University of California
Santa Barbara

Perceived Knowledge and Expectations: Essays on Individual Choice Behavior

A dissertation submitted in partial satisfaction
of the requirements for the degree

Doctor of Philosophy
in
Economics

by

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September 2015

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To my family.

Acknowledgements

I'd like to express my gratitude to all whom have helped and supported me in this journey.

To my love, my husband - César Santacana. Thank you for being my safe haven.

To my parents - Marta Melo and Marcos Ferreira - for their eternal and unconditional love and support. To my step-mom Marta Pituba and my beloved siblings - Januaria, Virgulino, Ligia, Luiza, Elomar and Ariano - who have shown me that time and distance can be non-significant parameters on the regression to explain love.

To my friends, the ones I knew from before and the ones I made along this past five years. Friends who have helped me to solve problems from homework, research and life. I couldn't have made it without them.

To the professors from the UCSB Economics Department, I am immensely grateful for all the knowledge and opportunities you brought into my life. A special thanks to my committee whose help was essential in every step of this journey. If I'm a better person today than I was five years ago, my Professors are greatly responsible.

To the staff from the Economics Department, the Office of International Students and Scholars and the Institute for Social, Behavioral and Economic Research. Thank you for all your help.

A special thanks to my advisor Professor Gary Charness. Thank you for believing in me, helping, guiding and for letting me know when my ideas weren't exactly "that good". Thank you for understanding and for helping me in every step of this journey.

Curriculum Vitæ

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Education

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Publications

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Ferreira, Iansã M. and José Raimundo O. Vergolino. Economia da Escravidão: A Depreciação da "Máquina Negra" nas Lavouras do Açúcar. Texto para discussão PET-Economia/UFPE, 2004.

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Abstract

Perceived Knowledge and Expectations: Essays on Individual Choice Behavior

by

Iansa Melo Ferreira

This dissertation is composed of three Experimental papers on individual choice behavior. On the first I discuss decision making process within ambiguous settings and how ambiguity aversion and contrast effects can affect choice behavior. In this work two types of ambiguity are defined: *Subjective Ambiguity*, where outcome probabilities are well defined but not known to the decision maker; and *Intrinsic Ambiguity*, where decision maker's perception about outcome probabilities are subject to sudden changes. Using these two concepts separately, I performed an experiment to test how does the flow of one's own knowledge perception behaves. The results suggest distinct choice patterns for each ambiguity type. I find that intrinsic ambiguity tends to enhance recency bias. Also the distance between 2 events has a clear effect when the decisions involve subjectively ambiguous events, but not so if probabilities are uncertain. Finally, the existence of an intermediate event with a distinct bias from that of the baseline does not reduce the influence of that baseline over the individual's knowledge perception. On the second paper I present a laboratory experiment designed to shed light into the role of expectations on workers' reciprocal behavior when a cut in wages takes place. Previous literature has studied reciprocity without expectation formation, but if expectations enter individuals' loss-gain utility, they may affect perception and effort choices. Using fixed wages and productivity-dependent profits, I measure workers' responses to a cut in wages in situations where that cut was more expected, as well as when it was less expected. Results are consistent with the notion of reciprocity and also with the idea that expectations can

influence workers' reciprocal behavior, so that workers effort varies less when wages were expected. Lastly, the third paper explores the effect of a movie trailer over the enjoyment of a short movie, using a lab experiment. The results show that the average enjoyment for was higher for the Control group than for the Treatment (Advertisement) group. In fact, on average, the difference between individuals' predicted and realized enjoyments (before and after watching the movie) was twice as much for the Control than for the Treatment group.

Contents

Chapter 1

Perceived Knowledge and Ambiguity: An Experimental Study

1.1 Introduction

The choices we make are not isolated events. Generally, when making a choice individuals tend to draw comparisons using their own past experiences or previously acquired knowledge and the options at hand. Further, when faced with a string of similar decisions such as the interview of prospective employees, food or beverage tasting, speed dating, etc. individuals tend to carry on to the next decision a baseline judgment generated from the qualifications of previous ones.[1] A behavior which, by extrapolation, we should expect when evaluating policies, programs, stock portfolios, etc.

In fact, comparative judgment should be expected whenever choice-objects contain intrinsic ambiguity, such that the decision maker's understanding of procedures, pros and cons are likely to affect his choices. For that same reason to better understand

[1] Unlike a Bayesian updating process, each event can be (and in many cases is) independent from the other ones, such that no new information is brought in, just a new perception of the existing information.

the decision making process within ambiguous settings, two types of ambiguity are here defined. *Subjective Ambiguity*, where outcome probabilities are well defined, but not known to the decision maker; and *Intrinsic Ambiguity*, where decision maker's perception about outcome probabilities are subject to sudden changes.[2]

Previous research shows that once an individual is presented with a highly desirable alternative, she is likely to update her impressions and judge subsequent options more harshly. Similarly, when first presented with a highly undesirable option, individuals are more likely to recalibrate, and accept not so good alternatives (e.g. Fox and Weber, 2002 [1]; Bhargava and Fisman, 2014 [2]).

A similar pattern can be observed when individuals evaluate their own knowledge regarding similar choice-objects. In evaluating ambiguous lotteries, for example, we should expect individuals to bet higher (overall) on the lotteries which pertain events they believe to be more familiar to them, and less on the ones that feature events about which they have less knowledge.

The Comparative Ignorance Hypothesis (Fox and Tversky, 1995 [3]) suggests that people don't classify their knowledge in absolute terms, instead they tend to draw comparisons based on previous experiences or on the knowledge of others. Fox and Weber (2002) [1] used ambiguity intrinsic events to show that when previously presented with a highly familiar event, people are likely to underestimate their own knowledge regarding an average familiarity one; and when previously presented with an unfamiliar event, they tend to overestimate their knowledge about the same average familiarity one (*study 1*, p. 481).

Following this literature, this paper advances the understanding of how the perception of one's own knowledge can be affected by framing and comparison. More specifi-

[2]Such changes can come from availability of new information, such as the knowledge of an incoming storm can change weather perspectives; or from the learning of relevant third party opinions, such as opinions regarding the future returns of a given stock option.

cally, whether the increase in the distance between the comparable information influences knowledge perception;[3] whether the presence of an intermediate event with a contrasting familiarity level promotes a diminished effect; and whether the structure of ambiguity (Subjective or Intrinsic) plays a role on individuals' perception of their own knowledge.

This paper contributes to the ongoing research on contrast and comparison effects on choice behavior by bringing a double analysis of such effects. It differs from previous literature as it experimentally elicits perception of knowledge for the two distinct structures of ambiguity on decision strings. Further, it uses the same pool of subjects and the same treatments, allowing for a cleaner comparison between effects across these two settings.

The experimental results suggest that distance between choice events may play a role in individuals' perception of knowledge. However, they also indicate that intrinsic ambiguity diminishes these effects, perhaps a feature of bounded rationality, which should be more pronounced when more parameters are at stake. As for the role of intermediate events on one's perception, again only the subjectively ambiguous lotteries presented significant results. Surprisingly, they indicate that the role of intermediate events may differ completely from that of the baseline (first) event presented, perhaps yielding assimilation rather than contrast, and allowing for a larger spread on acceptable choices.

1.2 Risk, Ambiguity and Choices

According to the literature, ambiguity aversion does not come from an inability to establish subjective probabilities to a certain event, but from the change in the will to act due to the lower weight of evidence, or yet due to a matter of source preference

[3]Here, distance stands for the amount of information visited by the decision maker in between the events, which may (or not) weaken the perceptive memory acquired from the baseline event (first event faced).

(Keynes, 1921 [4]; Ellsberg, 1961 [5]; Becker and Brownson, 1964 [6]). But, how do people act when facing ambiguity? How to classify behavior towards ambiguity when it is not contrasted with a risky option? And finally, how do ambiguous settings and events change individuals' choice behavior?

In 1921, Frank Knight [7] differentiated measurable uncertainty, risk, and unmeasurable uncertainty, ambiguity or Knightian uncertainty. Also in 1921, Keynes [4] pointed out that people base their decisions on two things: 1) *Judged Probability* - which regards the probability an individual believes to be true for a certain event; and 2) *Weight of Evidence* - which corresponds to the credibility of the source of the individual's underlying information.

A few years later, the Expected Utility Theory (Von Neumann and Morgenstern, 1949 [8]) came about regarding risky choices, and later the Subjective Expected Utility Theory (Savage, 1954 [9]) contemplated ambiguity in a risk-like setting. In 1961, Daniel Ellsberg [5] used urns with proportions of red and black balls in order to show that people do not necessarily behave according to (subjective) expected utility, instead they tend to avoid situations where probabilities are not entirely clear.

Becker and Brownson (1964) [6] performed an experiment similar to Ellsberg's but found no exact pattern regarding ambiguity preferences, but indications that individuals who may find ambiguity desirable in a given situation, may find it undesirable under different conditions. Yet, Gilboa and Schmeidler (1989) [10] modeled Ellsberg's idea of ambiguity aversion pointing out that if individuals are assumed to have a max-min expected utility Ellsberg's findings are completely in line with rational choice behavior.

Further pursuing the understanding of what came to be known as "ambiguity aversion" the Prospect Theory and the Cumulative Prospect Theory by Kahneman and Tversky (1979 [11] and 1992 [12]) suggested that individuals use two weighting scales on their decision making process, one regarding the probability of the outcome, and one

regarding the outcomes themselves.

Heath and Tversky (1991) [13] proposed that individuals would rather face an ambiguous choice to face a risky one as long as the former concerned a familiar subject. Their Competence Hypothesis postulates that agents' willingness to bet in an ambiguous event depends not only on its estimated probability of occurrence, but also on the knowledge or competence the individuals possess (or believe to possess) regarding that event.[4] Therefore, when facing risky and ambiguous situations, for a given level of judged probability, perceived knowledge could drive individuals to an ambiguity-seeking behavior with the idea that "they generally do better in situations they understand than in situations they have less knowledge" (p.9), an indication that, in a Prospect Theory setting, the lack of precision may not affect the probability weighting scale.

Charness and Gneezy (2010) [14] also found some evidence of this when discussing ambiguity aversion in a stock market setting. Using Ellsberg two-color urns and an in-between design, the authors evaluated individuals' willingness to pay to avoid ambiguity (by betting on the risky urn), and also willingness to invest in each case (ambiguous and risky). Results showed that participants were willing to pay to avoid ambiguity, however the amounts invested didn't change across treatments, which indicates that people may be averse to ambiguity, but when facing it, they tend to act (choose the amount to bet) on the same grounds as on a risky situation.

Many experimental papers tested how people behave regarding ambiguous versus risky events. However, in real life choices, we hardly find risky events with which to compare the ambiguous ones we face. In fact, the level and structure of the ambiguity that permeates most decisions on our daily lives can hardly be mimicked by risk. Therefore, before we try to understand individual behavior in face of uncertainty, it is worthwhile

[4]The fundamental aspect is the individual's evaluation regarding his knowledge/competence. Whether his perception is a reflection of the truth is irrelevant. It is his subjective sentiment regarding his own competence level that will be the driving aspect.

to think how different topics or events may present distinct ambiguity structures, and thus trigger different behavioral patterns. Here we'll deal with two ambiguity structures, as defined below:

- *Subjective Ambiguity*: Individual specific ambiguity, where the event itself has well-defined probabilities to each possible outcome. However, the decision maker is unaware of these probabilities and will, at best, make an educated guess regarding the outcomes. Examples of this type of ambiguity include Ellsberg's urns, and yes-or-no bets on factual events;

- *Intrinsic Ambiguity*: The event is inherently ambiguous in the sense that there are no well-defined probabilities. Instead, perception of probabilities for any given outcome are subject to sudden changes such that there are no ex-ante "correct answers". Examples of it include stock behavior, and future weather outcomes.[5]

The literature shows evidence that behavior is similar in risky and (subjectively) ambiguous situations, but how does it compare across our two ambiguity structures? We are often faced with strings of decisions which can influence each other by ordering, comparison and contrast. However, especially when dealing with intrinsically ambiguous events, it is hard to evaluate choices using Bayesian or any other "hard-structured" analysis method. That's when we need to appeal to our previously acquired knowledge, or yet to how much we believe to know, in order to establish our beliefs and make choices.

When discussing behavior in comparative situations, using non-ambiguous choices, Moore (1999) [15] argued that people are unlikely to have pre-establish global preferences, which would require preferences over an infinity of possibilities.[6] The literature shows

[5]Here, the number of factors which can influence the outcomes is not countable, and several of them can drastically change decision maker's probability judgment.

[6]Recall that dimensions such as time, place and state of the world can affect a good's desirability.

evidence that comparative and contrast effects may affect both ambiguous and non-ambiguous lotteries in a similar fashion (See for example: Keppe and Weber, 1995 [16]; Moore, 1999 [15]; Heath and Tversky, 1991 [13]).

Fox and Tversky (1995) [3] developed the Comparative Ignorance Hypothesis (CIH), which postulates that when facing ambiguous events, an individual will adopt a baseline parameter and evaluate new choice events by drawing comparisons with that baseline.[7] They showed evidence that when people are asked to price a prospect in context of another "they become sensitive to the contrast in their knowledge regarding the two events and as a result they price the less familiar or vaguer prospect lower than the more familiar or clearer prospect" (p.599). In that sense, a decision maker could be brought to believe herself more or less knowledgeable about a given event by the establishment of the appropriate baseline comparison parameter.

Further, the authors used choices in comparative and non-comparative settings to show evidence that source preference is inherently comparative. They found that the effects are more clearly observable with comparison between risky and ambiguous lotteries, than when comparing different levels of ambiguity. Also, when in isolation, an event will be analyzed using typical Bayesian methods, however in the presence of comparable events, judgments are likely to be biased.

Chow and Sarin (2001) [17] also tested for the comparative effects observed by Fox and Tversky. Their results supported an ambiguity averse behavior even without comparison. However, such an aversion was much decreased in the absence of a risky alternative. According to the authors, the difference observed between the comparative and the non-comparative scenarios may happen because in a non-comparative setting, ambiguity becomes a secondary issue, and as such may be under-evaluated by the participants.

[7] In general the baseline will be given by the first event faced for a given topic, or a comparable category.

Another explanation could be that risky lotteries are more easily evaluated, becoming a reference for the individual when she prices ambiguous ones. Finally, one may argue that the lack of knowledge in an ambiguous lottery becomes more evident when a comparable risky alternative is available - which is the case for most subjectively ambiguous lotteries (see Hsee, 1996 [18] and Hsee et al., 1999 [19]).

Fox and Weber (2002) [1] designed and performed five experiments to test whether enhancing perceived knowledge would exacerbate source preference. In their experiments the authors evaluated how perceived knowledge could be influenced by the establishment of a more (or less) familiar baseline event;[8] or by the addition (or not) of extra information which suggested the existence of more knowledgeable individuals. Their findings support that relative knowledge plays a large role on choice behavior in a comparative context, and that source preference is more pronounced when in the presence of comparison parameters.

