**Mendel University in Brno**
**Faculty of Business and Economics**

# Emotions and Utility Maximization

## Diploma thesis

**Supervisor:**

**Ing. Bc. Martin Machay, Ph.D.**

**Diya Elizabeth Abraham**

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**Abstrakt**

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Cílem této diplomové práce je výzkum role emocí souvisejících s problémem maximalizace užitku a vytvoření předpokladu pro začlenění emocí do ekonomických modelů rozhodování. Tato práce dále poukazuje prostřednictvím sociálního experimentu na to, jak specifické emoce ovlivňují úsudek mezičasové preference. Výsledky experimentu ukazují v souladu s dřívějšími výzkumy, že náhodný smutek zvyšuje úroveň ekonomické netrpělivosti. Nicméně v rozporu s teoretickými predikcemi, prosociální emoce soucitu nemůže být použita jako nástroj, který snižuje ekonomickou netrpělivost. Ve skutečnosti existují důkazy, které soucit v některých situacích spolehlivě neodlišují od smutku, pokud jde o jeho vliv na ekonomickou trpělivost, a poté může poškodit hospodářskou prosperitu.

**Klíčová slova**

Emoce, Úsudek, Rozhodování, Behaviorální ekonomie, Užitek, Mezičasová preference, Soucit, Smutek

**Abstract**

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The goal of this thesis is to examine the role of emotion as it pertains to the utility maximization problem and make an argument for incorporating emotion into economic models of decision-making. It further aims to demonstrate by means of a social experiment how specific emotions influence intertemporal judgment. The results from the experiment reveal that in line with previously documented findings, incidental sadness increases the level of economic impatience. However contrary to theoretical predictions, the prosocial emotion of compassion cannot be used as a tool to reduce economic impatience. In fact there is evidence to indicate that compassion, in some situations, is not reliably different from sadness in terms of its influence on economic impatience and can therefore be detrimental to economic wellbeing.

**Keywords**

Emotion, Judgment, Decision-making, Behavioral economics, Utility, Intertemporal choice, Compassion, Sadness

# Table of Contents

# List of Tables



# List of Figures

# 1. Introduction

Economists have in the past made certain simplifying assumptions about the way in which we make decisions, the most basic and fundamental of which are that we are all rational beings with ordered preferences who use all the available information to maximize our own utility. While few economists believe that there exists such a highly rational being who engages in extensive and complex calculation prior to every decision, many continue to use economic models based on these assumptions and believe that they are successful in explaining human behavior *in general*. Extensive experimental evidence from different fields, most recently from behavioral economics, has shown however, that even in the aggregate, people systematically fail to behave as these standard models predict.

Recent developments in the fields of psychology and neuroeconomics have suggested that the missing variable often ignored or left out of models of decision-making but which has high explanatory power is *emotion*. Given the growing body of evidence that now exists, it can no longer be denied that understanding the influence of emotions on judgment and decision-making can help us improve the predictive power of existing economic models.

## 1.1. Objectives

Given the current gaps in mainstream economic models and the evidence pointing to the role of emotion in decision-making, my objectives in writing this thesis are three-fold and are as follows:

1. To examine the utility maximization problem and call attention to the issues inherent in the assumptions of the rational choice model currently used as the primary model of decision-making in mainstream economics.
2. To review the existing literature in support of the argument for economists to consider the influence of emotions on economic decision-making. In doing this, I will examine the various theories of emotion, the types of emotions and their functions as they are relevant to the concept of utility and economic decision-making in general. Here, I will also examine the evidence that describes various ways in which emotions can be regulated to increase the likelihood of beneficial outcomes.
3. Finally I plan to examine the influence of emotions in the framework of intertemporal choice. Here my objective is to test, through means of a social experiment, the influence of the emotions of compassion and sadness on economic impatience.

# 2. Literature Review

## 2.1. Rational Choice and Utility Maximization

In order to understand the need to incorporate emotions into the utility maximization problem, it is necessary to first describe the shortcomings in the assumptions and rationale of the current mainstream model that deal with this problem.

Mainstream economic thought and economic policy today is based on the rational choice model. This model assumes that decision-making is completely rational and motivated only by self-interest (Scott, 2000). According to it, people utilize all the available information in the market and make decisions based on a systematic cost-benefit analysis that seeks to maximize utility while minimizing costs. Here, utility is thought of as a subjective measure of value or a measure of the desirability of the consequences of an action (Kuznar, 2000). In the framework of utility maximization, a rational decision is made by choosing that outcome which has the highest *expected utility* (Levin, 2006). In other words, the individual maximizes the product of the probability of a potential outcome occurring and the utility of that outcome.

Thus the rational choice model and the concept of utility maximization requires that the following assumptions are met:

1. Decision-making is motivated only by self-interest.
2. People are perfectly rational. This implies that their preferences are complete (i.e. the individual is always able to ascertain which of two given alternatives they consider preferable or that neither is preferred to the other), transitive (i.e. if option A is preferred to option B and option B is preferred to option C, then option A is preferred to option C) and non-satiable (i.e. we always prefer more of a given good). Moreover, individuals know their marginal utility or the utility that they derive from consuming one additional unit of the good (Levin & Milgrom, 2004).
3. People utilize all the available information in the market.
4. Expected utility is a linear model that expresses a multiplicative relationship between probability and utility.

