

# Preference Construction in Negotiations

— Loss Aversion and Quasi-Endowment —

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## Abstract

A common assumption in negotiation analysis and game theoretic bargaining models is that negotiators have exogenously given preferences from the beginning of a negotiation on; in particular, these preferences are assumed to be independent of the history of offers made. However, empirical evidence gives rise to the assumption that preferences are endogenously constructed during the course of the negotiation. Negotiators might account for (quasi-) endowment based on offers they receive and subsequently devalue alternatives which were favorable at the outset. This bias might prevent ex-ante Pareto-optimal outcomes of negotiations.

The paper motivates endogenous preference construction and adaptation. It outlines an experiment which aims at testing (1) whether preferences are constructed on the fly during a negotiation and, if so, (2) in which way they are influenced by the offers in the negotiation process. Results from a pilot experiment are presented and the final experiment design is discussed.

*Keywords:* Multi-attribute Negotiation, Bargaining, Consumer Choice, Constructive Preferences, Behavioral Economics, Experimental Economics, Endowment Effect, Loss Aversion

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## Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Preference construction in negotiations</b>	<b>4</b>
2.1	Endogenous preferences . . . . .	4
2.2	Path-dependent reference points—graphical example . . . . .	8
<b>3</b>	<b>Pilot experiment</b>	<b>10</b>
3.1	Experimental design . . . . .	11
3.2	Experimental results . . . . .	15
<b>4</b>	<b>Enhanced experimental design</b>	<b>16</b>
<b>5</b>	<b>Related work</b>	<b>19</b>
<b>6</b>	<b>Conclusion and future work</b>	<b>21</b>

# 1 Introduction

In a negotiation, two individuals have interest in reaching one of several possible agreements. However, their preferences over these agreements are not completely identical. In multi-attribute negotiations, studied here, parties usually have the possibility to simultaneously negotiate over several attributes and to search for integrative potential—they play a non-constant-sum game. Multi-attribute negotiations occur, for example, in labor disputes, in buying a new car with various extra equipment, or in negotiating tenancy contracts.

Empirically, negotiators oftentimes fail to reach mutually beneficial agreements in integrative multi-attribute negotiations and—even if they reach an agreement at all—it is oftentimes non-Pareto-optimal (Pruitt 1981; Raiffa 1982; Cray and Kersten 1999; Vetschera 2004). Some of the empirical observations are hard to explain by the neoclassical paradigm of exogenously given and fixed preferences, but can easily be explained if one allows preferences to change during a negotiation process or to be constructed in the first place.

Behavioral economics and cognitive psychology offer several insights in the context of consumer decision making which might help understanding negotiators' behavior; see Bazerman, Curhan, Moore, and Valley (2000) for an review history of (psychological) studies on negotiations. These will be outlined in the following. Preference construction, for example, might have an influence on negotiators' behavior.<sup>2</sup> Preference construction assumes that consumers do not start out with an invariable knowledge of what they like and how they trade-off different goods having multiple attributes—they rather construct their preferences by the time they face choices.

The specific preferences which emerge from a construction process are contingent on the context of the decision-making. This effect is more pronounced in domains where the respective consumer has little experience in choosing among alternatives (Hoeffler and Ariely 1999).<sup>3</sup> An extreme ex-

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<sup>2</sup>See e.g. Hoeffler and Ariely (1999) or Bettman, Luce, and Payne (1998) for an overview on constructive preferences.

<sup>3</sup>Hoeffler and Ariely (1999) offer a soon-to-be parent and his decision to buy a stroller as an example for a domain where the consumer has little experience and starts constructing his preferences.

ample of constructive preferences is that individual's might not even have a pre-existing sense whether an experience—like for example a poetry reading by their professor—is good or bad for them (Ariely, Loewenstein, and Prelec 2005). If negotiators likewise construct their preferences during a negotiation, the specific sequence of offers might matter for how they trade-off the attributes of the good under negotiation. In this case, preferences would be path-dependent.

Loss aversion—manifested in the instant *endowment effect* (Thaler 1980; Kahneman, Knetsch, and Thaler 1990) and the *history-of-ownership* effect (Strahilevitz and Loewenstein 1998)—can influence how preferences are constructed. The term endowment effect denotes the increased value of a good to an individual when the good becomes part of the individual's endowment: Consumers who possess a good, demand a higher price for selling the good, than they would be willing to pay if they wouldn't own it. Quasi-endowment is, according to Heyman, Orhun, and Ariely (2004), the attachment to an un-owned item; negotiators might develop a sense of ownership on specific values of single attributes even without a legal claim on obtaining that specific value.<sup>4</sup>

If one assumes negotiators to account for quasi-endowment of values on single attributes during a negotiation, this changes the reference-point from which subsequent offers are evaluated. This reference-dependant valuation of offers and possible agreements changes during the negotiation process. To secure their quasi-endowment, negotiators might reject offers which were favorable for them at the beginning of the negotiation.

