Gender Differences in Responsiveness to a Homo Economicus Prime in the Gift-Exchange Game

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Abstract

While situational cues are pervasive in real workplaces, they are usually tightly controlled for in laboratory settings. This discrepancy could explain the recently observed differences in the wage-effort sensitivity between gift exchange experiments in the laboratory and in the field. We test the extent to which exposure to a weak, subtle cue can change individuals' reciprocal inclinations. By using priming techniques from social psychology, we activate the concept of homo economicus and measure its effect on subsequent effort levels. As hypothesized, we find that priming draws behavior in the direction of the prime for the overall sample, that is, subjects make less selfish and more reciprocal choices. Surprisingly, we find that this effect is driven by men only, since males react strongly and in the direction of the prime, whereas the same prime has an opposing and rather weak effect on females' behavior. Data from a follow-up study point to a diverging association with the homo economicus concept as a likely reason for the observed gender differences. This finding is particularly important in the workplace, since any wording in job advertisements or task descriptions could operate as a prime and thus affect male and female behavior differently—in the extreme case, even contrarily.

Keywords: priming, gender difference, gift exchange, experiment, reciprocity

JEL classification: C91, D03, D63, M52

1 Introduction

While numerous laboratory gift exchange experiments (e.g., Fehr et al., 1993; Hannan et al., 2002) prove that agents' efforts clearly increase in response to principals' wage offers, the evidence obtained from field experiments is mixed and inconclusive. While some studies confirm the laboratory findings (e.g., Bellemare & Shearer, 2009), others provide only weak or moderate support for positive reciprocity (e.g., Gneezy & List, 2006; Kube et al., 2012). Obviously, lab and field settings differ in various ways[1]; thus, knowledge about the determinants of reciprocal behavior is still incomplete. We contribute to this research by testing the impact of a weak situational cue on subsequent behavior in a laboratory gift exchange experiment. While close attention is paid in laboratory settings to eliminate any factors that might trigger unintended reactions, situational cues are pervasive in real workplaces and may strongly affect employees' behavior. The presence of environmental factors that are not controlled for in the field might offer an intuitive explanation for why the observed wage-effort sensitivity differs between laboratory and field experiments.

A common approach for exposing subjects experimentally to behavior-relevant cues is the use of *priming* techniques, by which stereotypes, traits, or other action-relevant constructs that unconsciously influence behavior are made salient (see Dolan et al., 2012; Ferguson & Bargh, 2003; and Wheeler & Petty, 2001 for reviews)[2]. We study the effect of a novel instrument, which we call *homo economicus prime.* This prime is subtle (that is, people are not aware of it) and sufficiently unspecific to invite various perceptions, which may range from clearly negative views on selfishness regarding others' and individuals' own behavior to more differentiated—or even sympathizing—perceptions. We implemented the prime through an incentivized laboratory experiment: Before playing a bilateral gift exchange game, participants in the treatment group solved a simple word-search task containing words related to homo economicus, while subjects in the control group played the standard game. We aimed to discover whether such a weak situational cue activates homo economicus by heightening its accessibility, resulting in more selfish choices (i.e., lower effort). However, whether the

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[1] Hennig-Schmidt et al. (2010) suggest that the critical difference lies with information regarding an employer's cost and surplus, which is usually available in the lab, but not in the field. Similarly, Cohn et al. (2013) explain the presence of reciprocity by overpayment in the field, but not in laboratory settings. They find that only workers who felt underpaid at the base wage reciprocated the wage increase, whereas adequately or overpaid workers did not.

[2] Although priming effects are ubiquitous in psychological research and marketing science, economists only recently began to take seriously the idea that the implicit activation of stored knowledge may affect choices and actions (e.g., Al-Ubaydli et al., 2014; Benjamin et al., 2010; Benjamin et al., 2012; Christian & Alm, 2014; Kliger & Gilad, 2012; Matthey, 2010; Posten et al., 2014).

expected effect occurs, and whether the effect is homogenous across all subgroups, remain open empirical questions.

The process of choosing the priming content deserves closer attention, since previous studies (e.g., Drouvelis et al., 2010) were concerned with opposing contents clearly intended to increase individuals' pro-social behavior, and thus to enhance societal welfare. The present study examines whether selfish, own-payoff-maximizing choices are triggered by a subtle homo economicus prime. This question is not only interesting from a methodological point of view but also has potential practical implications. Workplace behavior seems to be particularly prone to (possibly unintentionally placed) situational wording cues related to economic concepts, since these are ubiquitous in job advertisements, task descriptions, and job instructions. There is some evidence from non-incentivized studies that suggests that priming for money and economic concepts negatively affects pro-social behavior. For example, the activation of monetary and economic concepts led to a decreased willingness to volunteer (Pfeffer & DeVoe, 2009). Business-related objects (e.g., briefcases and boardroom tables) increased selfish choices in the ultimatum game, while a backpack triggered the opposite behavior (Kay et al., 2004). Vohs et al. (2006) show through a series of experiments that reminders of money, relative to neutral primes, lead to fewer requests for help, less helpfulness toward others, and an increased preference for working alone.

Although priming effects are initiated relatively automatically, the same prime may have different—and sometimes even opposing—effects on different subgroups, depending on individual characteristics, such as personal associations with a prime or the extent of stored knowledge. Therefore, the present study also tests for differences between male and female behavior in participants' responsiveness to a homo economicus prime. Recent empirical evidence suggests that gender differences in responsiveness to social cues in general, and in the magnitude of prime-to-behavior effects in particular, may exist. For example, the behavior of female participants in economic experiments is—according to one meta-analysis—much more variable and inconsistent across different environments than men's behavior (Croson & Gneezy, 2009)[3], supporting Gilligan's (1982) suggestion that women are more sensitive to their social environment and social cues. However, explicit tests for this are still very rare and have yielded mixed results. One of the first pieces of experimental evidence (Ellingsen et al.,

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[3] Some studies have revealed that women are more reciprocal than men (e.g., Buchan et al., 2008; Croson & Buchan, 1999; Eckel & Grossman, 1996), whereas others did not find any gender difference (Bohnet, 2007; Clark & Sefton, 2001; Cox & Deck, 2006).