Ferreira and Resende (2011) [20] revisited the Comparative Ignorance Hypothesis by performing an experiment where 270 students from the University of Brasília, Brazil, priced intrinsically ambiguous lotteries regarding future weather conditions in three different locations. The participants were randomly divided into four groups. Each group was asked to price two or three lotteries regarding events of distinct familiarity levels according to the treatment received, as shown in order: 1A) low-familiarity, average-familiarity; 1B) high-familiarity, average-familiarity; 2A) low-familiarity, high-familiarity, average-familiarity; and 2B) high-familiarity, low-familiarity, average-familiarity.

The results corroborated the CIH as verified by Fox and Weber (2002) [1]. Further, on three-events questionnaires (treatments 2A and 2B), the comparative effect from the first event presented (baseline) was carried out to the last event (target), despite the

[8]The authors used either events that were highly familiar, or events that were highly unfamiliar to participants as a baseline, in the intent to bias their perception of knowledge regarding an average familiarity event pertaining the same topic.

existence of opposing intermediate event. However, the mean price given to an average-familiarity lottery on a three-event questionnaire showed a smaller effect than the one observed on the two-event questionnaire for a given baseline, suggesting that the presence of intermediate events may reduce the bias brought up by comparison. These results opened the question of whether the comparative bias decreased - from a two-event to a three-event questionnaire - due to a bigger distance between the first and the last lotteries, or because the intermediate event presented a familiarity level that strongly differs from that of the baseline.

The following session presents an experiment designed to test the effects of distance and familiarity of intermediate events on ambiguous choices. The objective is to understand how comparisons are performed when decision makers face a string of ambiguous decisions, what is more likely to affect final results, and whether the formation of perceived knowledge behaves similarly for subjective and intrinsically ambiguous decisions.

1.3 Experimental Design and Hypothesis

In order to evaluate how comparative knowledge is affected by the distance between events and the familiarity level of these events, two questionnaire types were formulated, each contemplating a different kind of ambiguity. Both questionnaires consist of the ordered presentation/evaluation of two or four events, according to one of three possible treatments designed to test our two main hypothesis. The treatments were:

- **T1**: Low-familiarity (LF); Average-familiarity1 (AF1);
- **T2**: Low-familiarity; Average-familiarity2 (AF2); Average-familiarity3 (AF3); Average-familiarity1
- **T3**: Low-familiarity; Average-familiarity2; High-familiarity; Average-familiarity1

Given the treatments we can define our two main hypothesis on perceived knowledge in terms of a target event E, and the baseline event (first event presented):

H1: *The further away an event E is from the baseline, the less it's perceived knowledge will be affected by that baseline.*

$$Perceived\ Knowledge\ of\ AF1 \mid T1 > Perceived\ Knowledge\ of\ AF1 \mid T2$$

H2: *The existence of an intermediate event which's familiarity degree strongly differs from the one of the baseline, will reduce the influence of the baseline over the individual's perception of knowledge regarding event E.*

$$Perceived\ Knowledge\ of\ AF1 \mid T2 > Perceived\ Knowledge\ of\ AF1 \mid T3$$

Charness and Gneezy (2010) [14] found that individuals may show aversion to ambiguity, but once facing a (subjectively) ambiguous situation they tend to act in the same manner as they would in a risk situation. However, it makes sense to think that when dealing with intrinsic ambiguity, the lack of a comparable risk situation should drive individuals to abide by some other "judgment base" in order to realize their choices.

It could be the case that this judgment base was defaulted to be the first event presented (baseline), such that the judgment of each event will be anchored to that baseline, diminishing the influence of intermediate events' familiarity and distance over one's perceived knowledge (Ferreira and Resende, 2011 [20]). Another possible judgment mechanism by the participants could be through a recency bias brought up by bounded rationality. According to Erev and Haruvy (2013) [21], recency bias is to the tendency of individuals to discount past information. Thus, given the more complex nature of intrinsic ambiguity, and the consequent larger amount of parameters and alternatives to be considered in the choice process, it is likely that boundedly rational agents will suffer a stronger recency bias, which should diminish the effects of events placed further away, reducing sequential judgment spillovers.

With that in mind, we write our third hypothesis:

> **H3**: *Even though the type of ambiguity should not affect the direction of the effects, intrinsic ambiguity should result in weaker effects.*

Each participant responded to two questionnaires, undertaking only one treatment for each kind of ambiguity. The events in each questionnaire type were chosen to maximize the match between the desired familiarity level (by the experimenter) and the participants' perceived familiarity level regarding each event. Recognizing that this perception is unlikely to yield a perfect match, possibly jeopardizing the results, all questionnaires were followed by a "knowledge sorting" sheet, where participants were asked to state how knowledgeable they believed themselves to be on a scale of 1 (no knowledge) to 7 (perfect knowledge) about each of the events they faced, allowing for the recognition and exclusion of individuals whose knowledge-familiarity ordering conflicted with the familiarity assumptions.[9]

Also, understanding the role of risk preferences on the choices made by the individuals throughout the experiment, and the importance of controlling for this preferences, at the beginning of each section participants were presented with a question meant to elicit risk preference. Exact words below:

> Suppose you were endowed with 100 lab tokens and asked what portion of it (between 0 and 100, inclusive) you wish to invest in a risky investment.[10] If the investment succeeds it will pay 2.5 times as many tokens as invested, otherwise you'll lose your investment. Each outcome happens with a 50% probability, and what you don't invest is yours to keep.
>
> How many tokens would you invest? _____

[9] This scale was used by Resende and Wu (2010) [22], and Ferreira and Resende (2011) [20].

[10] Payments for this phase were performed on an exchange rate of 1 token = US$0.05, and made out to 20% of the participants chosen at random in each session.

This method, known as the Gneezy and Potters method (Gneezy and Potters, 1997 [23]; Charness et. al., 2013 [24]), was chosen due to its simplicity regarding participant understanding and lab performance.[11] Although it does not allow for a distinction between risk-neutral and risk-seeking individuals, it allows for a scaling on risk-aversion, which can be controlled on data analysis.[12]

1.3.1 Intrinsically Ambiguous Events: Weather Lotteries

In this questionnaire based on Fox and Tversky (1995) [3] (See also Fox and Weber, 2002 [1]; and Ferreira and Resende, 2011 [20]) each participant was exposed to one event at a time, according to the treatment received. The events used were:

- *Low-familiarity event* (Baseline): Late-April's temperature at the city of Annaba, Annaba Province;[13]
- *Average-familiarity event 1* (Target): Late-April's temperature at the city of Douglas, Arizona;
- *Average-familiarity event 2*: Late-April's temperature at the city of Moscow, Tennessee;
- *Average-familiarity event 3*: Late-April's temperature at Oklahoma City, Oklahoma;
- *High-familiarity event*: Late-April's temperature at the city of Sacramento, California.

[11] I thank professor Gary Charness for pointing out this method and its advantages.

[12] In this task, any risk-neutral or risk-seeking agent should opt for investing all the tokens, since the expected gains are always higher than the initial endowment.

[13] Annaba is a province in Algeria. However, this piece of information was withheld from participants in order to minimize familiarity with the event.

The events (cities) were chosen based on participants' expected knowledge, as well as on the cities' average temperature around the target month (April). For each chosen city, the likelihood of the elected temperature to happen on the elected date is roughly the same, but participants should present a distinct knowledge perception across events. Each participant was asked to price 2 or 4 lotteries (according to treatment) on the cities' temperatures, as shown below:[14]

> Suppose you were offered a lottery ticket which would pay US$100 if the highest afternoon temperature in the city of [CITY, LOCATION] was *at least* 60F, on the next April 25th. How much would you be willing to pay for that lottery ticket?
>
> I'd be willing to pay US$ _____

> Suppose you were offered a lottery ticket which would pay US$100 if the highest afternoon temperature in the city of [CITY, LOCATION] was *less than* 60F, on the next April 25th. How much would you be willing to pay for that lottery ticket?
>
> I'd be willing to pay US$ _____

Participants were informed that there were no wrong answers, and that they should think carefully about what would be their true reservation prices for each lottery ticket. They were also asked to price complementary lotteries independently, and not as if they could acquire both to ensure winning. Finally, they were told that they were not to look either back or forth in order to answer a question, but should take them one at a time, as presented in each questionnaire.

[14]The experiment was performed on April 12th, making the temperature on April 25th an intrinsically ambiguous, but not too far off, event.

In order to avoid distortions regarding ordering and beliefs, some balancing efforts were made. For each event, half of questionnaires were written offering first a lottery that would pay for an afternoon temperature "at least 60F", and then one which paid for a temperature "less than 60F", while the other half faced the opposite ordering. All analysis were performed on the sum of prices reported for each event on complementary lotteries.[15]

By eliciting individuals' willingness to pay for a given set of lotteries, we may get a perspective on how does the flow of perceived knowledge influences their choices. According to previous literature, the less confident an individual feels about an event, the less she would be willing to bet on it, which would reduce the total any one individual would be willing to pay for a given event (sum of complementary lotteries) as her perceived knowledge regarding that event grows fainter. Since all treatments end with the same event (Average Familiarity1), we should expect the elicited price for its occurrence to indicate how knowledgeable individuals feel about that last event when they reach it.

If distance reduces the effect of the baseline over the last event's knowledge perception (H1), we should expect to have individuals pricing the target lottery more expensively on treatment 1 than on treatment 2, once the addition of the two intermediate events should decrease the upward bias promoted by the low-familiarity baseline.

Also, if the individual's familiarity with intermediate events should matter, as predicted by H2, we should expect a higher price for the last lottery on treatment 2 then on treatment 3, since the latter presents a high-familiarity event which should diminish the baseline's effect.

[15]This procedure is common on previous literature, and aims to avoid distortions generated by common beliefs regarding the any of the cities' temperatures used in the questionnaires, as well as to be consistent with the idea of *source preference* (see for example Fox and Tversky, 1995 [3]; Fox and Weber, 2002 [1]; Ferreira and Resende, 2011) [20].

1.3.2 Subjectively Ambiguous Events: Capitals' Lottery

Using the same pool of subjects and the same experimental setting,[16] the second type of questionnaires used the following events:

- *Low-familiarity event*: What is the capital of Estonia;
- *Average-familiarity event 1*: What is the capital of New Zealand;
- *Average-familiarity event 2*: What is the capital of Peru;
- *Average-familiarity event 3*: What is the capital of Argentina;
- *High-familiarity event*: What is the capital of England.

In order to choose the events (countries) for this questionnaires, we performed a quick survey with 13 undergraduate students from UCSB. In that survey, the students were asked to use a scale of 1 (no knowledge) to 7 (perfect knowledge) to answer how did they believe other people like themselves would feel about their knowledge regarding the capitals of 9 countries.[17]

This time, participants were asked to state what city did they believed to be the capital of the corresponding country, and invited to bet on their own answer, as shown below:[18]

Q1 - What city do you believe to be the capital of [COUNTRY]?

I believe the capital of [COUNTRY] is _____

[16] Randomly assigned treatments, one per participant, using the same events differing only in the order of presentation according to treatment, and also the presence of a knowledge sorting sheet at the end of each questionnaire for matching purposes.

[17] Students were asked about the capitals of New Zealand, Albania, Peru, Czech Republic, Philippines, Argentina, Chile, Paraguay and Brazil. For their participation on this survey, students had a chance to win a US$20.00 prize on a random draw.

[18] Notice that the end bet constitutes a *"yes or no question"*, qualifying these as subjectively ambiguous lotteries.

Q2 - Would you prefer to receive US$10 if your guess is correct, or to receive the same US$10 upon a coin flip? (Circle one)

[MY ANSWER] [COIN FLIP]

Should we expect distance to be influential (H1), the proportion of participants willing to bet on their own answers for the target lottery should be higher on the first than on the second treatment. And if the intermediate events matter (H2), we should expect less people willing to bet on their own answers about the target on the third treatment than on the second one.

Finally, in order to incentivize more reliable answers from this task, participants were paid either US$10 or nothing according to their answers and individually performed coin flips.[19]

1.4 Experimental Procedures and Results

The experimental sessions were performed in 3 distinct phases where each participant responded to the risk elicitation task, and both the weather lotteries and the capitals' lotteries questionnaires. Upon arrival, each participant was assigned an experimental ID number, which they were asked to write on each questionnaire, allowing for the experimenter to backtrack their elicited risk preferences, and their choice behavior at each situation.

To minimize misunderstandings, participants were encouraged to ask questions as long as those regarded procedures and protocols, not the research idea, nor the expectations

[19]In order to choose the event, a random draw out of 4 sets of 4 cards (Ace, 2, 3 and 4), performed *ex post*, determined what event was paid for. For treatment 1 an odd number (Ace or 3) stood for the first question, and an even (2 or 4) for the second one. For treatments 2 and 3, the card pinpointed the exact event which paid off.

(theirs or the experimenter's) about results. As yet another balancing effort, in half of the sessions, participants responded first to the intrinsically ambiguous questionnaires, and then the subjectively ambiguous ones, while the other half responded to them in the reversed order. All questionnaires were presented in paper, handed one at a time, and specific instructions were read out loud and cleared before each questionnaire.[20]

One hundred and fifty six UCSB undergraduates participated on the experiment, which was performed in 8 sessions along the same day. Upon arrival, each participant was immediately entitled $5 show up fee, which she received at the end altogether with any extra earnings from the capitals' lottery and the risk preference eliciting task, when applicable. Payments were made by handing opaque envelopes identified only by the experimental IDs and containing the amount of cash corresponding to participant's total earnings.

Each treatment type questionnaire was responded by approximately one third of participants. Questionnaire's data was excluded from the sample whenever the knowledge sorting (scale from 1 to 7) violated the assumption about relative familiarity levels.[21] Once data was cleaned for relative knowledge assorting, 130 observations remained for the lotteries with intrinsically ambiguous events, and 110 for the ones with subjectively ambiguous events.

Since the idea is to understand the flow of perceived knowledge by measuring how it reacts to framing and contrasts on a string of decisions, it is important that the participants' familiarity level with each of the events shows consistency with respect to the desired orderings. Table 1.1 presents the average levels of familiarity for each event

[20]Neither of the balancing orders showed significant differences across groups.

[21]Since the knowledge rating is inherently relative, in order to be deemed acceptable an observation's rating only needed to abide by the ordering of knowledge. That is, no rating could be lower than the one for the low knowledge event, no rating could be higher than the one for the high knowledge event (when applicable), and average events had to be within a distance of at most 2 rating points from each other.

as stated by the participants on the knowledge sorting scales for each questionnaire type.

Table 1.1: Average of Reported Familiarity Levels for each Event and Questionnaire type

		Weather Lotteries	Capitals' Lotteries
Low Familiarity	(LF)	1.26	1.11
Average Familiarity 1	(AF1)	3.86	1.97
Average Familiarity 2	(AF2)	2.95	2.02
Average Familiarity 3	(AF3)	3.37	1.76
High Familiarity	(HF)	5.03	4.27

NOTE: Average familiarity as reported on a scale of 1 through 7 by all respondents that faced the event, for all observations which remained in the final sample.