Quasi-endowment effects and the subsequent devaluation of offers reduces the set of mutually acceptable agreements and might prevent ex-ante Pareto-optimal outcomes of negotiations. There “are simply fewer mutually advantageous exchanges possible” as “potential traders are more reluctant to trade than is conventionally assumes” (Kahneman, Knetsch, and Thaler 1990, p. 1344). The existence of quasi-endowment effects reduces the gains from negotiating.

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<sup>4</sup>Heyman, Orhun, and Ariely (2004) introduce quasi-endowment in the context of bidding in auctions. However, a similar line of argumentation applies in negotiations (and other iterative market mechanisms).

The present paper outlines an experiment aiming at investigating the preference construction process during a negotiations. The research questions posed are:

- Do negotiators construct (or adapt) their preferences during a multi-attribute negotiation?
- If so, how is this preference construction process influenced by the counterparty's offers? Do loss aversion and the (quasi-)endowment effect play a role?

To this end, the paper is structured as follows: the next section presents endogenous preference construction in more detail, before Section 3 turns to the design and analysis of a pilot experiment. Subsequently, Section 4 outlines changes to be made in the experiment design. Section 5 briefly reviews related work and, finally, Section 6 concludes.

## 2 Preference construction in negotiations

### 2.1 Endogenous preferences

Integrative bargaining is oftentimes regarded as joint problem solving and jointly exploring the space of potential agreements (Cramton 1985); search techniques and heuristics for finding mutually beneficial agreements are proposed (Raiffa 1982; Bazerman and Neale 1983; Faratin, Sierra, and Jennings 2002; Tajima and Fraser 2001). However, many practical heuristics and advices how to negotiate have the limitation of assuming preferences to be exogenously given and fix during the bargaining process<sup>5</sup>—this may not be the case in many real life negotiations. Negotiators might fall pray to a quasi-endowment effect and value offers and agreements relative to reference points which are adapted during the negotiation.

A good is more valuable to an individual once it becomes part of the individual's endowment (Kahneman, Knetsch, and Thaler 1990). This effect—termed endowment effect (Thaler 1980)—grows stronger with duration of ownership and prevails after termination of ownership (Strahilevitz and Loewen-

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<sup>5</sup>Furthermore, preferences are usually assumed to be unknown to the counterparty.

stein 1998). If it is not based on actual and legally ensured ownership but rather on an individual’s sense of ownership or entitlement, the effect is called quasi-endowment effect (Heyman, Orhun, and Ariely 2004).

The notion of endogenous preference construction in negotiation assumes the following: During a negotiation process, parties constantly account for quasi-endowment on single attributes and afterwards feel entitled to the specific value on this attribute. Negotiators value the counterparty’s proposals relative to a reference point which is adjusted attribute-wise during the bargaining process. A proposal which is seen as a loss relative to the current reference point, i.e. the current quasi-endowment, on one or more attributes is devalued; preferences are endogenously changing and depend on the history of the specific negotiation. Each single offer proposed might change the counterparty’s quasi-endowment and might therefore destroy potential agreements. Searching the agreement space extensively—as some heuristics propose—becomes prohibitive.

**Loss aversion and the endowment effect** The endowment effect can be explained by the S-shaped value function employed in prospect theory (Kahneman and Tversky 1979; Tversky and Kahneman 1991). Figure 1—adopted from Strahilevitz and Loewenstein (1998, Fig. 1)—shows three value functions denoted by  $v_1$ ,  $v_2$ , and  $v_3$ . Each of these functions exhibits the usual S-shape established by prospect theory, i.e. it is convex for losses ( $v''(x) > 0$  for  $x < r$ ), concave for gains ( $v''(x) < 0$  for  $x > r$ ), and steeper for losses than for gains ( $-v(-x) > v(x)$ ). The point  $r$  thereby denotes the reference point or status quo; it is the intersection of the value function with the x-axis.

Loss aversion is captured by the kink at the reference point and the function’s different steepness for losses and for gains. If an individual does not own an item, its reference point might, for example, be at zero. Consequently, the individual’s willingness to pay for the item, i.e. obtaining an endowment of  $x$ , is  $v(x)$ . Once the subject owns the item and the endowment effect applies, the subject’s reference point adapts and shifts rightwards. As Strahilevitz and Loewenstein (1998) point out, adaptation is not all or nothing, but the shifting of the reference point proceeds gradually. At some point in time, the reference

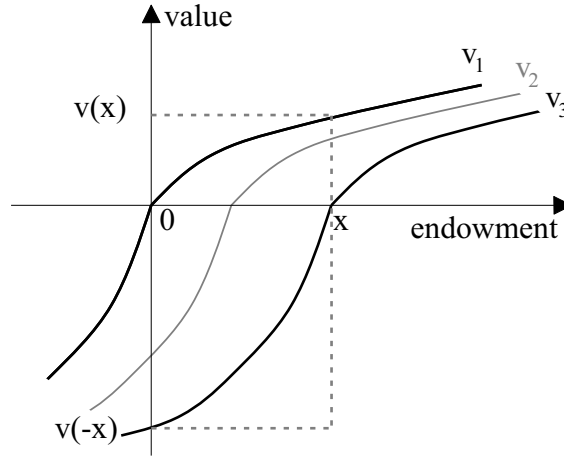


Figure 1: S-Shaped value function and shifting reference points

point might settle at  $x$  and, consequently, the individual's value function is now sketched as  $v_3$  in Figure 1. If the individual is now asked for the value of the item, it compares the status quo, i.e. the endowment  $x$ , with an endowment of zero, i.e. not owning the item. The individual would demand a compensation of  $-v(-x)$  for giving up the now owned item; this is, as stated above, greater than the item's previous value  $v(x)$ . Thus, the adaptation of the reference point influences the value an individual assigns to an item.