2013) was presented in support of the view that women respond more strongly to context than men do. The prime-to-behavior effects reported by Drouvelis et al. (2010) also support the assertion that women are more responsive to primes: Priming participants toward cooperation using a word-search task similar to ours, which included priming words such as teamwork, collaborate, support, and contribute, increased women's—but not men's—giving behavior in a public goods experiment. On the contrary, Rigdon et al. (2009) demonstrated that a weak social cue (three dots arranged as a "v," designed to be a reminder of watchful eyes) increased giving behavior in a dictator game significantly among men but had no effect among women.

In summation, the evidence concerning gender differences with regard to pro-social behavior in priming effects is mixed. For homo economicus cues, no empirical evidence exists at all. Yet, from these incomplete findings, it is conceivable that such gender differences exist, although it is not clear whether women will respond more or less strongly to the experimentally induced cue. Regardless, both male and female employees are exposed to situational cues at the workplace that may influence their choices and behavior in different ways. By analyzing whether the same prime has different effects on the effort levels of men and women, we also contribute to the discussion on the potential causes of gender differences in labor market outcomes.

This experiment sheds light on two questions. First, does exposure to a subtle homo economicus prime affect reciprocal behavior in a standard gift exchange experiment? Second, do men and women react differently to the prime? The data suggest a causal—but only marginal—relationship between priming and effort choices in the overall sample. However, we observe large differences between genders: the prime decreases men's inclination towards reciprocity (behavior with the prime; *assimilation effect*) but does not direct women's behavior in the direction of the prime. In fact, there is evidence suggesting that women even react in opposition to the content of the prime (behavior in the opposite direction of the prime; *contrast effect*). To explain these findings, we conducted a follow-up survey among other participants, which indicated that different associations with the priming stimulus between men and women are a likely explanation for the observed effects: males make significantly more positive associations with homo economicus than females.

This paper extends previous research in at least four ways. First, no other studies have analyzed the impact of a situational cue on behavior in an experimental labor market setting, therefore providing evidence on how a subtle prime affects agents' and principals' behavior in

a gift exchange game. Second, prime-to-behavior effects have previously been reported with regard to pro-social primes; this is the first economic experiment studying the impact of a homo economicus prime intended to increase selfish and decrease reciprocal behavior. Third, we explicitly test for gender differences in the responses to the situational cue. Focusing on a homo economicus prime in a labor market setting is relevant to the extent that gender differences in the workplace can partially be explained by different reactions to situational cues, such as economic environment. Fourth, we extend previous approaches by empirically testing the assertion that differences in behavior are due to diverging associations with the prime.

2 The Experiment

2.1 The gift exchange game

Participants play a standard bilateral one-shot gift exchange game in a labor market context (Fehr et al., 1993; Fehr et al., 1998) with written instructions (Appendix 2) based on those employed by Charness (2004). First, a principal specifies a wage, $w \in \{20, 40, 60, 80, 100\}$. Then, the paired agent chooses an effort level, $e \in [0.1, 0.2, ..., 1.0]$, which goes along with costs, $c(e)$. The effort levels and corresponding costs are shown in Table 1. The combination of wage and effort determines the outcomes for the principal ($\pi = (120 - w) e$) and the agent ($U = w - c(e)$).

Table 1: Effort levels and the cost of effort

e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
$c(e)$	0	1	2	4	6	8	10	12	15	18

Different theories concerning players' preferences suggest different behavioral predictions. Standard game theory predicts that agents will choose the minimum effort level regardless of wage offer. In turn, principals are expected to choose the minimum wage level. However, much literature suggests that people are not purely selfish, but are endowed with social preferences. In laboratory gift exchange experiments, if a substantial fraction of the agents reciprocate generous wages with positive effort choices (e.g., Fehr et al., 1993; Gächter & Fehr, 2002) and principals set non-minimal wages, this is considered to be a highly robust

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finding. This is in line with outcome-based models of social preferences that assume that agents are inequity-averse (e.g., Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000), and with intention-based models of reciprocity (e.g., Dufwenberg & Kirchsteiger, 2004; Falk & Fischbacher, 2006; Rabin, 1993).

2.2 Priming procedure

The priming protocol followed a commonly applied procedure (e.g., Bargh et al., 2001; Drouvelis et al., 2010): participants were asked to solve a word-search task before playing the game. A 12×11 matrix of letters was presented with a list of 13 words. These words were hidden within the puzzle and appeared either in a straight line or diagonally. The instructions informed the participants that they had a total of five minutes to find as many words as they could and that their total earnings from the experiment would not be affected by their performance on this task. The treatment of homo economicus prime was implemented by presenting the participants with a list of treatment-related and neutral words. Since this experiment is novel in its implementation of a homo economicus prime, we first had to evaluate words that people commonly associate with the underlying concept of homo economicus. We did so by running a pre-test among 10 men and 10 women who were not aware of the purpose of the study. Participants were asked to describe homo economicus in their own words. The seven words most frequently used were chosen as priming words and were incorporated in the task: *calculate, money*, *maximize*, *benefit*, *goal-oriented*, *rational*, and *winning*. The neutral words were *plant*, *window*, *hat*, *lamp*, *zebra*, and *carpet*. After the priming stage, participants read the instructions for the gift exchange game. In the control group, participants did not solve a puzzle, but rather read the instructions for the gift exchange game immediately. Indeed, one may argue that the mere fact of having solved a word-search puzzle could trigger behavior. In this case, an alternative control treatment, such as a word-search task containing neutral words only, would have been appropriate. Since this approach obviously has another important drawback—we cannot exclude the possibility that "neutral" words cause unintended behavioral effects as well—we chose the no-priming approach and thus decided in favor of a higher level of control.