Notice that, even though the uncertainty that permeates the weather events is deeper, the reported familiarity levels were higher than the ones reported for capital's lotteries for every event type. One possible explanation is that given that subjective ambiguity is closer to risk, in the sense that probabilities - despite being unknown - are fixed, it is likely that individuals will draw a risk-ambiguity comparison by realizing that there are other individuals who truly know the "more appropriate answer". Such recognition may promote an ambiguity aversion effect across all events analyzed, reducing the asserted familiarity for these lotteries.

In the other hand, when dealing with intrinsic ambiguity the lack of a directly comparable risk situation, and the understanding that perception of probabilities is unstable, may drive individuals to believe themselves more likely to "know as much as others" about the events, increasing the asserted familiarity for those lotteries in comparison to the subjectively ambiguous ones.

For each questionnaire, the data analysis was done using tests and procedures that best fitted the type of data. Both the familiarity level (knowledge assorting scale) and the main results (weather lottery prices or confidence on one's own answer for the capital lotteries) were evaluated using nonparametric distributions tests and central moment measures.

1.4.1 Intrinsically Ambiguous Events

According to the first hypothesis, the further away an event is from the baseline, the lower the effect on knowledge perception. To test that, treatments T1 and T2 were used since both have the same initial lottery (baseline) and the same target lottery, but treatment 2 presents two additional average familiarity questions in between these two. Therefore by comparing their results we should expect the price individuals attribute to the last lottery (pair), to be higher for first than the latter.

As for our second hypothesis, the presence of intermediate events with a contrasting familiarity level should reduce but not reverse the initial bias. Treatments 2 and 3 have the same low-familiarity baseline, and end in the same average-familiarity event (AF1), but treatment 3 has a high-knowledge event for its third lottery, while treatment 2 has only average familiarity ones as intermediate. Thus, by comparing their results we should expect the price individuals attribute to the last lottery (pair), to be higher for treatment 2 then for treatment 3.

Table 1.2 shows that there is no significant differences on means and standard errors, supporting neither of our hypotheses. And even though the means for lottery AF1 point out to results that contradict both hypothesis, those hypothesis rely on having an equivalent valuation of the baseline lottery (LF), which is also shown to be different.

Table 1.2: Average Prices for the Weather Lotteries (in USD)

	LF	AF2	AF3	HF	AF1
T1	26.975				35.785
(N=50)	(4.502)				(5.072)
T2	30.695	39.310	38.275		43.304
(N=46)	(5.237)	(5.693)	(5.238)		(5.571)
T3	41.007	48.157		52.728	51.738
(N=34)	(7.015)	(7.013)		(7.082)	(7.159)

NOTE: Average prices as given by the sum of complementary events lotteries (*at least* and *less than*) per event, per treatment. Standard errors in parenthesis.

The results observed in table 1.2 were corroborated by Ranksum and Kolmogorov-Smirnov tests (table 1.3) which did not show statistically significant differences between underlying distribution for the baseline (low knowledge event) as well as for the target lottery (average familiarity event 1) across treatments.

Table 1.3: Results of the Non-Parametric Tests ($p - values$)

Hypothesis	H_0	p_{KS}	p_R
H1	$Price_{LF}\|T1 - Price_{LF}\|T2 = 0$	0.998	0.694
	$Familiarity_{LF}\|T1 - Familiarity_{LF}\|T2 = 0$	1.000	0.881
	$Price_{AF1}\|T1 - Price_{AF1}\|T2 = 0$	0.490	0.263
	$Familiarity_{AF1}\|T1 - Familiarity_{AF1}\|T2 = 0$	0.577	0.379
H2	$Price_{LF}\|T2 - Price_{LF}\|T3 = 0$	0.479	0.139
	$Familiarity_{LF}\|T2 - Familiarity_{LF}\|T3 = 0$	1.000	0.682
	$Price_{AF1}\|T2 - Price_{AF1}\|T3 = 0$	0.619	0.402
	$Familiarity_{AF1}\|T2 - Familiarity_{AF1}\|T3 = 0$	0.625	0.245

Finally, linear regressions were performed to analyze the price attributed to the last lottery as a function of the price attributed to the baseline; dummies for the existence of intermediate events (treatments 2 and 3), and for the presence of a high-familiarity event (treatment 3); and controls for the individual's risk behavior, as measured by the Gneezy and Potter's method. The models complied with the following equation (results on table 1.4).

$$Price_{AF1} = \alpha + \beta_1 Price_{LF} + \beta_2 DIST + \beta_3 High\_Fam + \gamma RB + \epsilon$$

As expected, the baseline lottery's price ($Price_{LF}$) has a positive and significant effect on determining the target's price in all tested models.[22] According to the first regression model (1), distance was not significant ($p - value = 0.30$), even when controlled for *Risk Behavior* (model 2). Further, for both models (1) and (2) we have a counter-intuitive

[22]We expect a positive influence of the baseline because it is a low-familiarity event. Thus, it should set a lower bar for the prices attributed to each lottery, according to the CIH.

Table 1.4: Effects of Distance and Intermediate Events for Ambiguity Intrinsic Lotteries

$Price_{AF1}$	(1)	(2)	(3)	(4)	(5)	(6)
$Price_{LF}$	0.894**	0.866**	0.781**	0.736**	0.852**	0.828**
	(0.095)	(0.099)	(0.095)	(0.102)	(0.073)	(0.077)
$DIST$	4.192	4.899			4.349	5.064
	(4.333)	(4.257)			(4.374)	(4.285)
$High\_Fam$			0.377	1.390	-0.355	0.245
			(6.368)	(6.157)	(6.271)	(6.111)
$Risk\ Behavior$		0.189*		0.311*		0.196*
		(0.078)		(0.133)		(0.077)
R^2	0.67	0.69	0.57	0.60	0.65	0.66

Significance: $^{**}p < 0.01$, and $^{*}p < 0.05$.

result, which points a positive effect of the distance between baseline and target on the target's knowledge perception.

As for the our second hypothesis, the existence of an intermediate event with a strongly different familiarity level (high familiarity) does not show any significant effect at neither model (3) nor (4), suggesting that the presence of such an intermediate event will not alter choice behavior for events with intrinsic ambiguity.[23] Finally, for models where both hypothesis were tested in conjunction, neither was corroborated, even when risk behavior was controlled for (model 6).

1.4.2 Subjectively Ambiguous Events

The treatments used were the same as for intrinsically ambiguous events. Thus, given the binary nature of these lotteries, we should expect that if distance matters as in H1, the proportion of individuals who feel confident enough to bet on their own answer for treatment 1 is to be higher than for treatment 2. And if the relative knowledge about intermediate events follows H2, the proportion of individuals who feel confident enough to bet on their own answer for treatment 2 is to be higher than for treatment 3.

[23] All models were calculated with heteroskedasticity robust standard errors. The models were also regressed clustering for each of our 8 sessions, but no significant differences were found.

Table 1.5 shows that the percentage of individuals who chose to bet on their own answers for each treatment corroborates our hypothesis of a negative effect from distance. In fact, for treatment 2 the percentages showed a decreasing pattern for all average familiarity events, which were shown to be in accordance with our first assumption, and was confirmed by ranksum tests.[24] As for treatment 3, the perception of knowledge regarding the target lottery is lower than for the second lottery on the same treatment, but higher than the perception shown for the same target in treatment 2, which could be interpreted as an indication of distance effects.

Table 1.5: Perception of Knowledge as a Percentage of Bets on one's Own Answer

	LF	AF2	AF3	HF	AF1
T1	2.13				27.66
T2	0	12.12	9.09		3.03
T3	0	33.33		56.67	20.00

NOTE: Percentage of participants that chose to bet on their own answers over the coin flip per event, per treatment.

Finally, Probit models were used evaluate the probability of a participant choosing to bet on his own answer. Again, models used dummies for the existence of intermediate events (treatments 2 and 3), and of a high-familiarity event (treatment 3), along with controls for the individual's risk behavior, as measured by the Gneezy and Potter's method. The models complied with the following equation (results on table 1.6).

$$OwnAsw_{AF1} = \alpha + \beta_1 OwnAsw_{LF} + \beta_2 DIST + \beta_3 High\_Fam + \gamma RB + \epsilon$$

Here the effects of the baseline lottery are a strong predictor of the results, and so they are dropped from the analysis.[25] Aside from that, distance effects are shown to be significant and in accordance to our first hypothesis for all models that take it into

[24]The tests indicated the same level of familiarity for all *Average Familiarity* events, as well as the same familiarity for the same event across treatments. Further, *Low* and *Average Familiarity* events were shown to come from different distributions in the knowledge rating scale.

[25]In this situations, *Stata* automatically drops the linearly dependent variable(s).

Table 1.6: Effects of Distance and Intermediate Events for Subjectively Ambiguous Events' Lotteries

$OwnAsw_{AF1}$	(1)	(2)	(3)	(4)	(5)	(6)
$DIST$	-1.236**	-1.248*			-1.236**	-1.237*
	(0.481)	(0.506)			(0.481)	(0.486)
$High\_Fam$			1.035*	1.059*	1.035*	1.029*
			(0.511)	(0.501)	(0.509)	(0.512)
$Risk\ Behavior$		0.006		-0.006		0.002
		(0.01)		(0.007)		(0.005)
$Pseudo - R^2$	0.13	0.14	0.11	0.13	0.09	0.09

Significance: $^{**}p < 0.01$, and $^{*}p < 0.05$.

account. However, results regarding the effects of intermediate events seem to significantly contradict our second hypothesis, supporting the intuition that this effects are more intricate than initially believed.

According to Damisch, Mussweiler and Plessner (2006) [25], judgments realized over a string of decisions don't always happen by contrast. In fact, when an individual faces sequential decisions two possibilities arise. If framing brings about the differences between events, than these differences will generate a contrast effect that leads decision makers to judge the current event based on observed differences with respect to the baseline. However, if framing brings about existing similarities, an assimilation effect takes place and the common aspects between events will drive judgment.

In that setting, participants may be viewing the baseline as sufficiently dissimilar to the average familiarity events, so that facing the highly familiar event could make them perceive their knowledge about it as being similar to their knowledge about the target (average familiarity) event. Thus, this assimilation effect would increase in the willingness to pay for (or bet on) the target on treatment 3 when compared to treatment 2, justifying the pattern observed on the data.

Another possible explanation lies on bounded rationality. A boundedly rational decision maker does not have the power to analyze all possible aspects, parameters and

alternatives at once. "If attention is rationed, decisions can no longer be predicted simply by knowing the features of alternatives and desires. Decisions will be affected by the way decision makers attend (or fail to attend) to particular preferences, alternatives and consequences."(Nielsen, 2010, [26] p.31). Therefore, we can argue that the exposure to the high familiarity event, added to the distance from the baseline, may have "clouded" the decision makers' perception of that baseline, making them hold their mind-sets around more recently visited events.

1.4.3 H3: Intrinsic *Vs.* Subjective Ambiguity

According to hypothesis H3, although the direction of the effects should be the same across ambiguity structures, sequential effects should be less pronounced for intrinsically ambiguous lotteries. In fact, results show non-significant effects for both hypothesis 1 and 2 when ambiguity is intrinsic, but significant ones for subjectively ambiguous lotteries. Careful observation of the averages and effects shows that bounded rationality and recency bias can provide a plausible explanation for our results within and across ambiguity structures.

Nielsen (2010) [26], argued that even though boundedly rational decisions may approach full rationality, heuristics can distort the decision making process, jeopardizing the use of past behavior as a predictor for future behavior. Thus, if we believe that individuals are boundedly rational, the nature of intrinsic ambiguity and the amount of "extra parameters" to be considered in such cases is likely to strengthen the recency bias (Fudenberg and Peysakhovich, 2014 [27]; Erev and Haruvy, 2013 [21].), which would imply a more modest effect from events placed further away, diminishing the sequential effect of the baseline over the target lottery.

1.5 Concluding Remarks

A lot has been written about ambiguity aversion, contrast effects, and how these phenomena can shape choice behavior. Based on the idea that people tend to judge lotteries according to their level of (perceived) knowledge, which is in turn influenced by the sequential setting, we performed an experiment to test a few hypothesis regarding contrast and comparison effects in ambiguous settings.

Our contributions to the literature regard two points. First, the empirical evidence that perception of knowledge is sensitive to the weight of evidence and limited cognition, so that an ambiguous chance of error is likely to make individuals more cautious about their choices, reducing the spread of acceptable options. Our second contribution regards the way events affect perceived knowledge according to their position on a given string of choice options. While the first event presented seems to act as an anchor, intermediate events seem to somehow "un-anchor" the following decisions by widening the spread of acceptable choices.

Recognizing that ambiguity maybe individual specific - in the sense that fixed probabilities exist, but are unknown to the responder -, or maybe there are no fixed probabilities - such that no individual can calculate a precise expected utility to the event's occurrence -, we designed an experiment using two questionnaire types, each contemplating one kind of ambiguity. Our Capitals' Lottery questionnaire used individual-specific ambiguity events, here defined as *subjective ambiguity*; while the Weather Lotteries questionnaire referred to future weather events, which's ambiguity is intricate, and here defined as *intrinsic ambiguity*.

Building on the comparison experiments from the existing literature, we tested for effects of distance and relative familiarity of intermediate events over an individual's perception of her own knowledge for both ambiguity structures. Our results showed

distinct choice patterns for each ambiguity type, which suggests that the lack of specific probabilities fundamentally affects the flow of knowledge perception.

Moreover, it seems that intrinsic ambiguity tends to enhance recency bias, perhaps through bounded rationality, reducing the occurrence of large spreads on knowledge perception of sequential events. Our findings also suggest that distance - here described as the amount of information visited by the decision maker in between events - has a clear effect when the decisions involve subjectively ambiguous events, but not so if probabilities are uncertain. Further, the existence of an intermediate event with a distinct bias from that of the baseline does not reduce the influence of that baseline over the individuals knowledge perception. Whether by means of an assimilation effect, or due to boundedly rational decisions, results indicate that relative knowledge regarding intermediate events does not simply build on effects from the baseline, supporting the intuition that this effects are more complex than initially believed.

Chapter 2

What to expect when *they* are expecting: The role of expectations on labor market reciprocity

2.1 Introduction

When firms change workers' wages, workers tend to respond by changing their effort level, so as to repay that action. However, most evidence regarding this reciprocal behavior is based on wage changes that are not expected. But if expectations enter individuals' loss-gain utility, perhaps they may affect perception and effort choices, in which case our knowledge of the relationship between employers' choices and employees' reactions is incomplete. While a lot has been said about employers' intentions affecting workers' effort, to the best of my knowledge, the role of workers' expectations about employers' actions has not yet been directly addressed.