Besides the instant endowment effect, Strahilevitz and Loewenstein (1998) establish the duration-of-current-ownership effect and the duration-of-prior-ownership effect—both are vital to understanding a negotiator's construction and adaptation of preferences. The duration-of-current-ownership effect predicts that an individual's selling price for a current possession will increase as a function of how long the person has owned the item. The duration-of-prior-ownership effect furthermore suggests that an individual's buy-back price for a previously owned object will increase as a function of how long the person had owned the object. In a negotiation, a negotiator's quasi-endowment will consequently not only depend on the counterparty's current offer, but rather on the entire history of the negotiation, i.e. the history of all offers.

**Empirical indicators** Cray and Kersten (1999) report on data gathered with the Inspire<sup>6</sup> negotiation support system: in a pre-negotiation phase they elicit preferences; then they conduct the negotiation and, if an inefficient agreement is reached, they present Pareto-improvements to the negotiators in a post-settlement phase. In their study, 60.2% of the agreements are inefficient with respect to the preferences elicited in the first phase. However, only 20.8% of negotiators are willing to accept the proposed Pareto-improvements. At first sight this seems puzzling and irrational; but if preferences are endogenous and change during the negotiation, the system's proposal in the post-settlement phase is based on the negotiators' ex-ante preferences and may be unacceptable with respect to their ex-post preferences. This might explain the low acceptance rate.<sup>7</sup>

Vetschera (2004) analyzes utility functions elicited, offers made, and final agreements in thousands of Inspire negotiations. He reports that in about 25% of the cases, negotiators violated consistency in the sense, that their observed behavior did not fit the ex-ante elicited utility functions. Negotiators' inconsistency could possibly be tracked back to a changed preference structure by the time their seemingly inconsistent behavior is observed.<sup>8</sup>

The two studies cited above are first indicators for endogenously changing preferences. However, from their results one cannot directly assure that loss aversion and quasi-endowment account for the observed behavior. To analyze this more precisely, Sections 3 and 4 will detail experiments investigating the issue.

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<sup>6</sup><http://interneg.org/inspire/>

<sup>7</sup>Other explanations might be that Inspire presents several possible Pareto-improvements and the parties would have to enter a new negotiation for agreeing on one of them. This new negotiation is afflicted with costs (e.g. mental effort and time) and might therefore not be desirable for negotiators. Furthermore, parties might tend to ex-post rationalize their behavior after they negotiated an agreement; they might stick to the agreement for not admitting that they could have done better.

<sup>8</sup>Again, endogenous preference changes are not the only possible explanation for the behavior. Nuisance in the specific utility elicitation technique employed in the first phase of negotiation support might, for example, serve as a reason for the observed inconsistencies as well.



## 2.2 Path-dependent reference points—graphical example

This section exemplifies reference points endogenously changing attribute-wise during a two-attribute alternating-offer negotiation involving negotiators A (she) and B (he). The process is displayed in a sequence of Edgeworth-boxes<sup>9</sup> in Figure 2.

Both attributes, named  $x$  and  $y$ , are normalized to one and both parties prefer more to less on both attributes. The share of negotiator A is measured from the lower left corner of the box. Accordingly, negotiator B's share is measured from the upper right corner. For the sake of simplicity, only negotiator A has a shifting reference point in this example.

Figure 2a shows the initial condition at time  $t = 0$ ; time is indicated by superscripts. Three of negotiator A's indifference curves are displayed and the associated utility levels are indicated at the top of the figure;  $u_{A,3}^0 > u_{A,2}^0 > u_{A,1}^0$  holds in this example. Furthermore, A has a reference point  $r_A^0$  which might initially be at zero on both attributes and A makes an offer  $o_A^0$  at  $t = 0$ . Here, A is quite greedy and demands the best possible solution for herself.

At  $t = 1$  (2b), B makes a counteroffer anywhere in the space of possible agreements, i.e. in the interior of the Edgeworth-box. It is named  $o_B^1$ .

At  $t = 2$  (2c), it is A's term again and the quasi-endowment effect applies the first time: A notices what she is offered, namely  $o_B^1$ , and feels entitled to this level of  $x$  and  $y$ . She gets attached to this point, even if there is no legal claim on this agreement and the negotiation process itself does not guarantee the outcome to be at least as good as  $o_B^1$ . A's reference point shifts to  $r_A^2$  which is identical with  $o_B^1$  here. Furthermore, A makes the new offer  $o_A^2$ .