2.3 Experimental design and procedures

We implemented three specifics in the experimental setup, all of which were intended to ensure that the participants fully understood the game. In particular, it seems critical that there are no gender differences in understanding the structure of the game or in adequately

reflecting on behavior, as these differences might override the differences in responsiveness to the priming protocol. First, all participants were asked to answer several questions about hypothetical decisions and resultant earnings before the actual game took place in order to acquaint themselves with the payoff mechanism. Second, since choosing to behave like a homo economicus requires individuals to understand the underlying strategy, all participants were asked to provide the game-theoretic solution of the game before actually making decisions. This provides a measure for understanding the game (i.e., equilibrium correctly identified), which we used as an additional control variable. Indeed, as this procedure has some features of a "recommended play" treatment (Oxoby & McLeish, 2004), we realize that average behavior may be directed toward the equilibrium outcome; thus, a larger-than-usual fraction of selfish players might have been observed in our sample. However, none of the design features would have an effect on the difference between primed and non-primed participants, since everything but the priming protocol was kept constant.

Third, all participants play both roles, ensuring that they explicitly thought about their co-players' behavior and putting the participants directly "in the shoes" of a decision-maker for each role. Furthermore, we used the strategy vector method (Selten, 1967) for eliciting agents' choices, which allowed us to observe their behavior over the whole strategy space and to identify distinct player types (Altmann et al., 2008; Fischbacher et al., 2001; Maximiano et al., 2007): selfish and reciprocal. Thus, before the participants learned of their randomly assigned role, they indicated the wage offer they extended in the role of the principal and their contingent effort-based decisions for each possible wage offer in the role of the agent.

The sequence of events is as follows: After the priming task (Appendix 1), which was presented to the treatment group only, the experimental instructions for the treatment and control group were identical. The experiment proceeded with participants answering several test questions. Then, they intuitively provided the game-theoretic solution. Afterwards, participants decided on wage and effort levels. Finally, all participants answered a short questionnaire to gather their socio-demographic characteristics. Those in the priming condition answered additional questions at the end of the questionnaire to control for awareness of the priming manipulation, and hence to control for potential experimenter demand effects (Zizzo, 2010). Participants were asked to evaluate the goal of the study, whether they anticipated any relationship between the word-search task and the experimental

game (and if so, what this relationship might be), and whether they recognized a particular theme in the word-search task[4].

The paper-and-pencil experiment was conducted among 113 undergraduate students (68 females) from November 2011 to January 2012 at a German university. Men and women were randomly allocated to the experimental treatment *homo economicus prime* (*n*=58) and to the control treatment *no prime* (*n*=55). Students participated only once and had neither previous experience in economic experiments nor substantial knowledge of game-theoretic concepts. Each session lasted about 40 minutes, and the average payoff was 7.84 euros. After participants had completed the experiment, sheets were collected, roles were randomly allocated, pairs of players were randomly and anonymously matched, respective payoffs were calculated, and participants were paid and dismissed.

3 Results

To explore whether the homo economicus prime influences behavior independent of subgroups and whether it affects men and women differently, we use two different measures of agents' behavior. First, we derive a continuous measure for agents' reciprocal inclination: running simple OLS regressions for each participant to explain the individual effort level (multiplied by 10 to normalize coefficients) by wages leaves us with a slope coefficient that is interpreted as *degree of reciprocity* (see Maximiano et al., 2007 for the general approach). Consequently, a coefficient of zero indicates a level of zero reciprocity, which (in most cases[5]) is equivalent to selfish behavior. Second, we classify agents' behavior using the sequence of their effort choices. Two discrete types agent strategies are distinguished: selfish behavior (agents choose the minimum effort level regardless of the wage) and reciprocal behavior (agents increase the effort with wages in a monotonic way).

We proceed by first displaying descriptive data on effort choices. Then, we present simple econometric analyses testing for both a priming effect independent of subgroups and for

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[4] Only one subject realized a priming protocol. Although she did not correctly guess the goal of the study, data for this participant were excluded from further analyses.

[5] This is not true for only two participants: one chose an effort level of 0.4 for all wage levels; the other chose an effort level of 1.0 for all wage levels. Obviously, both do not fulfill the definition of selfish behavior, but can be classified as altruistic.

differences in this effect between men and women. Finally, a follow-up study proposes an explanation for the observed gender differences.

3.1 Descriptive statistics

Table 2 displays descriptive statistics for the raw data on effort and for the two reciprocity measures, separated by group and gender. Some behavioral patterns are well known, but others are surprising. In line with the experimental literature, the results point to substantive reciprocal behavior. This is true for the whole sample and each subcategory: first, the average effort level (independent of wages) is clearly above 0.1, the own-payoff-maximizing solution (first row of Table 2); second, the average effort levels increase with wages (rows 2 to 6 of Table 2); third, the degree of reciprocity is greater than zero, indicating clear reciprocal patterns (row 7 of Table 2); fourth, 35 percent or less of the participants in any subgroup can be classified as selfish type, while the remainder are reciprocal players (row 8 of Table 2). These results support the notion of positive reciprocity as a broadly conclusive phenomenon widely observed in laboratory experiments (e.g., Fehr et al., 1993; Hannan et al., 2002; Charness, 2004; Kube et al., 2012). However, the descriptive statistics also reveal some new insights into behavioral patterns with regard to treatment effects and gender differences.