There is a broad body of literature that discusses workers' responsive behavior to firms' actions (changes on wages) under several different settings (see for example Brandts

and Charness, 2003 [28]; Charness, 2004 [29]; Dufwenberg and Kirchsteiger, 2004 [30]; Cox et al. 2008 [31]). Yet another branch of literature talks about how individuals tend to smooth reactions to changes when those are expected. The argument is that expectations will anchor individuals' loss-gain utility, affecting overall utility and choice behavior (e.g., Köszegi and Rabin, 2006 [32]; Ericson and Fuster, 2011 [33]; Heffetz and List, 2014 [34]). What would then be the role of expectations on labor market reciprocation?

Over the past couple of decades several researchers have argued that, aside from the standard selfish behavior theory and simple fairness preferences, agents' actions may also be driven by a sense of reciprocity to others' actions. Several papers have been published modeling the impact of reciprocity on agents' distributional choices (e.g. Rabin, 1993 [35]; Charness and Rabin, 2002 [36]; Cox, et al., 2008 [31]; Dufwenberg and Kirchsteiger, 2004 [30]), while others presented experimental or field evidence regarding that phenomenon (e.g. Offerman, 2002 [37]; Brandts and Charness, 2003 [28]; Mas, 2006 [38]).

Falk, Fehr and Fischbacher (2008) [39], Offerman (2002) [37], Brandts and Charness (2003) [28], Gneezy and List (2006) [40], etc. advocated for the role of intentions on triggering reciprocal actions, pointing out that unfair distributions would be less likely to generate negative reciprocation when caused by a random mechanism or a neutral third party. In that sense, not only the final distributions of wealth matter, but also how an outcome has been effected.

Charness (2004) [29] found experimental evidence that workers are willing to exert less effort when a decrease in their wages results from a willful move from the firm, than when it is determined either randomly or by a neutral third party, indicating that agents are not reacting to the outcome alone, but also to the intentions that bring it about.

Gneezy and List (2006) [40] also found interesting evidence of reciprocal behavior. Using a couple of field experiments, the authors observed a significant positive impact on effort driven by reciprocal behavior due to an increase on the proposed earnings of

the agents "hired". However, they pointed out that the effort increase was short lived, holding for about a half of the working period.[1]

The common factor amongst most papers that discuss reciprocity in the labor market is that changes in wage are sudden, in the sense that there are no specific expectations formed prior to realizations. But what if these expectations took place? Köszegi and Rabin (2006) [32] wrote a model of reference-dependent preferences taking on the idea of the Prospect Theory's value function (Kahneman and Tversky, 1979 [11] and 1992 [12]). According to their model, when evaluating any given prospect, individuals take as a reference point not their status quo, but what they expect will be their outcome.

Based on that model, Ericson and Fuster (2011) [33] point out that that people seem to be loss averse around their expected outcomes, and that "expectation-based" loss aversion could compel agents to react to otherwise neutral actions. In that sense, if workers expect a wage raise, the lack of it may trigger negative reciprocation (drop in worker effort), while the occurrence of a raise when none was foreseen should yield a more positive response from workers than if they expected it.

Many authors claim that effects of positive reciprocity are harder to identify than those of negative reciprocity (see for example Offerman, 2002 [37]; Charness and Rabin, 2002 [36]; Kube et al., 2006 [41]). But what if these effects are largely impacted by expectations? If reciprocal behavior can be modeled as driven by beliefs about beliefs, and beliefs are the baseline for expectations, then reciprocity itself should be driven by the gap between expectations and realizations. In this case, an *expected* action should yield no significant reciprocal response, while an *unexpected* move should yield a reciprocal response that is increasing with the gap between expectations and realizations. In other words, it is reasonable to believe that existing expectations will tend to create a new

[1] On a one day task, the difference in productivity became insignificant after lunch, while on a two day task, it even showed reversal on the second day.

basis for a reciprocal move.

I claim that contemporary social standards force into agents a moral sense of "niceness" or fairness, which generates an expectation that overpowers some of the responder's need to reciprocate to a generous move by changing her perception of the outcome. Under this idea, a selfish or unfair move by the sender would be unexpected and thus generate a strong reaction from the responder, while a nice or fair move would be the natural act or approach, and so it would trigger a more modest need to reciprocate. However, under the same reasoning, if the experimental setting reflects/resembles a strategically competitive one, then people may expect others to behave selfishly, and so the expectation effects would work in a reversed manner, increasing positive reciprocity and diminishing negative reciprocity.

This is not to say that workers' expectations are the sole determinant of reciprocal actions, but that the extent of the workers' reciprocity could be enhanced or lessened due to existing expectations. Also, in the presence of expectation about a positive (or negative) action of the employer, a neutral action could be taken as a negative (positive) one.

Offerman (2002) [37] found evidence that surprises tend to enhance reciprocal behavior. By means of a questionnaire at the end of a *Hot Response Game*, the author elicited the second mover's feelings about the first mover's actions and found that an unexpected action triggers a stronger reciprocal response. Further, he finds that the intensity of a positive emotion to a helpful act does not depend on intention, but negative emotions are much more intense when the hurtful act is intentional.

Mas (2006) [38] collected data on wage arbitration and police performance from 255 US cities and found that not only did the fact of losing the wage arbitration process impact performance; but also, the larger the gap between the desired wage rate and the realized one, the larger the drop in performance. Mas points out that the correlation

between performance drop and the gap between desired and realized wages can be seen as an effect of expectation over effort choice. That is, the drop in performance could be interpreted as a negative reciprocation despite the "allegedly" positive action (increase in wage), since that action fell short from policemen's expectations. However, given the nature of the wage dispute and arbitration presented in Mas' paper, there is no clear reciprocal relationship, since the deciding party (arbiter) is not directly affected by the change in policemen's effort choice. Moreover, one should account for the possibility of the unions to be setting their wage proposal strategically, such that they wouldn't need to correspond to policemen's expectations.

Following that idea, I designed an experiment where expectations regarding wages are built through clearly announced probabilities, while firms simultaneously make wage decisions that will be the base for reciprocation, as described Section 2.2. In this experiment, I exogenously manipulated expectations about a wage cut while allowing for reciprocal response to firms' behavior, and using fixed wages and productivity-dependent profits, I measured the workers' responses to a cut in wages and to a "no-cut scenario" in situations where that cut was expected, as well as when it was not expected.

The results presented in Section 2.3 are consistent with the notion of reciprocity and also with the idea that expectations can influence reciprocal behavior. It seems that expectations influence workers' judgment of firms' actions, affecting effort levels and profits. In fact we find that when wages are intentionally cut by the firm, if the cut was expected the decrease in workers' average effort corresponds to half of the decrease which happens when the cut was not expected. Further, an intentionally granted high wage when not expected increases workers' average effort up to 5 times as much as when the high wage was already expected.

This analysis does not attempt to be final nor exhaustive. Instead I try to recognize the role of expectations on the reciprocal behavior one observes at the labor market,

and by doing so bring about the discussion and comparison of the impacts generated by employer's actions, and employees' expectations.

2.2 Experimental Design and Procedures

Following Ericson and Fuster (2011 [33], and also Charness and Levine, 2007 [42]), I used clearly announced probabilities to build expectations, such that agents might expect a certain wage, but that it may turn out to be a different one. Yet, given my goals, it was important that the firms could be held responsible for the final wage received for the reciprocal act to be carried out for workers. Thus, "*states of the world*" were randomly implemented granting firms a chance to choose while still having the odds of a wage cut somewhat determined.

Participants were 248 undergraduate students from the University of California, Santa Barbara, recruited by email from the general student population. The sessions were performed at the EBEL computer lab, using the interface Z-tree (Fischbacher, 2007[43]). Each session consisted of 3 rounds, composed of 3 stages each, and had between 8 and 16 participants who were randomly sorted into a role (worker or firm), and matched into groups of 4 (3 workers and one firm) at the beginning of each round.

Each stage had a specific objective. In the first stage, the goal was to set status quo earnings for both workers and firms. To allow for reciprocation effects, the second stage aimed to affect the workers' expectations about wages, and give the firms a choice about whether to cut wages. Finally, in the third stage the goal was to measure the workers' change in effort while controlling for their expectations, the wage realization, and whether those wages were determined by a firm's choice.

While workers' wages in any given stage were fixed, firms' profits depended on workers' productivity, on the firms' own decisions about cutting wages, and on chance. Final

earnings for all participants were based on their earnings at both working stages (stage 1 and 3) in one of the 3 rounds selected at random. Average earnings per participant were $14.00 for a 45 minute session.

Sessions started with an overall description of all 3 stages contained in a round, payment procedures and rules. This overall explanation aimed to inform participants that firms would have a chance to cut workers' wages, and workers' performance affected firms' profits. It was also made clear that as stages progressed, more detailed explanations would be given. Then, all participants were put through a 1.5 minute training round so they would understand the worker's task, as well as understand the possibilities of productivity and profit.[2] At the end of the training round, each participant was told the number of tasks she completed, and what would have been the firm's profit for that number of tasks.

Once the training round was over, participants were randomly sorted into workers and firms, and matched into groups. Then, specific instructions for each stage were cleared as the experiment progressed. Firms profit at any given round was affected by the productivity of ONE of its workers selected at random. Each firm learned only how many tasks were completed by the selected worker, no information about the productivity of the other workers was made available. Meanwhile, each worker learned only her own productivity, not being privileged to other workers' productivities or to the firm's profit.

The first stage was meant to set a status-quo for the workers' wages. In that stage, firms received a 48 "lab dollars" (henceforth, "units") endowment, with which they had to pay wages of 12 units to each of its workers, and keep the remaining 12 as a residual which also entered their profit function. Knowing their fixed wage, workers were given 1.5 minutes to work on the simple task that helped determining the firm's profit. All firms'

[2]The training round was only performed once in the beginning of each session. At this point roles were not yet assigned.

profits were calculated based on the number of tasks performed by the chosen worker in that group (T), and the residual endowment (R, where $R = Endowment - 3 * wage$), according to the following equation: $Profit = 1/8 * [R + 4T]$.

The second stage started with an explanation of the rules for the third stage, where the difference in treatments was implemented. In the third stage, the firms' endowment was reduced from 48 to 36 units, and the firms were given the choice to either keep paying 12 units wages to all 3 workers and have no residual left ($R = 0$), or keep 12 units as residual and cut all workers' wages down to 8 units each. It was explained that once firms had made their choices, one of 3 possible states of the world would be determined, possibly overriding the firm's wage choice, as shown on Figure 2.1.

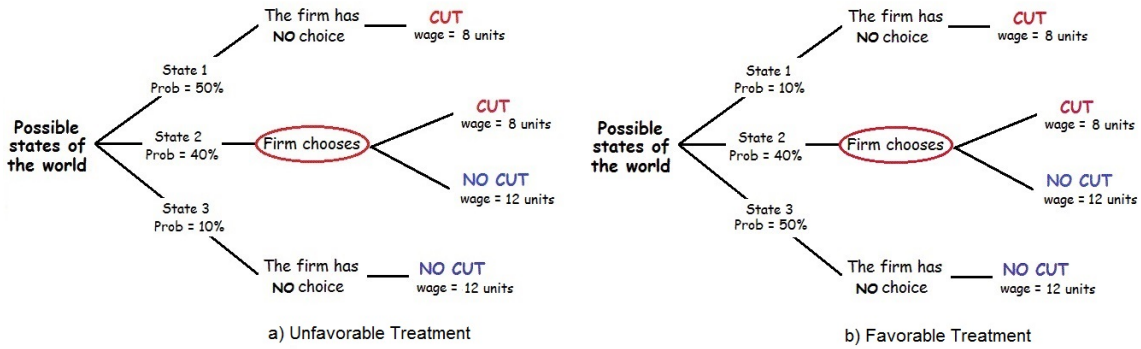


Figure 2.1: States of the World for each Treatment.

The difference in treatments rested on the probabilities of each possible state of the world. In the first state of the world, regardless of the firm's choice, the wages would be cut down to 8 units and the firm's residual would be 12 units; in the second state of the world, the firm's choice about wage cuts would be carried out, whatever it was; and for the third state, regardless of the firm's choice wages would remain 12 units, and the residual would drop down to 0. For each session either a favorable or an unfavorable treatment took place. Notice that for both treatments the probability of the second state

of the world was 40%, but the probabilities for states of the world 1 and 3 were reversed.[3]

Once all participants learned about the possible outcomes of stage 3, firms made their decision on whether to cut wages, and workers were asked about their opinions on whether they believed firms would **choose** to cut wages (*Willful Cut*); and on whether they believed their wages would be cut, either by firm's choice or the occurrence of State 1 (*Monetary Hurt*). The goal of the second stage was to set wage expectations for the workers, and set up the possibility of reciprocity by having the firms choose the new wage (in state 2).

Once firms and workers had responded to the questions regarding the third stage, that stage would take place. For each group a state of the world was determined, workers learned their new wage and whether the firm was responsible for it, and once again workers performed the simple task, just like in stage 1. After the third stage, participants were offered one extra dollar (a 2 units flat rate) to answer to a short debriefing questionnaire, where workers were asked about whether they got the wage they expected and whether they were disappointed or pleased by it. Meanwhile firms where asked about their reasons for choosing whether to cut workers' wages.

Once all participants finished the debriefing, they were re-sorted into roles (firm or worker), and re-matched into new groups to play the game again. Each participant played the game 3 times (3 rounds), and at the end of the third round, each participant answered a short demographics questionnaire, learned which round was chosen for payment, and was called to privately collect her earnings.

[3]The instructions for the Unfavorable treatment are available on appendix A1. The only difference between treatments' instructions were the probabilities of states of the world 1 and 3. Everything else, including examples, were the same.

2.3 Results

As we generate expectations involving a certain wage, the non-realization of that wage should represent an unannounced "shock" on wage, and as such reflect the disappointment (or joy) of an unexpected wage. For example, if you believe that there is less than a third of a chance that you are going to get a pay cut, getting that pay cut should be seen as a somewhat unexpected negative shock. If in the other hand you believe you're going to get the pay cut, the *"no-pay cut scenario"* can be seen as a somewhat positive shock.

In order to understand the reactions and motivations of our participants, the first step is to make sure that our "state of the world probabilities" yielded the desired expectations of a favorable and unfavorable treatments. Using the expectations about pay cuts elicited during the second stage, as shown in Figure 2.2, we can see that even though the percentages do not reflect statistically reasonable beliefs, they show that participants subject to the unfavorable treatment were more likely to believe they'd get hurt by a pay cut (henceforth, *Monetary Hurt*). Taking into account the need for independency, and considering that previous outcomes may influence agents' beliefs about the possibility of a wage cut (willful or not), I use only *Round 1*'s data for that analysis.

All else constant, we should expect to have similar beliefs about firms' behavior in both treatments, once the firm stands to gain (or lose) just as much in both treatments. In such case, we should expect the difference in beliefs to be driven by the states of the world which impose the wage despite of firms' choices.

If workers' beliefs about being affected by wage cuts were to be statistically consistent with the difference in the states of the world probability, we'd stand to find beliefs about wage cuts to be 40% higher on the Unfavorable Treatment.