Three things about shifting reference points in this example are noteworthy here:

- Firstly,  $r_A^2$  equals  $o_B^1$  in this example. This is not necessarily the case. A gradual adaptation of the reference point—as shown by Strahilevitz and Loewenstein (1998)— would argue for any point in between  $r_A^0$  and  $o_B^1$ . This is, for example, formally captured by Compte and Jehiel (2003); they present a model of a shifting reference point in a single-attribute ne-

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<sup>9</sup>Called Pareto-boxes by some authors.

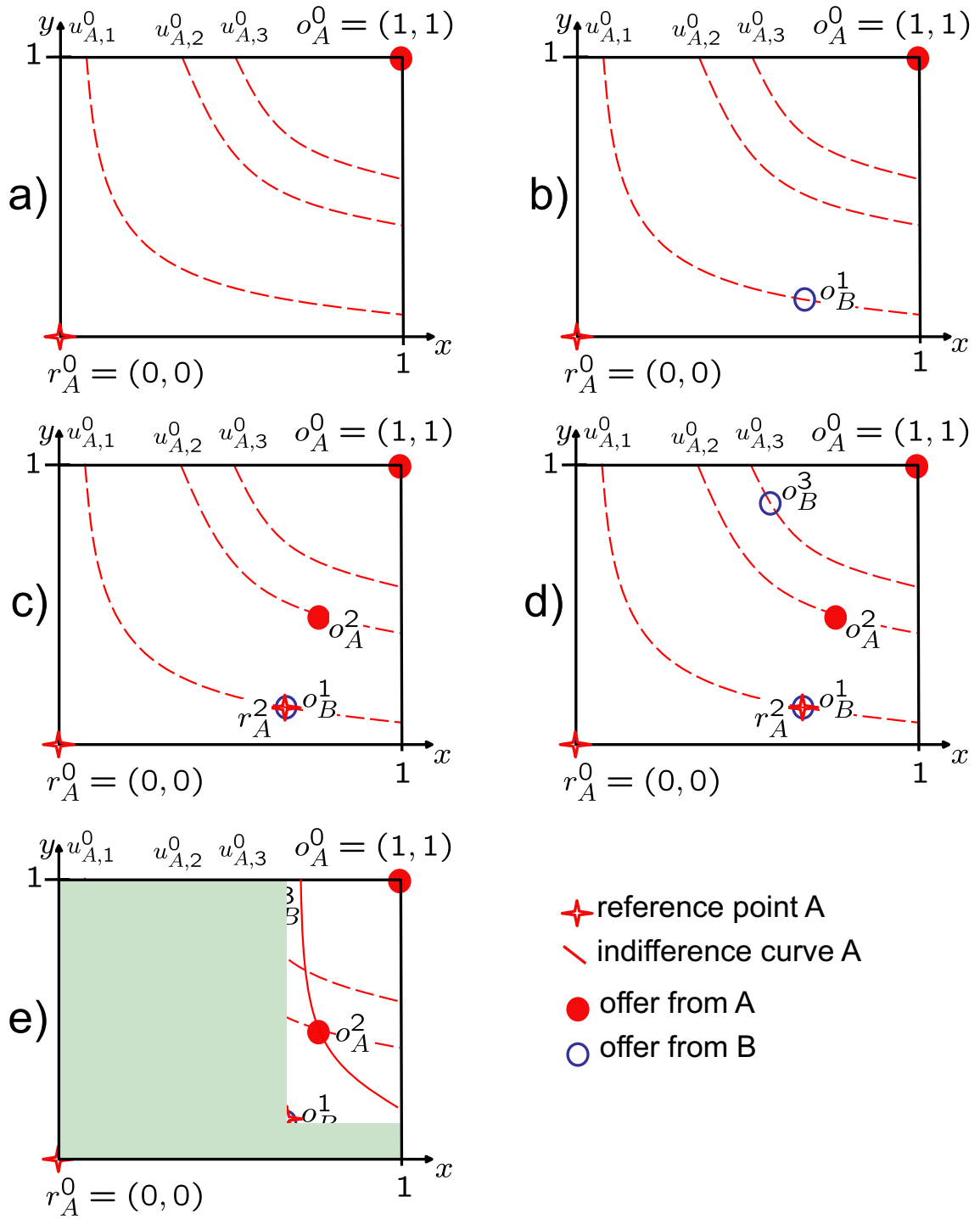


Figure 2: Bilateral Negotiation in an Edgeworth box

gotiation and account for partial adaptation by their update function  $f$ .

- Secondly, it is not only that A expects to get a utility of at least  $u_{A,1}^0$ . A expects to get at least as much on x, as  $r_A^2$  is in this attribute and at least as much on y, as  $r_A^2$  gives.
- Thirdly, this process of shifting the reference point will go over the entire negotiation and there will be a history of quasi-endowment effect.

At  $t = 3$  (2d), B rejects  $o_A^2$  and counters with  $o_B^3$ . Subsequently this is rejected by A at  $t = 4$  (2e). The negotiation goes on, but the interesting point is reached here, so the description ends.