Table 2: Descriptive statistics on effort levels and measures of reciprocity

Mean (Std. dev.)	Total sample				Men			Women		
	Overall	Control	Priming	*p*-value	Control	Priming	*p*-value	Control	Priming	*p*-value
Effort (all w)	0.449 (0.304)	0.437 (0.300)	0.460 (0.307)	0.3635	0.465 (0.300)	0.381 (0.299)	0.0371	0.418 (0.300)	0.512 (0.303)	0.0044
Effort (w=20)	0.187 (0.171)	0.144 (0.076)	0.228 (0.221)	0.0087	0.132 (0.065)	0.222 (0.245)	0.1028	0.152 (0.083)	0.231 (0.207)	0.0428
Effort (w=40)	0.305 (0.167)	0.280 (0.130)	0.329 (0.195)	0.1179	0.268 (0.095)	0.274 (0.171)	0.8908	0.288 (0.149)	0.366 (0.203)	0.0777
Effort (w=60)	0.450 (0.219)	0.440 (0.196)	0.459 (0.241)	0.6538	0.468 (0.164)	0.378 (0.241)	0.1529	0.421 (0.215)	0.511 (0.229)	0.0986
Effort (w=80)	0.584 (0.270)	0.587 (0.267)	0.581 (0.276)	0.9031	0.632 (0.230)	0.474 (0.302)	0.0555	0.558 (0.289)	0.651 (0.236)	0.1462
Effort (w=100)	0.718 (0.324)	0.733 (0.317)	0.703 (0.333)	0.6336	0.823 (0.231)	0.557 (0.379)	0.0070	0.673 (0.355)	0.800 (0.262)	0.0959
Degree of reciprocity	0.670 (0.443)	0.743 (0.384)	0.602 (0.485)	0.0906	0.873 (0.287)	0.435 (0.571)	0.0024	0.656 (0.419)	0.711 (0.390)	0.5743
Selfish type	0.204 (0.405)	0.182 (0.389)	0.226 (0.423)	0.5693	0.045 (0.213)	0.350 (0.489)	0.0113	0.273 (0.452)	0.151 (0.364)	0.2349

Notes: *p*-values refer to two-sided t-tests testing for equality of means for control and priming treatment

To obtain a first impression of the priming effect, we tested whether participants reacted differently to the homo economicus prime. In advance, we checked whether randomization

across treatments with regard to gender and control variables was successful (see Table A.1). Since the groups were sufficiently randomized, any observed differences between primed and non-primed subjects should be due to treatment variations.

To test for a subgroup-independent priming effect (column control vs. priming for the total sample in Table 2), we examined whether the homo economicus prime drew behavior towards selfishness. First, we inspected whether the prime decreased subjects' effort. For all wage offers above 20 (and averaged over all wages), the effort levels did not differ significantly between the priming and the control group. Only for a wage offer of 20 is a significant difference found between the two groups: In contrast to our expectation, the effort level was significantly higher in the priming than in the control treatment. Second, we examined the effect of priming on the two measures of reciprocity. While the degree of reciprocity is—as hypothesized—significantly smaller in the priming treatment, the relative frequency of selfish player types did not differ between the control and priming group. This is not surprising: If priming has a significant effect, it can be expected to be marginal, and therefore it is rather unlikely to change the composition of player types. Briefly, the priming effect seemed to be very weak in the overall sample.

Before examining the priming effect in subgroups descriptively, that is, whether men and women react differently to the homo economicus prime, we checked for randomization across gender with regard to control variables (see Table A.2). Since randomization was successful, any observed differences between men and women subjects should be due to treatment variations.

For men, we observed a significant difference in effort levels, averaged over all wages, between the priming and the control treatment. When we disaggregate the data, we see that the effect is driven by high wages. While there was no difference between the average effort levels in the two treatments for low wage offers, the effort levels in the priming treatment were lower for high wage offers. This finding meets the hypothesized expectations about the effect of a homo economicus prime. Similarly, the degree of reciprocity and the fraction of selfish players differed significantly across treatments. Both numbers suggest that men behave less reciprocally, that is, more selfishly, after being primed.

For women, we observe significant differences in effort levels across treatments for all wages separately (except for a wage offer of 80)[6] and averaged for all wages. However, effort levels are lower in the control than in the priming treatment. This finding is contrary to expectations, as it suggests that homo economicus priming increases effort. The measures for behavior, however, do not support this notion. Neither the degree of reciprocity nor the fraction of selfish player types differed significantly between the priming and control treatments.

There is clear evidence of an assimilation effect among men (i.e., men "follow" the prime) and some tendency for a contrast effect among women (i.e., women behave in the opposite direction of the prime). Obviously, these descriptive results support the hypothesis that priming affects male and female behavior differently, though the direction of the effects is astonishing. Since we observed opposite effects for men and women, it is not surprising that the effect of priming in the overall sample is so weak.

3.2 Multivariate analyses

To further investigate the effect of priming on agents' behavior, we run two sets of simple regressions. In a first step, we examine the priming effect in the overall sample; in a second step, we investigate the effect across gender subgroups. In both steps, we use the two previously introduced behavioral measures as dependent variables: the degree of reciprocity, which is calculated as the slope of a regression of wage on effort levels, is continuous and leads us to run linear regressions; the dummy variable for the selfish player type requests simple probit regressions. For each dependent variable, we run a reduced model, which only tests the effect of priming (and thus reduces the model to a simple correlation analysis), and a full model, which considers a group of control variables suggested by the literature. These control variables include a dummy variable, "equilibrium correctly identified," which indicates whether the participant had correctly identified the payoff-maximizing strategy (i.e., is able to behave as a homo economicus if intended to do so), and the average final grade in high school (grades in Germany range from 1 to 6, with 1 being the best grade), which maps general cognitive ability. Furthermore, we consider a dummy variable for business and economics that indicates the students' major to account for the robust finding that economists are more selfish than others (e.g., Carter & Irons, 1991; Cipriani et al., 2009; Marwell & Ames, 1981).

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[6] One-sided t-tests show that effort levels are significantly higher for all wage offers in the priming group than in the control group.