The difference in beliefs regarding *Monetary Hurt* between the two treatments, though

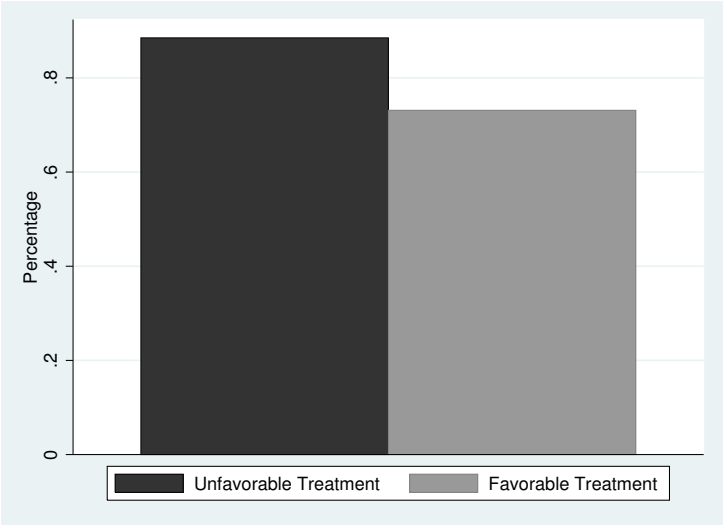


Figure 2.2: Percentage of Workers who Believed they'd suffer *Monetary Hurt*, by treatment.

smaller than predicted, are supported by an equality of proportions test (Glasnapp and Poggio, 1985 [44]) at a 5% level ($Z = 2.48$).

Now, to test how expectations and realizations impact workers reciprocal behavior, and knowing that different subjects would have different productivity levels, we focused on the difference in effort exerted by the worker between the first and the last stages of each round, from here on referred to as *effort-increase*. Several parametric and non-parametric tests were performed, and 3 separate analysis were carried out, one focusing on expectations and holding realizations constant; one focusing on the realizations and holding the expectations constant; and a more comprehensive analysis, as follows.

2.3.1 Effect of Expectations on Reciprocal Behavior

The first step in the analysis was to hold the realizations (final wage) constant, and analyze the impact of the difference in expectations, yielded by the two treatment conditions, on the workers effort level.

The numbers on Table 2.1 indicate that an intentionally granted high wage ($wage =$

Table 2.1: Statistics for effort increase when $wage = 12$ units

		Unfav. Treatment	Fav. Treatment
Intentional	Range of effort-increase	(-3, 7)	(-6, 9)
	Median	1	0
	Mean	1.595	0.333
	Std. Err.	(0.359)	(0.376)
Non Intentional	Range of effort-increase	(-11, 6)	(-17, 6)
	Median	0	0
	Mean	-0.354	0.152
	Std. Err.	(0.486)	(0.354)

12 units) will increase effort more than a randomly granted one, only when in the unfavorable treatment ($E[wage]$ = \$8 units). The same result is confirmed by Ranksum and Kolmogorov-Smirnov tests (henceforth K-S) at a 5% level, where the distribution of *effort-increase* is significantly different for the presence of intention for the unfavorable treatment ($p_{RS} = .003$, $p_{KS} = .010$), but not for the favorable one ($p_{RS} = .733$, $p_{KS} = .980$). Further, a first order stochastic dominance test indicated that, for a wage of 12 on the Unfavorable Treatment, the distribution of *effort increase* is significantly higher when the wage was chosen intentionally ($p_{KS} = .008$).[4]

Table 2.2: Statistics for effort increase when $wage = 8$ units

		Unfav. Treatment	Fav. Treatment
Intentional	Range of effort-increase	(-29, 8)	(-24, 9)
	Median	-1	-1
	Mean	-3.561	-2.063
	Std. Err.	(1.093)	(0.800)
Non Intentional	Range of effort-increase	(-28, 10)	(-15, 9)
	Median	0.5	-1
	Mean	-0.640	-0.641
	Std. Err.	(0.507)	(0.788)

When analyzing the data for the lower wage realization ($wage = 8$ units), results indicate that a low wage will not be punished when it was not intentional, especially if

[4]Graphs on the distributions of *effort increase* for each case - Wage/Treatment/Intentions - are available on appendix A2.

already expected (unfavorable treatment) (Table 2.2). Ranksum and K-S tests confirm that the distribution of *effort-increase* (decrease in this case) was only affected by intentionality when low wages were already expected ($p_{RS} = .041$, $p_{KS} = .010$). That is, when in the favorable treatment a low wage made workers decrease their effort regardless of it being intentional ($p_{RS} = .384$, $p_{KS} = .822$). Also, a first order stochastic dominance test indicated that, for a wage of 8 on the Unfavorable Treatment, the distribution of *effort increase* was more negative when wages were intentional ($p = .005$).[5]

Finally, diff-in-diff model regressions were analyzed for both realization cases ($wage = 12$ and $wage = 8$ units), separately, with the intent to evaluate the impact of expectations on worker effort, holding the realizations constant. The base model was:

$$Eff\_Inc_i = \alpha + \beta_0 Fav\_Treat_i + \beta_1 Intent_i + \gamma_0 Fav\_Treat_i * Intent_i + \psi Round_i + \delta X_i + \epsilon_i$$

Where Eff_Inc stands for difference between number of tasks completed by the worker on stage 3 and stage 1; Fav_Treat is a dummy that identifies the favorable treatment ($E[wage] = 12$); $Intent$ is a dummy for wages intentionally determined by the firm (State of World = 2); X is a vector of controls;[6] and $Round$ is a vector of dummies for our 3 rounds.

Notice that, for the high wage realization (Table 2.3), despite the fact that being in the favorable treatment alone did not present any significant changes to workers' effort-increase, the positive effect from an intentional move of the firm in keeping the wage at 12 units in stage 3 ($Intent$) seems to be mostly offset when a high wage was expected (favorable treatment). In fact, a Wald test could not reject the hypothesis that the coefficients for $Intent$ and $High\_Wage * Intent$ cancel out ($p - values > 0.609$).

[5]Distributions on the Appendix.

[6]Controls were: the number of tasks completed by the worker on the training round; age; sex; race; major (econ or non-econ); participation in previous experiments.

Table 2.3: Effort Increase with a High Wage Realization

	(1)	(2)	(3)	(4)
Fav_Treat	.0565	.3814	.3867	.5097
	(.4305)	(.4215)	(.4201)	(.4134)
Intent	1.9494***	1.9734***	1.9846***	1.9984***
	(.3841)	(.5037)	(.5026)	(.5573)
Fav_Treat*Intent	-1.7685***	-1.6902**	-1.7055***	-1.7969***
	(.4824)	(.5786)	(.5613)	(.5991)
Round	No	Yes	Yes	Yes
Training	No	No	Yes	Yes
Demographics	No	No	No	Yes
R^2	0.03	0.05	0.05	0.09

Significance: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.
Notes: N = 264. Standard errors were clustered on Session, but when clustering on Subjects significances remained roughly the same.

In sum, though the firms' intentions matter despite treatment, when under a favorable treatment, the effect of a high wage over productivity was diminished by the expectation of a high wage. This is consistent with the idea that a positive surprise enhances the reciprocal effort.

Table 2.4: Effort Increase with a Low Wage Realization

	(1)	(2)	(3)	(4)
Fav_Treat	-.0007	.0529	.3240	.2460
	(.9633)	(.9851)	(.9969)	(.9715)
Intent	-2.9211*	-3.0789*	-3.0313*	-2.8940**
	(1.4056)	(1.5402)	(1.5623)	(1.3209)
Fav_Treat*Intent	1.4986	1.3874	1.0196	1.0344
	(1.8884)	(2.0067)	(2.0338)	(1.8702)
Round	No	Yes	Yes	Yes
Training	No	No	Yes	Yes
Demographics	No	No	No	Yes
R^2	0.03	0.06	0.07	0.14

Significance: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.
Notes: N = 273. Standard errors were clustered on Session, but when clustering on Subjects, variables significant at 10% become significant at a 5% level.

In the other hand, when the wage realizations were low (Table 2.4), a firm's active choice yielded a drop in effort regardless of the treatment to which participants were

subject. That is, regardless of workers' expectations, an intentional cut in wages yielded a drop in effort, indicating that an intentionally negative action will be reciprocated despite expectations.

2.3.2 Effect of Realizations on Reciprocal Behavior

On this step of our analysis, expectations were held constant (separate analysis of each treatment) and our focus was to evaluate reciprocity for each possible wage realization. If we refer back to the statistics on the previous sub-section, we can observe that intentionality plays a role in determining workers effort change on the unfavorable treatment. The same results are corroborated by Ranksum tests, which significantly distinguishes the distributions of effort-increase (or decrease) when the third stage wage is determined by the firm, from the randomly determined one, for both realizations ($wage = 12$, $p = .0031$; and $wage = 8$, $p = .0413$).

In the other hand, when the treatment was favorable (subjects should expect a high wage), firms' intentions barely played a role. If we observe the medians for effort-increase (alt. decrease), we notice that they are no different for a given wage, again a result corroborated by Ranksum tests ($wage = 12$, $p = .7326$; and $wage = 8$, $p = .3835$). Further, for our favorable treatment, the Ranksum test cannot reject the equality between distribution of effort-increase across wages when there is no intention ($p = .3304$), and just marginally rejects it when wages are determined by firms' choices ($p = .0602$).

Again we analyzed diff-in-diff models, this time holding expectations (treatments) constant. The regressions complied with the following model (results on Table 2.5:

$$Eff\_Inc_i = \alpha + \beta_0 High\_Wage_i + \beta_1 Intent_i + \gamma_0 High\_Wage_i * Intent_i + \psi Round_i + \delta X_i + \epsilon_i$$

Where most variables are define as in section 2.3.1, and $High\_Wage$ is a dummy that

identifies the realization of a high wage ($wage = 12$ units).

Table 2.5: Effort Increase for the Unfavorable Treatment

	(1)	(2)	(3)	(4)
High_Wage	.2862	.2230	.1938	.0925
	(.9915)	(.9907)	(1.0188)	(1.1569)
Intent	-2.9211*	-2.9670	-2.9382	-2.9217*
	(1.4581)	(1.6668)	(1.6865)	(1.5173)
High_Wage*Intent	4.8705*	4.6765**	4.5294**	4.7139**
	(1.3430)	(1.5156)	(1.5187)	(1.2545)
Round	No	Yes	Yes	Yes
Training	No	No	Yes	Yes
Demographics	No	No	No	Yes
R^2	0.08	0.10	0.10	0.15

Significance: $***p < 0.01$; $**p < 0.05$; $*p < 0.1$.
Notes: N = 261. Standard errors were clustered on Session. When clustering on Subjects, significance levels of 5% were found for "Intent", and of 1% for "High_Wage*Intent" on all models.

In all models studied, when under an unfavorable treatment workers relied on firm's intention to reciprocate. When final wages were high ($High\_Wage = 1$), the difference in effort seems to be higher if wages were determined by a firm's choice; and when wages were low ($High\_Wage = 0$), difference in effort seems to be lower when the cut was intentional. Also, a Wald test rejected the hypothesis of equality between the two coefficients ($Intent$ and $High\_Wage * Intent$), further indicating the effect of an intentionally granted high wage.

In sum, the results indicate that even when a low wage is expected, an intentional wage cut can reduce workers' effort, while an intentional non-cut will increase that effort.

In the other hand, just as our previous test indicated, when under the favorable treatment intentions did not play a role (Table 2.6). A result which indicates that when expecting a high wage, workers respond less to the employer's intention, and feel less inclined to reciprocate to a high wage.

Table 2.6: Effort Increase for the Favorable Treatment

	(1)	(2)	(3)	(4)
High_Wage	.7934	.5767	.4042	.9690
	(.5807)	(.6288)	(.6586)	(.7069)
Intent	-1.4225	-1.5535	-1.6890	-1.0771
	(1.2896)	(1.4514)	(1.4923)	(1.4657)
High_Wage*Intent	1.6034	1.8570	2.0225	1.4043
	(1.4532)	(1.6060)	(1.6420)	(1.5363)
Round	No	Yes	Yes	Yes
Training	No	No	Yes	Yes
Demographics	No	No	No	Yes
R^2	0.04	0.06	0.06	0.12

Significance: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Notes: N = 276. Standard errors were clustered on Session, but when clustering on Subjects, no differences were observed on significance levels.

2.3.3 Net Effect of Expectations on Reciprocal Behavior

Finally, in order to analyze the net effect of expectations and realizations we used the following regression model:

$$Eff\_Inc_i = \alpha + \beta_0 Fav\_Treat_i + \beta_1 High\_Wage_i + \beta_2 Intent_i + \gamma_0 Fav\_Treat_i * High\_Wage_i +$$

$$+ \gamma_1 Fav\_Treat_i * Intent_i + \gamma_2 High\_Wage_i * Intent_i + v_0 Fav\_Treat_i * High\_Wage_i * Intent_i +$$

$$+ \psi Round_i + \delta X_i + \epsilon_i$$

Where all variables are as previously defined.

Observe that intentions have a significant negative impact for all models evaluated (Table 2.7). However, that decrease in effort is more than compensated by the increase which happens when the wage granted intentionally is high ($High\_Wage * Intent$). Also, for our first regression (1), the effect of the intentional high wage seems to be diminished when workers expected to get the high wage in the first place ($Fav\_Treat * High\_Wage *$

Table 2.7: Net Effect of Expectations and Realizations on Effort Increase

	(1)	(2)	(3)	(4)
Fav_Treat	-.0007	.1092	.2472	.0830
	(.9627)	(.9773)	(.9686)	(.9471)
High_Wage	.2862	.2768	.2538	.1710
	(.9551)	(.9773)	(.9992)	(1.1221)
Intent	-2.9211*	-2.8888*	-2.8641*	-2.8512*
	(1.4046)	(1.5366)	(1.5485)	(1.4067)
Fav_Treat*High_Wage	.5072	.3049	.1206	.2792
	(1.1110)	(1.1125)	(1.1315)	(1.2858)
Fav_Treat*Intent	1.4986	1.3140	1.1261	1.3099
	(1.8871)	(2.0344)	(2.0532)	(1.9602)
High_Wage*Intent	4.8705***	4.6469***	4.5256***	4.6754***
	(1.2937)	(1.4133)	(1.4166)	(1.2223)
Fav_Treat*High_Wage*Intent	-3.2670*	-2.7776	-2.4577	-2.6494
	(1.9210)	(2.0733)	(2.0884)	(1.8742)
Round	No	Yes	Yes	Yes
Training	No	No	Yes	Yes
Demographics	No	No	No	Yes
R^2	0.07	0.08	0.09	0.12

Significance: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.
Notes: N = 537. Standard errors were clustered on Session. When clustering on subjects, the variable *Intent* became significant at a 5% level.