The rejection of  $o_B^3$  is somewhat puzzling. With respect to A's preferences at  $t = 0$ , given by the dotted indifference curves,  $o_B^3$  gives utility  $u_{A,3}^0$  which is strictly more than  $u_{A,2}^0$ . So B offers A a higher utility at  $t = 3$ , than A asked for at  $t = 2$ . However, A's preferences from  $t = 0$  might no longer be the current preferences if A evaluates  $o_B^3$  with respect to  $r_A^2$ . On attribute y,  $o_B^3$  is much better for A, than the reference point; on the other hand, it is a little worse on x. Every potential agreement worse than  $r_A^2$  on any attribute is shaded in Figure 2e.

If A would be concerned with (ex-ante) utility only, she would accept  $o_B^3$ , as the huge increase in y over-compensates the small loss in x. But if she cares about reference points and attribute-wise losses or gains, she (irrationally ?) rejects  $o_B^3$ . The interesting question now is, whether such patterns and evidence for endogenously changing preferences can be found in experimental data.

### 3 Pilot experiment

The notion of negotiation endogenous preference construction and the influence of loss aversion and quasi-endowment was tested in an internet pilot experiment (see Reips (2002a) and Reips (2002b) for an introduction to internet-based experimentation). The main challenge for testing on endogenous preferences in a negotiation experiment is, that subjects' preferences are neither directly observable, nor can they be elicited reliably and multiple times from

the same subject; a within subject comparison of ex-ante and ex-post preferences is impossible.<sup>10</sup> Consequently, the basic idea of the experiment is to confront different subjects with different negotiation strategies in different treatments and to solely measure their ex-post preferences. These ex-post preferences can then be analyzed in a between-subject comparison.

### 3.1 Experimental design

The pilot experiment involves non-induced value negotiations and subjects are asked for their preferences on small changes of a negotiated agreement. More specifically, their willingness to accept (WTA) for loosing on a single attribute is elicited. This data can be used to draw conclusions on subjects' reference points relative to which they evaluate an agreement. An quasi-endowment effect and a history-of-ownership effect influencing the construction of preferences might be observed and might differ depending on the history of offers made by the counterparty.

If assignment of subjects to treatments is randomized, there should be no systematic differences in the subjects' ex-post preferences across treatments except if the preferences are influenced by the process of negotiating. Systematic differences across treatments thus support the hypothesis that preferences are endogenously formed in a negotiation.

The operationalization of the basic idea is as follows: subjects negotiate bilaterally with a software agent on a tenancy contract. The monthly rent, the availability of an elevator, and the existence of a balcony are negotiable attributes in the tenancy contract. All other attributes like the size of the apartment, the available furniture, the location, etc. are non-negotiable and fixed in the subjects' instructions. After negotiating, the subjects willingness to accept a change in a single attribute of the negotiated agreement is elicited and compared across treatments.

**Recruitment** The experiment took place in April 2005 at the University of Karlsruhe, Germany. The procedure was as follows: subjects' were recruited

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<sup>10</sup>Ex-ante preferences are a subject's preferences before entering a negotiation while ex-post preferences are the subject's preferences after negotiating.

in an undergraduate class on business administration; the lecturer briefly promoted participation and sheets of paper with the login data were handed out. Subjects then logged in from home over the internet via a web browser.

A week after recruiting the subjects, a lottery was held in the lecture and 50 Euro (about 60 US Dollar) were awarded to one of the 43 participants who participate in the entire experiment. The lottery was announced in advance and each participant had the same chance of winning the lottery which was not related to a subject's specific choices during the experiment. Therefore, the lottery served as an incentive for participation but was not a salient reward as oftentimes used in experimental economics (cf. Smith (1982) and Davis and Holt (1992, p. 24ff)).

**A subject's session** When a subject logs in, the session starts with two pages of instructions followed by a questionnaire. Afterwards the subject negotiates over a tenancy contract. After the negotiation terminates, a second landlord steps in and offers an alternative contract. This second landlord serves for giving subjects in different treatments the same final tenancy contract. From this contract, the subject's willingness to accept a worsening in either the attribute elevator (attribute A) or the attribute balcony (attribute B) is elicited by asking the subject to solve to indifference equations for the respective monthly rent, i.e. the monthly rent was taken as numeraire. Finally, the session ends with retrieving some demographic data, thanking the subject, and asking for general comments on the experiment. The entire procedure is explained to subjects in the experiment's instructions.<sup>11</sup> A usual session lasted between 10 and 15 minutes.

**Negotiation protocol** During the negotiation, offers for contracts are exchanged between the two parties. The software agent representing the landlord starts with an initial offer and subsequently the parties alternate in deciding on the acceptability of an offer and proposing a counteroffer after rejecting an offer. If a maximum of six offers per party is reached, i.e. overall twelve offers, without any of the offers being accepted, an arbitrator steps in and proposes an agreement which is binding for the two parties. The subject can, however,

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<sup>11</sup>The full instructions as well as screenshots from the system are available upon request.

improve its contract by accepting the second landlord’s proposal which always is strictly better than the arbitrator’s proposal.