Table 3 presents the results from testing the priming effect in the overall sample. In models (1a) and (1b), which explain the degree of reciprocity, the coefficients of priming are statistically significant and negative, that is, the prime reduces the degree of reciprocity in the overall sample. Since models (2a) and (2b) explain the probability to behave as a selfish player rather than the degree of reciprocity, we expected to see opposite signs for all coefficients in these models. The, probit analysis suggests that priming does not have an effect on this probability (models 2a and 2b). The different effects of priming on the degree of reciprocity and the probability for selfish player type are only surprising at first glance. Upon closer inspection, the results seem highly plausible: Priming can marginally reinforce behavior, which is reflected by the continuous degree of reciprocity, but it cannot reinforce discrete changes, such as from a reciprocal to a fully selfish type. Thus, priming channels behavior in the direction of (or opposite to) the prime, but it does not substantially change behavior to a different type.

These results do not depend on control variables (included in models 1b and 2b), although the effects of the control variables differ in part. While a better average high school grade decreases the degree of reciprocity (model 1b) and increases the probability for selfish player types (model 2b), game-theoretic understanding (equilibrium correctly identified) and participants' field of study do not have robust significant effects in either model. Nevertheless, the results from previous descriptive statistics find support in the multivariate analysis. Priming has a moderate effect on the degree of reciprocity but not on the probability to behave as a selfish player.

Table 3: Testing for prime-to-behavior effect in the overall sample

	Degree of reciprocity		Selfish type	
	Model (1a)	Model (1b)	Model (2a)	Model (2b)
Priming	-0.141*	-0.181**	0.158	0.367
	(0.082)	(0.080)	(0.276)	(0.294)
Female		0.066		0.019
		(0.090)		(0.310)
Final high school grade		0.204***		-0.831***
		(0.073)		(0.283)
Equilibrium correctly identified		-0.031		0.549*
		(0.085)		(0.310)
Business or economics		0.162*		0.078
		(0.088)		(0.302)
Constant	0.743***	0.093	-0.908***	0.699
	(0.052)	(0.229)	(0.198)	(0.804)
Observations	113	113	108	108
F-value	2.95*	3.90***		
Chi2-value			0.33	15.05**
Adjusted R2	0.017	0.097		
Pseudo R2			0.003	0.148

Notes: Dependent variables: degree of reciprocity (OLS) in models (1a) and (1b), selfish type (Probit) in models (2a) and (2b). *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent. Robust standard errors in parentheses (White, 1982).

Table 4 presents the results for different gender subgroups. Technically, we incorporated the interaction of priming and females in all models, so the independent variables of interest are priming, female, and the interaction term, priming x female. In all models, the interaction term is statistically different from zero, supporting the notion of a differential effect of priming for men and women on the degree of reciprocity as well as on the probability of behaving as a selfish player type. Again, interpreting the results in models (4a) and (4b), we expected opposite signs for all coefficients, compared to models (3a) and (3b), because we explain selfish rather than reciprocal behavior.

Since models (3a) and (3b) are linear, the size of the effects can be evaluated easily. Both models show that, in the priming treatment, the degree of reciprocity is significantly smaller for men; more precisely (e.g., in model 3b), priming reduces the degree of reciprocity by 0.450 for male participants. Since the probit (as in models 4a and 4b) is not a linear estimator, we cannot interpret the size of the coefficients directly (Ai & Norton, 2003). Therefore, we computed the conditional marginal effects of priming for men and women in the full model (4b), fixing all other variables to the mean. For men, priming significantly increases the probability of behaving like a homo economicus by 0.336 ($p = 0.004$). However, though

priming also decreases the probability for homo economicus behavior in women by 0.082, the effect is not statistically significant ($p = 0.394$). The results with the control variables are the same as in the models without interaction terms, suggesting robustness of the results.

Briefly, for gender subgroups, the multivariate analysis suggests that priming affects behavior differently. While it has no significant effect on women, priming influences male behavior substantially, affecting not only the degree of reciprocity but also the probability to behave as a selfish player.

Table 4: Testing for gender differences in prime-to-behavior effects

	Degree of reciprocity		Selfish type	
	Model (3a)	Model (3b)	Model (4a)	Model (4b)
Priming	-0.438***	-0.450***	1.305**	1.782***
	(0.133)	(0.132)	(0.549)	(0.595)
Female	-0.217**	-0.176*	1.086**	1.330**
	(0.095)	(0.096)	(0.522)	(0.582)
Priming x female	0.493***	0.456***	-1.731***	-2.122***
	(0.166)	(0.164)	(0.654)	(0.756)
Final high school grade		0.179**		-0.859***
		(0.071)		(0.283)
Equilibrium correctly identified		-0.062		0.746**
		(0.081)		(0.345)
Business or economics		0.158*		0.055
		(0.086)		(0.313)
Constant	0.873***	0.319	-1.691***	-0.313
	(0.061)	(0.225)	(0.467)	(0.917)
Observations	113	113	108	108
F-value	4.27***	5.14***		
Chi2-value			7.10*	18.29***
Adjusted R2	0.078	0.154		
Pseudo R2			0.077	0.233

Notes: Dependent variables: degree of reciprocity (OLS) in models (3a) and (3b), homo economicus type (Probit) in models (4a) and (4b). *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent. Robust standard errors in parentheses (White, 1982).

Taken together, a simple word-search task that includes priming words related to the homo economicus concept affects behavior. We interpret this finding as a first piece of evidence that a homo economicus prime is effective in an incentivized experiment. The priming effect, however, is homogenous in neither size nor direction across different samples.

In the overall sample, the prime decreases the degree of reciprocity but it is not influential enough to alter behavior such that the composition of player types is changed: The fraction of selfish player types in the whole sample is not increased by the prime.

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However, this finding is not surprising since the empirical results also support the concept of gender differences in responsiveness to the situational cue: Presenting the same subtle homo economicus prime to all participants before playing a gift exchange game affects men and women differently. In particular, the prime enhances selfish behavior in men, but not in women. All the obtained results are robust against including various control variables. The effect in the male subgroup is strong; not only is the degree of reciprocity significantly reduced by priming but also the probability for the selfish player type is significantly increased. Women respond in the opposite way, as expected, but significant differences are only observed in the descriptive analysis. Thus, male participants—not female—playing the role of agents in a gift exchange game are more responsive to a situational cue intended to increase selfish behavior.

