to carefully consider the use of badge systems.

5.3. Limitations

Although the current studies certainly have their merits, we have identified limitations, too. A limitation of the current research is the generalizability of the results, which is grounded in the choice of method. The findings are based on experiments that – as is the nature of experiments – do not assess legit behavior in the field. Experiments address the issue of internal validity, but examining the research question in a laboratory experiment limits the generalizability of our results. The sample used in the laboratory experiment consisted of young and well-educated individuals, as previous research identified this group as the main customers of sharing economy services (PricewaterhouseCoopers, 2015). However, previous research has mainly focused on users of P2P sharing platforms and thus, knowledge on participants’ characteristics of sharing communities is still lacking (e.g., income). In contrast to community gardens (e.g., Armstrong, 2000; Corrigan, 2011; Glover, 2004; Twiss et al., 2003), car sharing communities are poorly researched. Although the laboratory experiments in the current studies enable tight control of decision environments and isolation of the causal effect of interest (Falk & Heckman, 2009), the gained insights should be complemented by field experiments to overcome the shortcomings of the method. In order to better represent the reality in the current studies, participants were informed at the beginning of the experiment that their payoff was calculated on the basis of contributions and requests in one of the ten rounds, which was randomly chosen at the end of the experiment. Thus, participants’ knew beforehand that their behavior and the behavior of all other community members had an impact on their remuneration. Although this might affect participants’ behavior in the experiments, this approach was chosen intentionally to better represent the reality as consumers’ payoff in the community depended on their decision as well as the decision of all other members. This should reflect the issue that members of sharing communities face: Their outcome does not only depend on their own contribution, but the contribution and requests of the other community members.

6. Conclusion

The current results hold valuable implications not only for research but are particularly relevant for the constitution of car sharing and other sharing mobility activities in the sharing economy (e.g., carpooling or bike sharing) and the legislature. As more and more sharing economy activities are organized, the question arises as to whether trust as an organizing principle should be relied upon and whether power mechanisms should be used to achieve cooperative participation in a sharing community. Due to its increasing popularity and digitalization, the sharing economy is not a small group phenomenon of close acquaintances anymore and therefore faces the problem of regulation. As our study showed, power and trust in terms of a badge system plays a role in the sharing of cars within a community.

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