**Incentives** A critical point in analyzing the data gathered in the experiment is whether the subjects were sufficiently motivated to participate and sincerely consider the choices presented to them. As the financial reward was non-salient, this might be questioned. However, casual observations indicate that the subjects were motivated. Immediately accepting the landlord’s first offer would have been the fastest way to secure participation in the lottery. However, none of the subjects chose this least-effort-way and just one subject accepted the landlord’s second order; all other subjects negotiated eagerly. Overall, 47 students logged in at the experimental system; this is about 90% of the students addressed in the lecture. In four cases, the session was abandoned by the respective subject and one observation was discarded as the subject used the web browser’s forward and backward functionality.<sup>12</sup> Overall, there are 42 valid observations and the subjects’ intrinsic motivation for participating sincerely seems to be rather good.

**Treatments** The experiment embraces four treatments, i.e. four classes of strategies. Strategies in treatment 1 ( $T1$ ) have in common that each single offer grants an elevator to the subject. In treatment 2 ( $T2$ ), no offer grants an elevator to the respective subject. The values of the other attributes are randomized with a slight tendency to making concessions as the negotiation progresses. Treatments 3 and 4 ( $T3$  and  $T4$ ) utilize the strategies employed in  $T1$  and  $T2$  with the difference that attributes A and B are reversed, i.e.  $T3$  always offers a balcony to the subject while randomizing the values of the remaining two attributes and  $T4$  never offers a balcony. The software agent simply presents the sequence of predefined offers and does not accept any subject’s offer unless it dominates either a previous offer by the agent or the next offer to be made. Table 1 gives an overview on how the strategies set the attribute values in the four treatments.

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<sup>12</sup>In the instructions, subjects were asked not to use the browser’s forward and backward functions as this allows them to retract to a previous offer by the agent for accepting it after seeing the agent’s next offer.

Table 1: Overview on treatments

treatment name	monthly rent in Euro	elevator (A) yes / no	balcony (B) yes / no
$T1$	randomized	yes	randomized
$T2$	randomized	no	randomized
$T3$	randomized	randomized	yes
$T4$	randomized	randomized	no

**Theoretical Predictions** According to a neoclassical model, the willingness to accept should be the same in all four treatments and for both attributes individually. More formally, this means that the equations

$$WTA_A^{T1} = WTA_A^{T2} = WTA_A^{T3} = WTA_A^{T4}$$

and

$$WTA_B^{T1} = WTA_B^{T2} = WTA_B^{T3} = WTA_B^{T4}$$

should hold.  $WTA$  thereby stands for the willingness to accept a worsening in the attribute denoted by the subscript in the treatment indicated by the superscript.

On the contrary, a behavioral view on negotiator decision making suggests that subject in  $T1$  might feel more entitled to getting an apartment with an elevator than subjects in  $T2$  do. This quasi-endowment would lead to a higher  $WTA$  on attribute A in treatment  $T1$  than in treatment  $T2$ . For attribute B, i.e. the balcony, there shouldn't be a difference across  $T1$  and  $T2$ . Furthermore, subjects in  $T3$  might feel more attachment towards a balcony than subjects in  $T4$  while there shouldn't be a difference concerning the elevator. Overall, the behavioral predictions are:

$$WTA_A^{T1} > WTA_A^{T2}$$

$$WTA_B^{T1} = WTA_B^{T2}$$

for treatments 1 and 2 and

$$WTA_A^{T3} = WTA_A^{T4}$$

$$WTA_B^{T3} > WTA_B^{T4}$$

for treatments 3 and 4.

### 3.2 Experimental results

The average willingness to accept in T1 and T2 is given in Table 2. The different predictions derived from the neoclassical and the behavioral model can be tested with the data. The neoclassical model predicts no systematic difference across treatments whereas the behavioral model predicts a difference for attribute A. For inferences, a randomization test on ranks of classified data is used. The difference across treatments with respect to attribute A is significant at a 5% level (one-sided test,  $H_0 : WTA_A^{T1} \leq WTA_A^{T2}$ ), whereas the difference with respect to attribute B is not significant at any reasonable level (two-sided test,  $H_0 : WTA_B^{T1} = WTA_B^{T2}$ ). For attribute B, both models coincide with their prediction and this prediction cannot be rejected. For attribute A however, the neoclassical prediction can be rejected, whereas the behavioral prediction does a better job at explaining the data.

Table 2: Average WTA in treatments 1 and 2

treatment	sample size	average WTA	average WTA
		attribute A	attribute B
$T1$	13	12.9	10.7
$T2$	14	4.9	14.1

The average willingness to accept in T3 and T4 is given in Table 3. Again, a randomization test on ranks of classified data is used for inferences. The difference across treatments with respect to attribute A is not significant at any reasonable level (two-sided test,  $H_0 : WTA_A^{T3} = WTA_A^{T4}$ ), whereas here—as suggested by the behavioral model—the difference with respect to attribute B is significant at the 5% level (one-sided test,  $H_0 : WTA_B^{T3} \leq WTA_B^{T4}$ ). For attribute A, both models' predictions coincide and cannot be rejected. For attribute B, the neoclassical prediction can be rejected, whereas the behavioral prediction again does a better job at explaining the data.