Since all subjects played as both employer and employee, each participant indicated a wage level. Accordingly, we can check whether priming had an effect on wages as well. However, this is not the case following two-sided t-tests (control vs. priming all: $p = 0.5892$, control vs. priming men: $p = 0.4434$, control vs. priming women: $p = 0.1638$) or ordered probit models (see Table A.3 in the appendix, models 5a and 5b). Furthermore, there are no gender differences in the wage offers for primed vs. non-primed subjects (Table A.3 models 6a and 6b). This is important since different wage choices between primed and non-primed subjects, or between men and women, might cause subjects to form different beliefs about others' wage choices, which may affect behavior (e.g., people put less emphasis on particular effort choices when filling in the wage-effort table since they do not expect the corresponding wage offer to get realized).

Taken together, we expected to see gender differences in the prime-to-behavior effect, and we found support in the data. In fact, the results revealed that males are more responsive to manipulation than women. Surprisingly, women respond to priming—if they respond at all—in a way opposite to what the homo economicus prime suggests. To elaborate on this interesting finding, we offer a post-hoc explanation. We realize that further research is needed to clarify the exact conditions that apply and the mental processes that are occurring.

3.3 Follow-up survey

Research in related fields has reported that prime-to-behavior effects are sensitive to individuals' associations with the prime (Bargh, 2006; Wheeler & Berger, 2007; Wheeler & Petty, 2001)[7]. The homo economicus prime in the previous experiment may have triggered divergent associations (or emotional states) among men and women, and consequently, may have affected individuals' subsequent choices differently. The assimilation effect (Wheeler & Petty, 2001) among men (i.e., men's behavior becomes consistent with the prime) and the null result among females may occur if men have more positive associations with the homo economicus concept than women.

To test whether this conjecture is true, we designed a survey asking men and women about their perceptions of the homo economicus concept. In particular, we raised the following question: "Consider the following words [priming and neutral words used in the priming condition appearing in random order]: Please choose the six words you consider the most pleasant and most appealing." We ran this online survey in July 2012 at the same university. None of the 452 students, all of whom were from various fields, had participated in the experiment before. We found that men chose an average of 3.744 priming words, whereas women chose only 3.248. This difference is highly significant ($p < 0.001$) in a two-sided t-test, suggesting that women have significantly fewer positive associations with the concept of homo economicus, and thus with the homo economicus prime. This finding indicates that the same prime activated different associations among men and women, which may have triggered the observed gender differences in prime-to-behavior effects.

4 Concluding Remarks

This paper focuses on individuals' responsiveness to a situational cue. In particular, we use priming as an unconscious reminder of the concept of homo economicus and analyze its impact on subsequent incentivized behavior in a gift exchange game. We expected that this

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[7] For an excellent review of the psychological literature, see Wheeler & Berger (2007). Evidence regarding the potential moderators of priming effects on economically relevant behavior is very rare. A notable exception is Gilad and Kliger's (2008) work, which analyzed differences in the magnitude of prime-to-behavior effects between two subgroups of the population, undergraduates, and financial professionals. The authors found that the priming stimulus had a stronger effect on the investment decisions of professionals than on undergraduates' decisions.

kind of manipulation would increase selfish and decrease reciprocal behavior in the overall sample. Additionally, we tested for the assertion that men and women differ in responsiveness to the prime. Taken together, the observed behavior of male participants was consistent with the prime: Men exposed to a series of words linked to the homo economicus model behaved more selfishly and less reciprocally. This finding is highly significant and robust against using different measures and including various control variables. Surprisingly, descriptive statistics among women revealed a priming effect opposite to the prime (i.e., primed women tended to choose higher effort levels). Although the data on female behavior do not allow us to draw the broad conclusion that the homo economicus prime reliably leads to a contrast effect, the counter-directional results explain why only a weak effect is observable in the overall sample. Furthermore, the data unambiguously show large differences between genders, with men being more responsive to the situational cue.

We explain the observed gender differences in prime-to-behavior effects by men and women's differing associations with the particular priming stimulus. Whereas most priming research has focused on stimuli for which people are likely to have the same associations, a homo economicus prime may generate different associations across genders. Through a follow-up survey, we proved that men have significantly more positive associations with the homo economicus concept than women. Since associations can influence individuals' attitudes and behavior, gender-invariant associations are likely to have caused the assimilation effect among males as well as the weak and opposite-to-prime effect among women.

Our research also provides evidence in support of the view that gender may affect not only the magnitude of the prime-to-behavior effect but also the overall existence of such an effect. The present study complements Drouvelis et al.'s (2010) work, which showed that priming subjects toward cooperation resulted in an assimilation effect among women and in no effect among men. By merging this finding with our results and drawing upon our survey data, the underlying regularity could be that priming results in an assimilation effect only among subgroups that are susceptible to the content of a particular prime.

Understanding divergent priming effects is of particular importance in the context of labor markets, since any wording in job advertisements or task descriptions may operate as a prime. If our experimental findings translate into real employment relations, a managerial directive stressing the need for profit maximization or highlighting another aspect of homo economicus could have the intended behavioral effect among men, but no (or even the opposite) effect

among women, since men are somewhat susceptible to such priming contents. Furthermore, our findings regarding the responsiveness to weak situational cues can add to the ongoing discussion about why reciprocity is strikingly robust in the laboratory but not in the field. If a weak manipulation tool, such as a word-search task, is able to significantly affect behavior in the laboratory, then unconscious situational cues not controlled for in the field may easily drive individuals' decisions without the experimenter's awareness.