Intent). Once again, the cancellation of coefficients is corroborated by a Wald test, which cannot reject that the sum of the coefficients for $Intent$, $High\_Wage * Intent$ and $Fav\_Treat * High\_Wage * Intent$ is zero ($p - value = 0.518$).[7]

Further, intentionally low wages tend to reduce worker effort regardless of expectations (treatment), and non-intentional actions, whether positive or negative, show no significant effects.

[7] As a robustness check regressions on each possibility Wage/Treatment/Intentions were run and can be found on appendix A3.

2.4 Concluding Discussion

The concept of reciprocity brings up the relevance of intentions and the idea that the perception of intentions are dependent on expectations formed by the receiver. Thus, a second mover may deem the same action either nice or hurtful, according to her beliefs about the first movers' intentions, motivations and justifications.

In our experiment, if a worker is facing a favorable treatment, she is likely to expect to get a 12 units wage, which should entail a feeling of disappointment in case it doesn't happen. But how should we expect her to react to it? According to intentional reciprocity, she'd react negatively only if the wage cut was due to an intentional move by the firm. But even then, if she believes that the firm is justified in cutting wages, she may not decrease her effort as much, deeming the action fair due to external causes. Further, when in a favorable treatment, if a worker is graced with a high wage (12 units), even when due to a nice move from the firm, she may feel like that was "no more than expected", in which case she may not feel as compelled to reciprocate as she might have otherwise.

If workers are facing an unfavorable treatment, where they are likely to believe they'll get a lower wage (8 units), getting a high wage may be seen as a nice surprise, and they may feel the urge to reciprocate when it was based on an intentional move from the firm. Finally, even if workers are expecting to get the lower wage (unfavorable treatment), that does not necessarily mean they believe the firm will cut wage, even less that they see it as being justified. Perhaps workers see an intentional cut on wages as the "dissolution" of their "small chance" on getting a nice wage, and therefore they see it as a hurtful act that deserves punishing, which entails them to decrease effort.

We found evidence that employees' expectations can affect their behavior towards the firms, whether enhancing or reducing effort choices when wages are intentionally

implemented. Moreover, results indicate that an intentionally hurtful move by the firm will be reciprocated by workers even when the lower outcome was already expected. While an intentionally nice move from the firm, when a high outcome is expected, can be overseen by workers and thus, not reciprocated.

This result agrees with Offerman's (2002) [37], who points out that the intensity of a positive emotion to a helpful act does not seem to depend on intentions, but negative emotions seem much more intense when the hurtful act is seen as intentional, and that surprises about the first player's (firm) choice seem to enhance second player's (worker) emotions.

Initially I claimed that a nice move should be regarded as socially expected and as such, it does not entail positive reciprocation, while a hurtful move is usually seen as deserving of a negative reciprocal action. If this claim can be deemed true, it is easier to understand the findings (or lack of findings) reported on the literature, where positive reciprocity is either not found (Charness, 2004 [29]), short lived (Gneezy and List, 2006 [40]) or simply weaker than its negative counterpart (Offerman, 2002 [37]; Charness and Rabin, 2002 [36]). While negative reciprocity is not only evident, but also resilient (Kube et al., 2006 [41]).

Despite the fact that the earnings were quite balanced (between workers and firms), one can claim that there may be some sort of fairness goal involved in a decrease in effort by a worker when wages are cut. Once a wage cut consists of a third of workers earnings, it makes sense within the fairness theory that workers would diminish effort by approximately a third to even out losses, regardless of that cut being intentional. Under the same theory, if wage cuts did not take place, the lower initial profit for the firms on stage 3 should stimulate workers to intensify effort to equalize payments once more.

But what would expectations do in such a case? Notice that if the idea is simply to equalize payoffs, expectations should play no role whatsoever. In fact, neither expecta-

tions nor intentions should affect workers' effort choices. Instead, workers should always react in a way to smooth payments across agents, both firms and workers, taking actions based solemnly on the third stage wage outcome.

Our data indicates that when firms' intentions did not affect the end result (wage on stage 3), workers did not significantly react to it regardless of expectations, once more defending the idea of reciprocity, as opposed to theories of distributional preferences. It also suggests that reciprocity is more frequently observed when a lower outcome is expected, in which case not only a positive surprise yielded a positive reciprocation, but a negative realization, despite being expected, was negatively reciprocated.

It is important to understand how workers behave in the labor market, and what do they deem fair; under what situations would they react to a wage cut, and whether a peek at the market's current moves would generate an expectation that would help to justify the firm's actions, diminishing any possible negative reciprocity. Perhaps when firms foresee a need to cut wages, it is not a good plan to make workers aware of that appending need. Perhaps it is best if when that need is established, firms just draw their best explanation and hope that workers will deem the cut as justified.

One way to try to better understand participants' behavior and their justifications for such is to turn to the firms' debriefings. At the end of each round, they were asked to state their beliefs about workers reactions to wage cuts, as well as the reasons that led them to their own choices on whether to cut wages. A quick analysis of those debriefings reveled concerns with fairness, kindness and efficiency. Also, some firms realized that workers' feelings of frustration could make workers diminish their effort such that firms' profit would be even lower with wage cuts; and some stated to hope for *State of World* to be 1, so that they could keep the residual and avoid the blame.

Finally, it is important to bear in mind that our design did not allow us to establish whether workers believed that the wage cut was justified. A possibility which arises

because the endowment is reduced on stage 3, which can characterize a hardship on the firms. According to Charness and Levine (2007) [42], perceptions of fairness regarding identical actions will differ depending upon circumstances and justifications to one's actions. If we believe that workers deemed a wage cut, in any level, as a fair move on the firms part, than we should expect that the reciprocal effects would be lessened and our results should represent an even stronger reaction than initially believed.

Chapter 3

Advertising and Enjoyment: The Case of a Short Movie

3.1 Introduction

Have you ever gone to a movie on a whim, without information or expectation, and then found yourself enjoying all the surprises that could've otherwise been ruined by scenes on trailers? Have you ever seen a trailer so good, that made you write the movie opening in your calendar, and then when the movie came on you were disappointed? Have you ever watched those movies again only to find out that the latter was actually better than the former? Have you ever questioned whether you should keep watching trailers?

Initially based on still images from upcoming attractions, movie trailers are as old as the movie industry itself (Buehler et al., 2008) [45], and today they are the main channel through which audiences learn about new movies. According to Oliver et al (2007) [46] movie previews play an important role in entertainment-selection decisions. Faber and O'Guinn (1984) [47] say consumers have rated trailers as the most useful, important and

influential source for movie choice.

Over the past decade the number of tickets sold in box offices fell about 16%, while the number of movies released has increased in about 30% (Lepore, 2014 [48]). Knowing the box office is still considered the thermometer for a movie's success; the greater competition brings producers and studios to "employ emotional branding to hype the movies for a significant period of time prior to its release" (Stapleton and Hughes, 2005 [49], p.23).

Recent literature in marketing and psychology have concentrated some effort in studying movie trailers, including how they impact viewers' anticipated enjoyment and how do new technologies such as interactive trailers, and even the online streaming of trailers affect box office openings (see for example: Xie and Lee, 2004 [50]; Buehler et al, 2008 [45]; Oh, Chung and Han, 2014 [51]; Jensen, 2014 [52]). The importance of these questions is evident when we observe that the US movie industry is a $100 billion dollar industry, counting the receipts not only from box office, but mostly all the subsequent franchise markets (Stapleton and Hughes, 2005 [49]).

However, according to Stapleton and Hughes (2005) [49], about 90% of the revenue from the movie industry is driven by rentals, media sales, games, merchandise, licensing, etc. The authors claim that "the power of the movie to romance the story creates deep and fond memories for audiences, bonding them to almost anything associated with that entertainment franchise brand, which in turn sells everything from games to breakfast cereal." (p. 24)

But if the main source of revenue for this industry comes from franchise products other than the movie itself, it is important to look past the box office and analyze what are the exogenous factors that affect movie enjoyment, and particularly how do trailers impact the viewers final enjoyment.

Many factors may influence a viewers enjoyment of a movie, some more intuitive

than others. Amongst them we may quote exogenous factors such as expectations, level of attention, arousal, etc. and some endogenous ones such as the movie's plot, genre, technological and overall quality of the movie.

Geers and Lassiter (1999) [53] performed a 2X2 experiment where they analyzed the effect of the level of attention (gross-attention vs. fine-attention) and expectations (high-expectation vs. no-expectation) on subjects' judgment of a movie. Their results showed that when individuals were highly attentive (fine-attention) to the movie, high expectations yielded a lower level of enjoyment. But when attention was low (gross-attention) high expectations yielded an assimilation effect and consequently a higher level of enjoyment. Perhaps the lack of proper incentive-compatible mechanisms, jointly with the wording of the instructions may have discouraged participants to pay attention all together, possibly confounding the results.[1] The authors argue that in being more attentive, participants were more apt to notice discrepancies between their expectations and the outcome.

Several other authors have analyzed movie enjoyment under different lenses, such as the viewer's mood (Eliashberg and Sawhney, 1994 [54]); interactive introspection and identification with characters or plot (Batat and Wohlfeil, 2009 [55]; Cohen, 2001 [56]; Green, Brock and Kaufman, 2004 [57]). According to Oliver et al (2007) [46], viewers experience gratification from the success of protagonist characters or the failure of the disliked characters. Therefore, in order to generate anticipated enjoyment, and thus be appealing to prospective viewers, trailers are produced not just to give an overview of the film, but to *sell* it (Garret, 2012 [58]). But how does trailer viewing impact on movie enjoyment?

[1]Instructions for the gross-attention group asked participants to *"segment the [character's] behavior into the largest actions that are meaningful to you"*. The examples given were made it clear that "actions" could describe steps taken, or the intended final action, in such a way that the individual did not need to pay attention to details and perhaps not fully understand the video.

On a brief online search about movie trailers and enjoyment, one would observe that several bloggers advise against watching trailers.[2] Among the reasons why "trailers are ruining movies" they mention that trailers tend to show the best action pieces and jokes, give away the story, or even completely misrepresent the plot, such that the viewer may get something entirely different from what she expected (McBeth, 2014 [59]).

In this paper I used a lab experiment to study the impact of a movie trailer on the enjoyment of a short movie. My initial hypothesis is that when the subjects are exposed to a movie trailer, they acquire some information about the movie which may raise their expectations, generate anticipated enjoyment, and perhaps lessen their actual enjoyment of the movie. In other words:

> Hypothesis: *Watching a movie trailer may reduce the enjoyment of the movie itself.*

The experiment involved 2 groups (Treatment and Control), both of which were exposed to the same information about the short movie in different ways. The Treatment group experience a movie advertising interview and a trailer, and the Control was exposed to the same information by means of a written paragraph.

Results showed that the average enjoyment for was higher for the Control group. In fact, on average, the difference between individuals' predicted and realized enjoyments (before and after watching the movie) was twice as much for the Control group than for the Treatment group.

In the next section, I describe the experimental design and procedures, followed by detailed results and the conclusions.

[2] Amongst the links you may find: http://blog.contv.com/are-movie-trailers-ruining-your-enjoyment-of-movies/; http://www.kotaku.com.au/2014/11/idea-stop-watching-movie-trailers/; http://metro.co.uk/2014/11/15/5-reasons-why-trailers-are-ruining-movies-4941834/; etc.

3.2 Experimental Design and Procedures

The subjects were 87 undergraduate students from the University of California, Santa Barbara, who were recruited from the general student pool. The experiment was performed using paper questionnaires and a projection screen for both the movie and the information that preceded it.

For both treatments, sessions lasted about 30 minutes. A total of 6 sessions were performed, and the average earnings of a participant were US$8.20. The experiment involved the judging of the Oscar nominated short live action movie, Boogaloo and Graham, by Ronan Blaney and Michael Lennox. Set in 1970's Belfast, the movie tells the story of 2 boys whose father gives them 2 chickens to raise. The birds become all the kids care about while the trouble and mayhem is breaking up all around them. The director claims that the idea was to use the military scenario of the time to introduce a theme he describes as "universal in any conflict", which are real life and family conflicts that happen behind closed doors.

For all participants the experiment consisted of an initial exposure to some information about the movie (producer, director, storyline, prizes and praises),[3] followed by a couple of questions about their own impressions, and what they believed the other participants thought of it. As shown below:

1. How much is the genre of the movie (Comedy/Drama) appealing to you? [scale 1-5]

2. Consider the following statement: *"I think this will be a really good movie."*, and the scale [1 (Strongly Disagree) - 5 (Strongly Agree)]: On average, how many

[3]the information that was shared with both groups can be seen as a positive propaganda of the movie, which would normally stimulate prospective viewers into actually watching the movie. In a real world setting this information can be compared to billboard signs, or casually shared information.

participants, out of the [NUMBER OF PARTICIPANTS IN THE SESSION] people in the room, do you believe would strongly agree (5) with the statement?

Once the questionnaires were collected, participants were invited to watch the movie and to answer a similar questionnaire about their impressions, and what they believed the other participants thought of it, only this time with the knowledge of the actual movie. As shown below:

1. Have you ever watched this movie before today? [Yes - No]

2. Consider the following statement: *"I think this was a really good movie."*, and the scale [1 (Strongly Disagree) - 5 (Strongly Agree)]: On average, how many participants, out of the [NUMBER OF PARTICIPANTS IN THE SESSION] people in the room, do you believe would strongly agree (5) with the statement?

For both questionnaires (before and after the movie) our main interest regarded the participants' beliefs about the elicited average opinion. Thus, in other to properly incentivize their answers, a quadratic scoring rule was used for payments to incentivize truthful answers.

Aside from a US$5.00 show up fee, participants earned up to US$2.50 for each of the two questionnaires based on accuracy about other participants' opinions, according to the following equations:

$$Earnings\ from\ Questionnaire = 2.5 * [1 - Error^2]$$

where the error was given by:

$$Error = \frac{|AverageGuess - ParticipantsOwnGuess|}{AverageGuess}$$

Also, no negative results were allowed. If $Error > 1$, the participant's Earnings for that questionnaire were null. Of all questionnaires, the case of an $Error > 1$ only happened twice, and though the payments were defaulted to zero, the actual answers

were used in the data set. Also, all participants claimed to never having watched the movie.

If we believe the *Quadratic Scoring Rule* (QSR) yielded the correct incentives than, for any one participant, the best response is to be truthful about the number of participants they believed would truly enjoy the movie. Since participants were not allowed to communicate with each other, it is reasonable to assume that they would base their guess on their own personal enjoyment level (predicted or realized) and strategic reasoning.

Since all participants had the same set of incentives, strategic behavior should be uniform within treatment. That being the case, if we are aware of how does strategic behavior influence each group (treatment), we should be able to discern the direction of its effects. Thus, we here use (and henceforth refer to) the elicited *"average number of participants who'd qualify the movie as a 5 out of 5"* as the participants' *"Average Enjoyment"* (predicted or realized). One may perhaps point out that a QSR is not immune to risk averse behavior. However, risk aversion would have participants to skew their choices towards the midpoint, which would not be confounding to our results.