Table 3: Average WTA in treatments 3 and 4

treatment	sample size	average WTA	average WTA
		attribute A	attribute B
<i>T3</i>	7	28.5	31.3
<i>T4</i>	8	15.2	3.9

**Summary of experimental results** Overall, the behavioral model based on the quasi-endowment effect and shifting reference points is in line with the data, whereas the neoclassical model of exogenously given and invariable preferences cannot account for the observed differences. However, the results should be interpreted carefully, as the pilot experiment has some limitations which will be outlined in the following section.

## 4 Enhanced experimental design

The pilot experiment gives evidence for negotiators endogenously constructing and adapting their preferences in a negotiation. However, the results have to be handled with care, as the pilot experiment broke with three methodological features which are common in experimental economics: (1) it does not base on induced values, (2) it is not context free, and (3) there are no salient monetary rewards. Therefore, the pilot experiment is first examined with respect to these features, before changes for the final experiment are pointed out.

**Examination of the pilot experiment** Kahneman, Knetsch, and Thaler (1990) present experiments on the endowment effect in scenarios with and without induced values. They find strong evidence for the endowment effect in the treatments with non-induced value consumer goods. On the contrary, the effect does not emerge in induced value settings. Therefore, the pilot experiment refrained from inducing values by handing out utility functions to the subjects. In some real life multi-attribute negotiations, decision makers might have explicitly given utility functions. However, in many scenarios—especially for consumer goods and if there is no repeated negotiation on the same good—people do not have the numbers in their head waiting to be elicited

and utilized in a negotiation; they have rather vague ideas on what their preferences are (von Winterfeld and Edwards 1986, p. 353). This is resembled in the pilot experiment.

Oftentimes, almost context free environments are created by isolating subjects from as many situational cues and real life associations as possible: players, goods, and attributes are, for example, labeled with abstract names.<sup>13</sup> On the contrary, the pilot experiment explicitly creates context by detailing the basic conditions of the tenancy contract. The case provides a rich context and tries to get the subjects involved in the scenario. This is necessary, as there are no induced values. Subject's have to bring their own preferences in the experiment and it is unlikely that subjects have reliably stable preferences over abstract goods and attributes.

Salient monetary rewards are payments based on the subjects' performance in an experiment; they intended to provide incentives for rational—or at least well considered—decision making. The experimenter does not want the subjects to make random actions; instead, subjects should aim at maximizing their performance measured by induced values. As there are no induced values, it is difficult to measure performance in the pilot experiment and to base payments on the performance. The challenge is that there is no correct or incorrect decision by a subject—there is no right or wrong but decisions depend on a subject's (unobserved) personal preferences. Therefore, rewards cannot directly base on actions.

On the other hand, there is evidence that monetary incentives do not necessarily increase performance (Gneezy and Rustichini 2000). Cognitive psychology suggests that performance-related rewards might decrease intrinsic motivation and therefore might decrease overall motivation to perform. This problem seems less severe with performance-independent rewards. Therefore, the pilot experiment—without performance-based monetary payments—simply offers a lump-sum compensation for the time spend and appeals to the subject's intrinsic motivation.

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<sup>13</sup>Loewenstein (1999, p. F29) on the other hand points out that an experiment will never be context free; there are always real life associations going into a subject's decision making.

**Design changes** From an experimental economics view, the main drawback of the pilot experiment is the lack of salient rewards. This shall be overcome by the final experiment. Instead of a hypothetical rent contract, subjects will negotiate over

- durable consumer goods like mp3-players  
(attributes might be the manufacturer, the memory capacity, and the price)
- perishable consumer goods like restaurant gift coupons  
(attributes might be the specific restaurant, the time frame for usage, and the monetary value)
- abstract induced value goods where the utility function given by the experimenter is just partially defined. The single-attribute value functions might be contingent on the realization of a random event which is unobserved by the subject.
- abstract induced value goods where a subject knows its utility function with certainty.

The consumer goods will physically be handed out at the end of the experiment, whereas the abstract goods will be exchanged for monetary payments. The riskless abstract induced value good serves as benchmark case as one should not expect a quasi-endowment effect here (cf. Kahneman, Knetsch, and Thaler (1990)).

In addition, the experiment will differ from the pilot experiment in allowing for repeated negotiations on the same good. There is evidence that experience reduces the impact of the endowment effect (List 2003). In Section 1 it was argued that preference construction is especially pronounced in domains where the respective individual has relatively few experience or none at all. Therefore, one can imagine, that the endogenous construction and adaptation of preferences diminishes when subjects repeatedly negotiate over the same good.

Furthermore, the experiment will not only comprise negotiations among subjects and software agents but will examine negotiations among pairs of

human subject's as well. The purpose is to analyze whether subject's behave differently depending on whether their counterparty is a fellow student or a software agent acting on behalf of the experimenter.

Finally, the experiment will be conducted in a laboratory rather than over the internet.