These findings also hint at an important methodological point, which prompts us to assert a note of caution. Obviously, situational cues should not be underestimated when inferring individuals' preferences from observed choices in economic experiments. However, this is even more important if effects arise only among subgroups. Thus, our results emphasize the importance of understanding individuals' associations with cues and suggest that men and women may interpret experimental treatments differently. This, in turn, may be a source of differences in responsiveness between genders.

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Appendices

Appendix 1: Priming Task

The following 13 words are hidden in the puzzle:

PFLANZE   FENSTER   ZIELSTREBIG

HUT   MAXIMIEREN   RATIONAL

KALKULIERT   LAMPE   ZEBRA

TEPPICH   VORTEIL   GEWINNEN

GELD

The words can be vertical, horizontal and diagonal.

Try to find all of the words.

```
K   Z   E   B   R   A   M   R   X   G   A   M
A   W   I   H   B   A   P   N   Q   E   R   V
L   D   F   E   N   S   T   E   R   W   L   O
K   L   N   I   L   T   H   I   L   I   E   R
U   E   N   R   O   S   U   P   O   N   U   T
L   A   M   P   E   P   T   X   A   N   G   E
I   G   T   I   O   L   M   R   G   E   A   I
E   P   F   L   A   N   Z   E   E   N   T   L
R   E   P   M   G   A   O   Z   L   B   D   L
T   E   P   P   I   C   H   S   D   P   I   A
M   A   X   I   M   I   E   R   E   N   M   G
```

Appendix 2: Experimental Instructions

Original (German) instructions are available from the authors upon request.

Thank you for supporting this research project. You are participating in a study of the labor market. If you read these instructions carefully, you can earn some money. Your income will be paid out to you privately and in cash in the next lecture. During the experiment, your income will be calculated in Chips. At the end of the experiment, the Chips will be converted into Euros at the rate of:

10 Chips = 1 €

Each participant will be randomly assigned to a group of two people. Each group consists of an "**employee**" and an "**employer**". The role of each participant will also be randomly assigned. You will only find out later whether you are an employer or an employee. Therefore, it is necessary that you – as well as the second person in your group – make your decisions as an employer and as an employee. You will never find out with whom you have been matched.

The experiment consists of 2 stages:

Stage 1: In stage 1, each person playing as an **employer** chooses a **wage** for his/her employee.

Stage 2: In stage 2, each person playing as an **employee** chooses the **effort level** according to the procedure described below. As the employee at this moment is not aware yet of the decisions made by his/her employer in stage 1 (amount of wage), he/she can choose an effort level for every feasible amount of wage mentioned on the decision sheet. The employee will learn about every feasible wage and can decide which effort level he/she would like to achieve for each wage.

An employer's income depends on the wage paid and on the effort level provided. **An employee's income** depends on the wage received less the costs of the effort level provided. Below, you will find the exact procedure for calculating the income of employees and employers. After stage 2, the experiment will be over, and your income will have been determined. The preceding questionnaire will not affect your income.

How the labor market works

1. Two participants will be randomly assigned to each other. One will be the employer, and the other the employee. They will form a contract with each other.

2. No employer/employee will ever know with which employee/employer he/she has formed a contract.

3. Only after the end of the experiment, will the role of the employer and the employee be randomly assigned. Therefore, each participant must make his/her decisions in the role of an employer as well as in the role of an employee.

4. In stage 1, each **employer** chooses a **wage** for his/her employee. **The employer can choose among 20, 40, 60, 80, and 100 Chips**. The employer records this wage on his/her decision sheet.

5. In stage 2, each **employer** chooses the **effort level** he/she would like to achieve according to the procedure described below. As the employee is not aware yet of the decisions made by his/her employer (amount of wage), he/she can choose an effort level for every feasible wage mentioned on the decision sheet. The employee thus learns about every feasible case and can decide on an effort level for each case.

6. After stage 2, all relevant labor market decisions will have been made and with that, the income of the employer and the employee will have been determined.

How does an employee calculate his/her income?

1. Every employer receives from the experimenter 120 coupons from which to pay wages to an employee. If the employer offers the employee a wage of 120 Chips, then the employer will have no income coupons left. If he/she offers the employee a wage of 20 Chips, then the employer will have 100 income coupons left. In general, the employer will have

120 Coupons – wage

income coupons left.

2. How are the remaining coupons converted into Chips? The number of coupons retained by the employer is multiplied by the effort level chosen by the employee. The result is the income of the employer in Chips. Thus:

Employer's Income (in Chips) = Coupons retained * Effort Level

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How does an employee calculate his/her income?

1. Employees receive a wage from their employers. From this wage, the costs of the effort level chosen must be subtracted.

2. The employee determines his/her effort level by choosing a number between 0.1 and 1.0 from the schedule below. The lowest effort level he/she can choose is 0.1. The number 0.2 is a slightly higher number and therefore a higher level, and so on up to 1.0, the highest effort level.

3. The higher the effort level an employee chooses, the better it is for his/her employer because the employer's income will be higher.

4. The higher the chosen effort level, the higher the work-related costs will be. You can find out how these costs are related to effort levels by looking at the schedule below.

5. The income of an employee (in Chips) is determined by the following formula:

Income of the employee (in Chips) = Wage – Costs of Effort Level

6. The following table shows a schedule of possible Levels of Effort (LoE) and corresponding work-related costs to employees (Cost):

LoE	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Cost	0	1	2	4	6	8	10	12	15	18

Please note:

The income of all employees and employers will be calculated according to the same rules. Every employer has 120 coupons, and the work-related costs are the same for every employee. Every employer can calculate the income of "his/her" employee, and every employee can calculate the income of "his/her" employer.

A few exercises

We would like to ask you to solve the following exercises to become familiar with the decision situations of an employer and an employee.

1. Let us assume that the employer pays his/her employee a wage of 40 Chips. In response to this wage offer, the employee chooses an effort level of 0.2. How high is the income of the employer and the employee?