Further, to understand the effect of advertisement, a treatment and a control group were used. For the *Advertisement* group I used a short interview with the Director and the Producer of the movie in addition to a short trailer, and for the *Control* group the same information was conveyed by the means of a written paragraph that was displayed and read out loud to the participants, minimizing the advertisement's effect without compromising equality of information. Finally, simple demographics were collected to be used as controls; these were: gender, age, major and race.

3.3 Results

If we believe that watching the movie trailer (Treatment group) should yield a lower enjoyment, than we should expect that the average number of participants who believed the movie was going to be "really good" (5 out of 5 on the scale) should be greater for the participants who were in the Control group.

In fact, as we can observe on table 3.1, the elicited average number of participants to classify the movie as a 5 out of 5 was higher for the control group after participants actually watched the movie.

Table 3.1: Elicited Average Enjoyment

	Predicted	Realized
Treatment (N = 41)	6.439	8.220
	(.486)	(.567)
Control (N = 46)	6.913	10.543
	(.639)	(.674)

Ranksum and Kolmogorov-Smirnov tests corroborated our results, rejecting the equality across treatments after subjects watched the movie (average realized enjoyment) with $p - values$ of: $p_R = .011$ and $p_{KS} = .055$.

One may observe that the elicited averages on predicted enjoyment indicate that there were no differences in expectations generated by the trailer. However, existing literature gives us reason to speculate on whether there was an influence of latent expectations on strategic behavior, as follows.

Ruström and Wilcox (2009) [60] performed an experiment in which they found that belief elicitation affects strategic choice actions. According to the authors, when directly asked about one's own beliefs, individuals tend to enter into a more deliberative consideration, moving away from their "affective" predispositions. In such case, it makes sense that individuals would strategically skew their "predicted enjoyment averages" towards

the midpoint, as to increase chances of a better payout. Such behavior should tend to draw the predicted enjoyment down for the Treatment group, and up for the Control group. Further, the elicited *average realized enjoyment* should also move towards the midpoint, which in this case would not affect the gap between treatments.

Another possible reason to speculate about expectations is discussed by Atlas and Wager (2013) [61], who explain that individuals try to keep their expectations "under control" to avoid disappointments. In that case, individuals in the Treatment group may have reported a lower level of predicted enjoyment as means to convince themselves not to expect much from the movie. In this case, the only incentive to misreport would be on the prediction for the Treatment group, whose true value would have been purposely under reported.

All in all, assuming that strategic reasoning does not confound our results, I evaluated the gap between the average enjoyment before and after the movie.[4] The so called *Difference in Enjoyment*, corresponds to the "average realized enjoyment (after the movie)" minus the "average predicted enjoyment (before)" of each participant. The statistics on Difference in Enjoyment are reported on table 3.2.

Table 3.2: Statistics for Difference in Enjoyment

	Control	Treatment
Mean	3.630	1.780
Std. Errors	(.578)	(.444)
Median	3.5	1

Observe that the gap on enjoyment is significantly greater for the Control group, a result again corroborated by Ranksum and Kolmogorov-Smirnov tests, which rejected the equality of the gap between reported enjoyments with $p - values$ of: $p_R = .004$ and $p_{KS} = .001$.

[4]If one believes that latent expectations play a role, then our results should in fact be strengthened.

I also counted the number of participants who stated that the movie would be qualified as a "5 out of 5" by more than 30% of their peers, before and after watching it (Table 3.3).

Table 3.3: Participants who Stated that more than 30% of Peers would Qualify the Movie as a 5

		More than 30%	Percentage
Control	Before	27	58.7
(n=46)	After	43	93.5
Treatment	Before	28	68.3
(n=41)	After	34	82.9

Notes: The counting was made considering the number of participants in each session to ensure the correct proportionality of 30%.

Notice that after watching the trailer, but before the movie, roughly 10% more participants believed in a high rating of the movie on the Treatment group. However, after watching the movie, the number of participants who believed that his peers would highly enjoy the movie were almost 10% higher for the Control group.

Now, recall that our focal question asked "On average, how many participants, out of the [number of participants in the session] people in the room, do you believe would strongly agree with the statement *'I think this was a really good movie'.*" Table 3.4 analyses what factors influenced participants' answers considering treatment, predicted enjoyment, and controls, as well as a variable regarding how appealing participants considered the movie's genre.[5]

As expected, the realized enjoyment, was positive and significantly dependent on the predicted enjoyment. Further, all regressions indicate that the advertisement (Treatment) group yielded a negative effect, confirming our hypothesis that the trailer would negatively affect enjoyment.

[5]Recall we asked participants to rate on a 1-5 scale how appealing the genre of the movie was to them. *Appeal* is a dummy variable that assumed value 1 when the participant claimed a high appeal (4 or 5 out of 5), and zero otherwise, aiming to control for what would be an individual-based determinant.

Table 3.4: Regressions for Realized Enjoyment

	(1)	(2)	(3)
Pred_Enjoym	.683***	.625***	.555***
	(.099)	(.108)	(.116)
Trailer	-2.000***	-1.913***	-2.145***
	(.685)	(.681)	(.732)
Appeal		1.419*	1.895*
		(.776)	(.964)
Demographics	No	No	Yes
R^2	0.44	0.46	0.55

Significance: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.
Notes: N = 87 and robust standard errors. When clustering on subjects no significant changes were observed.

Finally, I tested for the effect of the trailer on the gap between elicited enjoyment (predicted and realized). Table 3.5 reflects the regression in levels, and once again presents the Treatment as a negative and significant contributor to the participants' relative enjoyment of the movie. The advertisement negatively affected the gap, which indicates that participants who were exposed to the trailer had a less enjoyable experience than those in the Control group.

Table 3.5: Regressions on Difference in Enjoyment

	(1)	(2)	(3)
Trailer	-1.850**	-1.821**	-2.143***
	(.729)	(.739)	(.797)
Appeal		.359	.359
		(.787)	(.834)
Demographics	No	No	Yes
R^2	0.07	0.07	0.19

Significance: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.
Notes: N = 87 and robust standard errors.

Figures 3.1 and 3.2 show the density distributions for predicted and realized enjoyments for each treatment. Notice that for the Control group, the predicted enjoyment is more spread and its distribution is set around 7, while for the Treatment group, it is more concentrated with a longer tail towards higher values. As for the realized en-

joyment, while not much change is observed for the treated group, the control group's distribution for realized enjoyment is clearly skewed to the right, now centered on 10.

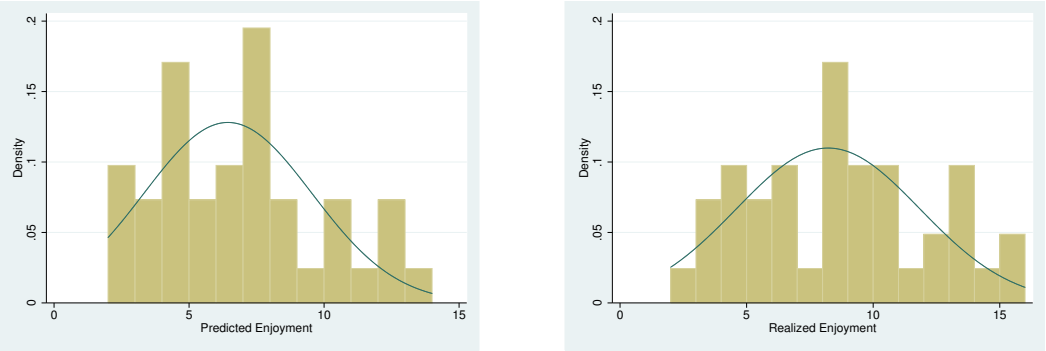


Figure 3.1: Density of Predicted and Realized Enjoyment for the Treatment Group

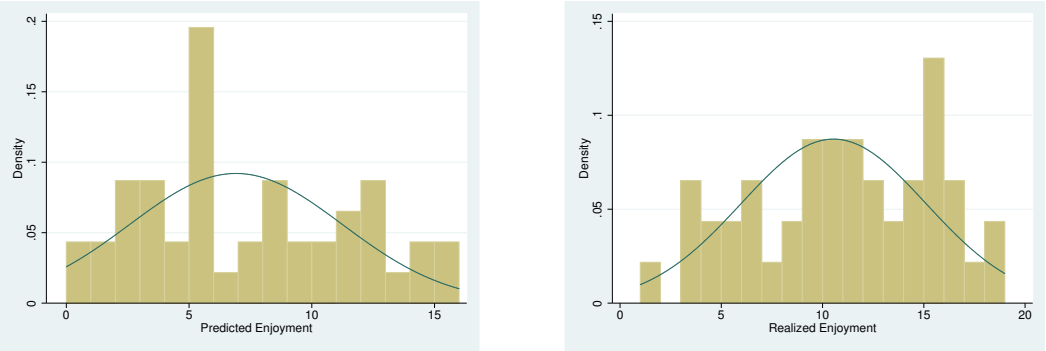


Figure 3.2: Density of Predicted and Realized Enjoyment for the Control Group

Figure 3.3 shows the density for the difference in enjoyment for each treatment. Notice that despite the fact that both distributions are centered on close values, while for the Treatment group the distribution is more dense to the left, for the Control group it is more dense to the right, indicating a greater gap in enjoyment (and a higher relative enjoyment) for the latter.

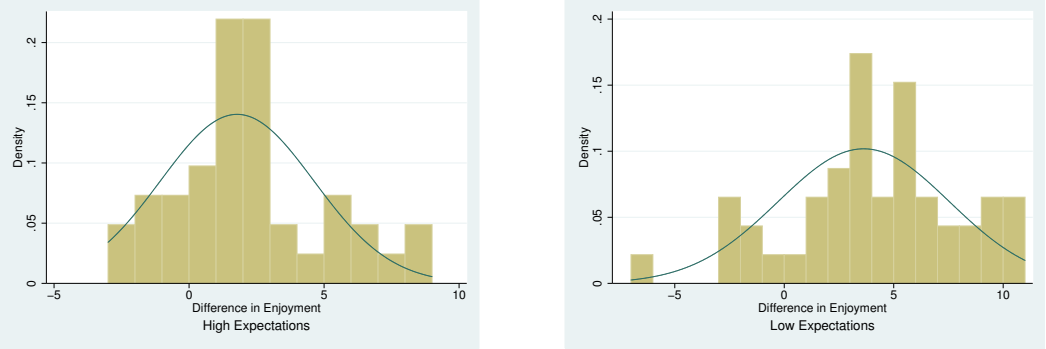


Figure 3.3: Density of Difference in Elicited Enjoyment

3.4 Conclusion

This paper discussed the effect of trailers on movie enjoyment. The idea is that trailers may raise their viewers' expectations about a movie, generate anticipated enjoyment, and perhaps lessen their actual enjoyment of the movie.

To test this hypothesis, I performed an experiment using a short, Oscar nominated, live action movie (Boogaloo and Graham). In this experiment participants were divided into two groups. The Treatment group started by watching a short interview with the movie's director and producer, and a short trailer. The Control group, in the other hand, received the same information about the movie, but via a simple paragraph which was displayed and read out loud by the experimenter. Following, both groups were questioned about what they predicted would be the average enjoyment of the movie. Afterwards, both groups watched the movie, and reported what they believed to be the average realized enjoyment.

Results showed that the Treatment group enjoyed the movie significantly less than the Control group, indicating that the trailer did indeed affect individual's judgement and enjoyment of the movie. In fact, on average the Control group reported a difference in enjoyment (realized - predicted) that was twice as high as that reported by the Treatment group.

Also, regressions showed that realized enjoyment was significantly and negatively affected by the advertisement, as was the difference in enjoyment both in levels, and as a percentage of the number of participants. Further, the distributions where shown to be centered on a higher level of realized enjoyment for the Control group. It is interesting to observe that despite the fact that the trailer yielded insignificant results on the elicited expectations (predicted enjoyment), it still significantly reduced the realized enjoyment, increasing the gap between expected and realized enjoyment of the movie.

Despite the fact that expectations didn't seem to be affected by my Advertisement treatment, I speculate that trailers and other forms of movie promotion may affect prospective viewers' expectations. And the higher are one's expectations the more likely she is to experience some level of disappointment.[6] And, in affecting ones enjoyment, expectations can influence future choices by affecting utility maximizing behavior.

The danger in generating disappointment for a particular picture is not as big as the danger of spillover through recognizable names, such as leading actors, directors and producers. It is not uncommon to hear an statement such as "I like Jonny Depp's movies!", or "Quentin Tarantino is great!". But just as those comments generalize the idea of a good characteristic of a certain group of movies, a significant disappointment may generate comments which may be detrimental to a whole class of movies, such as "Katherine Heigl movies are always the same".

It is important to exploit the individuals anticipated enjoyment to convince the audience to go the theaters, and start moving the wheels of enjoyment and recognition which will, later, boost the sales and the positive impacts. But it is essential to understand the what are the factors that affect enjoyment, and what are the mechanisms that take effect

[6]According to Bell (1985) [62], disappointment is a psychological reaction to an outcome that falls short of one's expectations such that the greater the disparity, the greater the disappointment. Therefore, forming expectations about a movie may skew the viewer's final judgment about it and, in some cases, even generate disappointment (or elation).

in this process. The more we understand about how choices are made, the more we can understand what incentives are necessary, how to build them and what is their efficient level.

The movie industry is a multi-billion dollar enterprise which directly and indirectly affects multiple industries and markets across the world. According to Roos (2009) a common rule of thumb for marketing is to devote one third of the total movie budget to it, which on average of $35 million in 2009. To make sure this investment does not backfire (by reducing overall revenue) can help increase and fortify this industry, bringing the positive impacts to the economy as a whole.

Appendix A

Appendix Chapter 2

A.1 Experiment's Instructions

INITIAL INSTRUCTIONS

Thank you for participating today!

You will be paid for your participation in cash and privately at the end of the experiment. What you earn may depend on decisions (yours or of others) and on chance. At this point, please turn off all electronic devices.

The entire experiment will take place through the computer and there should be no interaction with participants seated at other computers. If at any point you have a question, please do not hesitate to raise your hand, and I will be by to answer your question.

Please do not talk or in any way try to communicate with other participants during the experiment.

We'll start by going over general instructions about payments and tasks throughout a round. These will be followed by a training after which more specific instructions will be given before each actual stage.

GENERAL INSTRUCTIONS

At the beginning of each round you will be randomly assigned into a group of 4 participants, where one participant will play the role of the firm and the other 3 will be the workers for that firm.

Each round will consist of 3 stages. **The workers' wages for the first stage are determined by the experimenter, but during the second stage firms will make decisions that may influence third stage wages**, as we'll see momentarily.

The **firms' profits will be determined by the firm's decision in the second stage (when applicable) and the productivity of ONE of its 3 workers** to be chosen at random. Each worker will have an equal chance in determining firm's profit at any working stage.