## 5 Related work

Literature on negotiation analysis brought up several explanations for empirically observed behavior of negotiators; see Bazerman and Neale (1992) for an overview. The lack of Pareto-optimal outcomes, for example, is frequently attributed to the following cognitive biases:

- The *fixed pie illusion* states that many negotiators disregard integrative potential and assume to play a constant-sum game (Bazerman and Neale 1992).
- The *illusion of conflict* implies that parties assume that a compromise which is good for the counterparty is bad for themselves (Thompson and Hastie 1990).
- The theory of *reactive devaluations* of the counterparty's offers directly follows from the illusion of conflict. Parties devalue any proposal made by the counterparty just because it originates from the counterparty (Ross and Stillingner 1991).
- Positive *framing* of a negotiation situation leads to better performance of negotiators than a negative framing (Neale and Bazerman 1985b).
- *Goal setting* influences negotiators' perception of what is attainable or acceptable and as a result affect negotiators' performance (Neale and Bazerman 1985a; Bazerman, Magliozzi, and Neale 1985).
- Different *fairness perceptions* provide parties to dismiss outcomes which are identified as fair by the counterparty (Babcock, Loewenstein, Is-sacharoff, and Camerer 1995).

- The *self-enhancement bias* assumes that negotiators are overly confident in the own skills which reduces a negotiator’s performance (Neale and Bazerman 1985b; Kramer, Newton, and Pommerenke 1993).

The offer-dependent preference construction outlined in the previous sections is not in conflict with these established behavioral patterns and biases but introduces a new perspective on negotiators’ decision making. All of these effects might interact with each other.

Reference-dependent evaluation of offers—as argued in the present paper—is not entirely new to negotiation analysis; it is related to anchoring which is among the common mistakes in negotiations (Bazerman and Neale 1992). However, studies on anchors in negotiations regard the initial positions of bargainers, i.e. their opening offers, as anchors. How negotiators adapt anchors and reference points gradually during the process of negotiating is not resolved up to know.

Furthermore, the influence of reference-dependent evaluation on decision making is well-known: Tversky and Kahneman (1991) extended the concept of reference points from risky choices (Kahneman and Tversky 1979) to riskless multi-attribute choices. The authors cover the effect of reference-dependence in great detail without addressing the emergence of reference points in a multi-attribute decision space. “The question of the origin and the determinants of the reference state lies beyond the scope” of their article (Tversky and Kahneman 1991, p. 1046). The present paper takes up the established reference point concept and studies its emergence in bilateral negotiations.

Curhan, Neale, and Ross (2004) study preferences changing during a negotiation with a focus on dissonance and self-perception theory. The basic idea of endogenously constructed preferences is related to the present study. Yet the authors do not address endowment effects and loss aversion and therefore have a different perspective on a related phenomenon.

Besides the negotiation analytic approaches outlined above, game theory deals with bilateral interactions as well. Game theoretic models of negotiations with reference-dependent preferences are build by Compte and Jehiel (2003) and Li (2004); their players’ reference points shift as a function of offers received—this is in line with the argumentation in the present paper. Both

articles, however, focus on single-attribute bargaining and the results do not straightforwardly apply to multi-attribute negotiations. Finally, and again for the single-attribute case, Kristensen and Gärling (2000) find experimental evidence on subjects evaluating offers relative to adaptive reference points. These single-attribute studies strengthen the assumption that related effects might emerge in multi-attribute negotiations as well and preferences might be endogenously constructed during a negotiation process.

## 6 Conclusion and future work

Two polar perspectives on negotiators' behavior and preferences are that (1) negotiators enter a multi-attribute bargaining process with exogenously given and invariable preferences over possible agreements, on the one hand, or that (2) they endogenously construct and adapt their preferences during the negotiation with respect to the history of offers made in the ongoing process, on the other hand. The paper outlines the theoretical background of preference construction and adaptation in negotiations, introduces an experiment which aims at testing the descriptive validity of the two perspectives, and reports results from a pilot experiment.

The main ideas incorporated in the notion of endogenously constructed and history dependent preferences in negotiations come from

- the reference-dependent evaluation of multi-attribute outcomes (Tversky and Kahneman 1991),
- studies on loss aversion and the endowment effect (Kahneman, Knetsch, and Thaler 1990),
- their extension to quasi-endowment (Heyman, Orhun, and Ariely 2004),
- the effect of the history of ownership on preferences (Strahilevitz and Loewenstein 1998), and
- the literature on constructive consumer choice (Bettman, Luce, and Payne 1998; Hoeffler and Ariely 1999).

Empirical studies on negotiation support systems and experiments on single-attribute negotiations back up the idea that negotiators' preferences might not be invariant to the negotiation itself; see e.g. Cray and Kersten (1999), Vetschera (2004), and Kristensen and Gärling (2000). Furthermore, the internet pilot experiment with students negotiating over hypothetical tenancy contracts strongly supports the supposition of negotiation endogenous preference construction with respect to quasi-endowment.

Future work will be twofold: On the one hand, the pilot experiment's results will have to be reproduced in a laboratory experiment based on salient rewards as outlined in Section 4. On the other hand, implications for negotiators will be analyzed with the intention to give prescriptive advice for negotiation heuristics and for the design of negotiation support systems.

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