   Income of employer = _____Chips

   Income of employee = _____Chips

2. Let us assume that the employer pays his/her employee a wage of 20 Chips. In response to this wage offer, the employee chooses an effort level of 0.6. How high is the income of the employer and the employee?

   Income of employer = _____Chips

   Income of employee = _____Chips

3. Let us assume that the employer pays his/her employee a wage of 60 Chips. In response to this wage offer, the employee chooses an effort level of 0.1. How high is the income of the employer and the employee?

   Income of employer = _____Chips

   Income of employee = _____Chips

4. Let us assume that the employer pays his/her employee a wage of 80 Chips. In response to this wage offer, the employee chooses an effort level of 0.5. How high is the income of the employer and the employee?

   Income of employer = _____Chips

   Income of employee = _____Chips

5. Let us assume that the employer pays his/her employee a wage of 100 Chips. In response to this wage offer, the employee chooses an effort level of 0.9. How high is the income of the employer and the employee?

   Income of employer = _____Chips

   Income of employee = _____Chips

A further exercise

Please think about which choice rational employees and employers who want to maximize their self-interest would make.

As a reminder: The labor market works as follows. First, the employer decides on a wage, and then the employee chooses an effort level. Subsequently, the incomes are calculated (according to the following equations) and paid out.

Income of the Employee (in Chips) = Wage – Costs of Effort Level

Employees choose one of the possible Levels of Effort (LoE) from the first row of the schedule. The higher the number, the higher the level of effort will be. The second row of the schedule shows the costs of every effort level (Cost). The higher the level of effort, the higher the employee's costs.

LoE	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Cost	0	1	2	4	6	8	10	12	15	18

Coupons retained = 120 Coupons – Wage

Employer's Income (in Chips) = Coupons retained * Effort Level

1. **Which effort level would a rational employee choose who is set out to maximize his/her self-interest? 0.1, 0.2, 0.3, …, 0.9 and 1 are possible.**

   He/She chooses an effort level of ……………………… .

2. **Which wage would a rational employer choose who is set out to maximize his/her self-interest and who anticipates the choice of his/her employee? 20, 40, 60, 80, and 100 Chips are possible.**

   He/She would choose a wage of ……………………………….. Chips.

Decision stage 1 for employers

Now it is your turn. The labor market is open.

As you do not know whether you will be randomly assigned to the role of the employer or employee, you will have to decide in both roles.

First, it is your job as an employer to determine the amount of your employee's wage. You have five wage possibilities to choose among: You can pay your employee a wage of 20, 40, 60, 80, or 100 Chips. **Please decide now**:

I will pay the employee a wage of

☐   *20 Chips*

☐   *40 Chips*

☐   *60 Chips*

☐   *80 Chips*

☐   *100 Chips.*

Decision stage 2 for employees

In the second stage, you choose an effort level as an employee. If you are randomly assigned to the role of an employee, you will receive the wage chosen by the employer. However, you do not know the amount of the wage yet. The following shows five possible wages the employer was able to choose from. Please fill out which effort level you would like to achieve for each feasible wage:

1. Imagine your employer chose a wage **of 20.** Which effort level would you like to achieve in such a case?_____.
2. Imagine your employer chose a wage **of 40.** Which effort level would you like to achieve in such a case?_____.
3. Imagine your employer chose a wage **of 60.** Which effort level would you like to achieve in such a case?_____.
4. Imagine your employer chose a wage **of 80.** Which effort level would you like to achieve in such a case?_____.
5. Imagine your employer chose a wage **of 100.** Which effort level would you like to achieve in such a case?_____.

The experiment is finished now, and your income has been determined. Please wait for further instructions.

Appendix 3: Complementary Analyses

Table A.1: Descriptive statistics by treatment

	Control (*n*=55)		Priming (*n*=58)		t-test
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	***p*-value**
Female	0.600	0.494	0.603	0.493	0.9705
Average high school grade	2.558	0.618	2.714	0.543	0.1571
Equilibrium correctly identified	0.491	0.505	0.517	0.504	0.7820
Business or economics	0.636	0.485	0.690	0.467	0.5531
Number of test questions solved correctly	9.036	1.915	8.741	2.396	0.4726
Wage offer	52.727	19.763	54.828	21.377	0.5892

Note: *p*-values refer to a two-sided t-test for equality of mean values

Table A.2: Descriptive statistics by gender

	Men (*n*=45)		Women (*n*=68)		t-test
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	***p*-value**
Priming treatment	0.511	0.506	0.515	0.503	0.9705
Average high school grade	2.753	0.555	2.562	0.592	0.0873
Equilibrium correctly identified	0.578	0.499	0.456	0.502	0.2080
Business or economics	0.644	0.484	0.676	0.471	0.7271
Number of test questions solved correctly	9.133	2.007	8.721	2.271	0.3245
Wage	52.000	21.490	55.000	19.963	0.4498

Note: *p*-values refer to a two-sided t-test for equality of mean values

Table A.3: Explaining the wage offer in ordered probit regressions

	Dependent variable: wage offer			
	Model (5a)	**Model (5b)**	**Model (6a)**	**Model (6b)**
Priming	0.124	0.072	-0.249	-0.335
	(0.202)	(0.206)	(0.334)	(0.344)
Female		0.204	-0.161	-0.158
		(0.224)	(0.277)	(0.306)
Priming x female			0.617	0.686
			(0.419)	(0.452)
Final high school grade		0.496***		0.465***
		(0.167)		(0.169)
Equilibrium correctly identified		-0.478**		-0.531**
		(0.214)		(0.228)
Business or economics		-0.013		-0.014
		(0.226)		(0.224)
Observations	113	113	113	113
Wald Chi2-Test	0.3775	19.4075***	3.0833	18.6501***
Pseudo R2	0.0012	0.0514	0.0103	0.0600

Notes: Dependent variable: wage offers (ordered probit). *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent. Robust standard errors in parentheses (White, 1982).

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