Workers will earn **fixed** (of either 12 or 8 lab dollars) that will be revealed prior to each working stage (stage 1 and 3). Firms will earn profits according to the equation: **Profits = 1/8*[R + 4*T]**, where R is the residual endowment (= endowment - wages), and R = 12 or zero; and T is the number of tasks completed by the chosen worker. So if R = 12, the firm will receive 12/8 + 4T/8 = 3/2 + T/2; if R = 0, the firm will receive 4T/8 = T/2.

In sum, **workers can influence firm's profit at both working stages, while firms have a chance to cut worker's wages for the second working stage.**

Workers' productivity and firms' final earnings will be private. Workers will learn their wage and whether it was determined by a firm's choice, but no worker will ever learn other workers' performance nor the firm's final earnings. Firms will only observe the performance of the chosen worker, which directly determines her earnings, but it will not learn the worker's ID, nor the other workers' productivities.

Final earnings for the experiment will be given by your earnings on **both working**

stages for one of the 3 rounds to be chosen at random, plus 2 lab dollars for each debriefing questionnaire answered. Workers will answer the questionnaire through the computer, while firms are to answer it on paper.

Lab dollars will be converted to US dollars in a rate of 2-to-1, that is: 2 lab dollars = 1 USD.

TASK INSTRUCTIONS

Once the time starts, on the left hand side of the screen, you will be given a grid where each letter of the alphabet is associated to a number. In the center of the screen, you will be given a box containing a letter and a space where you are asked to type in the corresponding number. Look up the letter on the grid, type the number that corresponds to it, and click "OK".

Each number correctly entered will count as one completed task. If you enter the wrong number, a pop up will let you know. In which case you should click "OK" on it, and proceed with the task. At the right hand side of the screen, the number of correct answers will be continually displayed.

You will have 1.5 minutes to go about your task. When the time is up, the screen will display the number of tasks you completed, and what would be the firm's profit considering residual endowments (R) of both 12 and zero lab dollars.

FIRST STAGE INSTRUCTIONS

In this stage, firms will receive an initial endowment of 48 lab dollars. Each firm will use this endowment to pay a mandatory wage of 12 to each of its 3 workers, and keep the remaining 12 as residual (R = 12).

Workers will be given 1.5 minutes to work on the simple task, just like on the training round. Once the 1.5 minutes are up, ONE of each firm's workers will be randomly chosen, and the number of tasks completed by that worker (T) will help to determine the firm's earnings according to the equation:

Profits = 1/8*[R + 4*T], where R is the residual endowment (= endowment - wages = 12); and T is the number of tasks completed by the chosen worker.

Workers' wages for this stage will be 12, regardless of how many tasks they complete.

FIRST STAGE EXAMPLES

Example 1:

Suppose each of the 3 workers completes 21 tasks during the 1.5 minutes. For any chosen worker T=21. In this stage, the endowment is 48, and the wages are 12, such that the residual will be R = 12 (= 48 - 3(12)).

Thus, each worker will earn 12 lab dollars, and the firm will earn 12 (= 1/8*(12 + 4*21)).

Example 2:

Suppose workers 1 and 2 complete 23 tasks each, and worker 3 completes 18 tasks during the 1.5 minutes. Again, the residual is R = 12. If worker 3 is chosen, T=18. Each worker will earn 12 lab dollars, and the firm will earn 10.50 (= 1/8*(12 + 4*18)).

However, if either worker 1 or 2 is chosen, T=23, each worker will earn 12 lab dollars, and the firm will earn 13 (= 1/8*(12 + 4*23)).

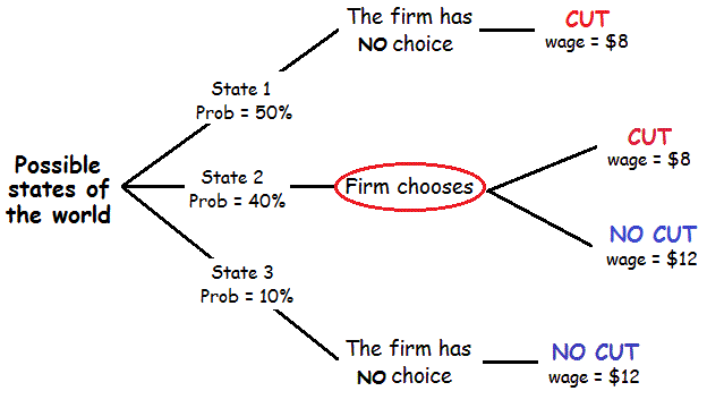
SECOND STAGE INSTRUCTIONS

In this stage firms will make decisions about wages for stage 3, and workers will state their beliefs about those decisions and their impact on future wages.

During stage 3, **firms will get a 36 endowment, 12 less than they got in the first stage**, then firms will decide whether they'd prefer to bear the 12 loss, or to pass it on to the workers in the form of wage cuts. In the latter case, wages of all 3 workers would drop to 8 lab dollars.

Even though all firms will make choices about pay cuts, **firms' choices may or may not matter** according to which stage of the world is realized. Once firms have made their decisions, both workers and firms will learn the state of the world, wages and residual endowment.

There are 3 possible states of the world, which can happen with specific probabilities, as shown in the picture below. Regardless of the firm's choice, **there is a 50% chance that workers' wages will be cut and a 10% chance that wages will NOT be cut. Only 40% of the time the firm will actively choose** whether or not to cut the wage.



SECOND STAGE EXAMPLES

Example 1:

Suppose **NO pay cuts** happen, then R=0 (= 36 - 3(12)); workers 1 and 2 complete 21 tasks each, and worker 3 completes 26 tasks during the 1.5 minutes.

If either worker 1 or 2 is chosen T=21, workers will earn 12 lab dollars, and the firm will earn 10.50 (= 1/8*(0 + 4*21)).

However, if worker 3 is chosen, each worker will earn 12 lab dollars and the firm will earn 13 (= 1/8*(0 + 4*26)).

Example 2:

Suppose **pay cuts happen**, then R=12 (= 36 - 3(8)), worker 1 completes 21 tasks, and workers 2 and 3 complete 16 tasks each during the 1.5 minutes.

If worker 1 is chosen T=21, workers will earn 8 lab dollars, and the firm will earn 12 (= 1/8*(12 + 4*21)).

However, if either worker 2 or 3 is chosen, workers will earn 8 lab dollars, and the firm will earn 9.50 (= 1/8*(12 + 4*16)).

Example 3:

Suppose **NO pay cuts** happen, again R=0, and each of the three workers completes 24 tasks during the 1.5 minutes.

For any chosen worker T=24. Thus, each worker will earn 12 lab dollars, and the firm will earn 12 (= 1/8*(0 + 4*24)).

THIRD STAGE INSTRUCTIONS

First you will learn the realized state of the world, and the wages for your group in this stage.

Then, workers will be given another 1.5 minutes to work on the task completion, which impacts the firm's profit.

Firms' earnings for this stage will be determined by the realized state of the world, the firm's choice in the second stage (if applicable), and the productivity of one of her three workers chosen at random.

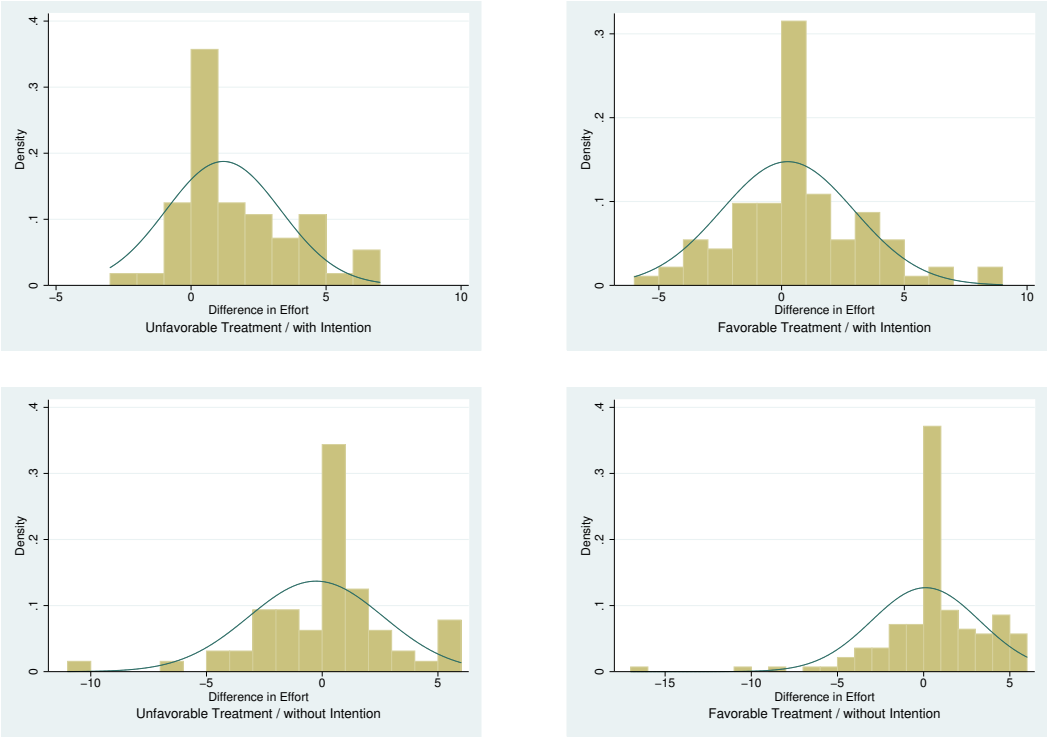


Figure A.1: Distribution of Effort Increase with $wage = 12$ units.

A.2 Graphs on the Distribution of Effort Increase

In analyzing the distribution of effort increase we notice that there is not much of a difference in distributions when the wages are determined by randomness. However, when the firm is allowed to choose the wage (with Intention), the distributions shift according to treatment, to the right when wages are high, and to the left when they are low.

For an intentional high wage, observe that the distribution for the Unfavorable Treatment is skewed to the right, indicating an increase in effort that is more prominent than its counterpart on the Favorable Treatment (Figure A.1). Meanwhile, for an intentionally granted low wage (Figure A.2), the distribution of effort increase is slightly skewed to the left, and more concentrated around zero when participants faced the Favorable Treatment.

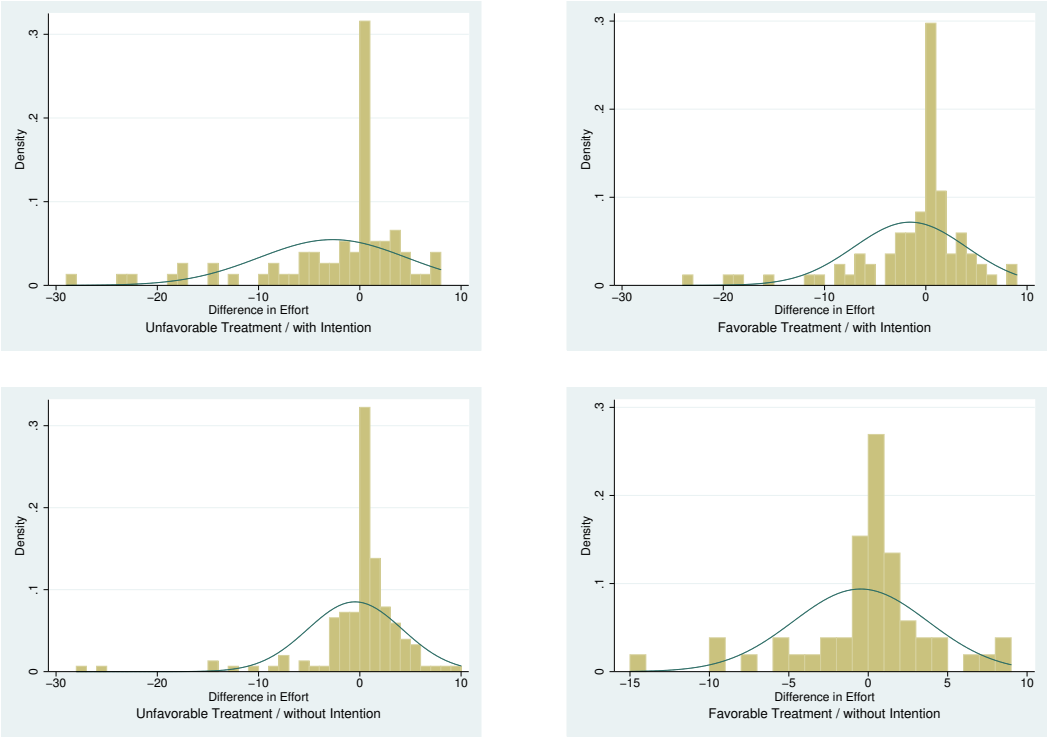


Figure A.2: Distribution of Effort Increase with $wage = 8$ units.

A.3 Robustness Check

Since several of our variables are binary, we also ran a few regressions for each specific combination of variables (Intention / Wage / Treatment), which are presented on the tables below. We separated them into Intentional and non-Intentional model to reduce collinearity among models.

Notice from Table A.1 that when the firms intentionally set the wage, if wages are high the workers will relatively increase effort when they expected a low wage (Unfavorable Treatment), but not when the high wage was already expected. If in the other hand wages are low, an Unfavorable Treatment also yields a bigger and marginally significant reaction from the workers. When considering the Overall model ($wages = 8$ and 12) only the unexpected high wage will yield a significant difference in effort.

When the wages are randomly determined (Table A.2), expectations do not seem

Table A.1: Difference in Effort by Situation - Intentional

	(Wage = 12)	(Wage = 8)	(Overall)
Unfav_Treat*High_Wage	1.6581***		1.7645***
	(.4695)		(.4540)
Fav_Treat*High_Wage	.3577		.7887
	(.4302)		(.4819)
Unfav_Treat*Low_Wage		-2.9610**	-3.0705
		(1.3974)	(1.7235)
Fav_Treat*Low_Wage		-1.6768	-1.6861*
		(1.4178)	(1.1915)
Round	Yes	Yes	Yes
Controls	Yes	Yes	Yes
N	264	273	537
R^2	0.09	0.14	0.12

Significance: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.
Standard errors were clustered on Session.

to play a role, since regardless of treatment workers effort is lower when the wage is high (compared to overall high wage efforts), and effort is higher when wages are low (compared to overall low wages). Across all wages, all we find is a marginally significant increase in effort when expected high wages are randomly granted.

Table A.2: Difference in Effort by Situation - Non-Intentional

	(Wage = 12)	(Wage = 8)	(Overall)
Unfav_Treat*High_Wage	-1.2175**		.6180
	(.5117)		(.8627)
Fav_Treat*High_Wage	-.6813		.9124*
	(.3933)		(.4925)
Unfav_Treat*Low_Wage		2.2107**	.4105
		(1.0412)	(.7407)
Fav_Treat*Low_Wage		2.4780*	.6023
		(1.3046)	(.8643)
Round	Yes	Yes	Yes
Controls	Yes	Yes	Yes
N	264	273	537
R^2	0.08	0.13	0.07

Significance: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.
Standard errors were clustered on Session.

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