The first three assumptions describe the ideal of homo-economicus, or economic man, and are generally seen as a somewhat unrealistic picture of human behavior in the real world. Nonetheless the concepts of rational choice and utility maximization are the pillars of microeconomics and are used to explain a range of economic behavior including but not limited to:

1. Consumer behavior - given the consumer's income and the prices of goods, the consumer chooses that affordable bundle of goods which maximizes her utility.
2. Decision-making under risk - given a set of outcomes with given utilities and probabilities of occurring, the individual chooses that outcome which maximizes his/ her expected utility.

3. Decision-making involving intertemporal choice i.e. decisions that involve a trade-off between the present and the future.

Since broader macroeconomic theory is based on the aggregate of all such individual decisions, the rational choice model can be thought of as the foundation on which mainstream economics is based. This model definitely has its advantages, not least of which is its wide scope to analyze behavior ranging from personal choices to economic matters involving decisions about consumptions, savings and investment and even extending to choices about education, crime, marriage and so on (Levin, 2006). However, it has also been found to fail in specific circumstances and more importantly, the situations in which it fails can be systematically predicted (Tversky & Kahneman, 1986). In order to understand how and why this happens, it is necessary to examine in more depth the problems with the key assumptions underlying this model:

### 2.1.1. The problem with the pure self-interest assumption

The self-interest assumption has its roots in both evolutionary theories as well as the economic theories of Adam Smith and Alfred Marshall. While the strong explanatory power of self-interest cannot be argued, the assumption has also proven limiting and often the term is defined too narrowly.

It is no secret that many people volunteer their time, give to charity, do not steal even when there is no chance of getting caught, and help others when they know that there is no chance of reciprocation in the future. This goes against the assumption of pure self-interest. Experimental evidence from dictator and ultimatum games in lab settings also indicate that human beings care positively about fairness and reciprocity (Fehr & Schmidt, 2006). Additionally, there is evidence to show that people exhibit altruistic tendencies and care positively about intrinsic social norms (or have a moral compass), which also violates the self-interest assumption (Bowles & Gintis, 2011).

While there is still some debate over how self-interest should be defined in the economic context, it can no longer be assumed that we are *only* motivated by self-interest. This is because there is always a larger social context that we take into account, consciously or not, before making even the simplest of decisions.

### 2.1.2. The problem with the assumption of perfect rationality

In order to understand why this assumption may not always hold, it is necessary to recognize that there are four different types of utility that do not always coincide (Kahneman, 1994): These are anticipated or predicted utility (what people expect to like or think they will like), choice or decision utility (what people reveal by choosing; experienced at the moment of choice), experienced utility (what is actually experienced while consuming the good) and remembered or retrospective utility (what people recall as their experience in choosing and consuming the good). To understand why these utilities would not always coincide, consider the following examples: A compulsive shopper may buy something (revealing choice utility), which they later find no use for or simply do not consume (showing little or no experienced utility). Similarly, drug addicts report having cravings or high levels of anticipated

utility but lower levels of experienced utility as a result of actually consuming the drug. Further evidence confirming the existence of these different types of utility comes from the emerging field of neuroeconomics which reveals that in fact there are different brain regions associated with these different types of utility (Camerer, Loewenstein & Prelec, 2004). If the different utilities associated with a given choice do not coincide, then the assumption that we have standard or consistent preferences across a given range of choices can no longer hold.

It has also been shown that our preferences are not standard over time. The common difference effect coined by Loewenstein and Prelec (1992) illustrates the tendency to exhibit time-inconsistent or present-biased preferences. This can be seen from a simple example: when faced with a choice between $100 today and $110 two months from now, if we choose $100 today then we should always prefer $100 at time *t* compared with $110 in t + 2 months. However, if *t* was say 5 years (so t + 2 months would be 5 years + 2 months), then our preferences would generally tend to reverse, i.e., as *t* gets larger we will start to prefer the delayed reward.

### 2.1.3. The problem with the assumption that economic agents always utilize all the available information

This assumption presupposes the idea that economic agents have both unlimited time within which to make decisions and unlimited information processing capabilities. Clearly, this does not represent a realistic picture of real-world decision-making.

Herbert Simon (1955) suggested the term 'bounded rationality' to reflect the more limited nature of our problem solving capabilities. He suggested that people adopt certain heuristics or rules of thumb to make the best possible decision given limited time and brainpower. He termed this satisficing or adopting a decision-making strategy that aims for a satisfactory or adequate result, rather than the optimal solution.

In some real-world decision scenarios, a search for the optimal solution may often involve wasting valuable time and resources and may therefore result in a sub-optimal outcome compared with the solution obtained by adopting the less taxing satisficing strategy. For example, consider the decision to buy a new pair of running shoes. Given the vast amount of choice today for such a product, engaging in a lengthy cost-benefit analysis considering quality, price, style and so on, is not the best use of one's time. In such situations, many consumers tend to go with brand value - a brand they are familiar with or one that has a strong reputation. While the shoes they end up buying may not be the 'optimal' shoes for them, it would still be 'good enough' in the circumstances. We routinely engage in satisficing mainly so that we can focus our cognitive faculties on more important decisions but also because in many situations, it may actually be more efficient than searching for the optimal solution.

### 2.1.4. The problem with the assumption of linear probability and value curves

This assumption concerns our ability to accurately assess expected value which is assumed to be the integration of two linear functions namely, our estimates of value as well as our estimates of probability.

However, in reality, observed behavior tends to be more in line with prospect theory (Kahneman & Tversky, 1979). According to this theory, we have a tendency to overestimate small probabilities and underestimate large probabilities. It also suggests that our value function is highly asymmetrical, being steeper for losses than for gains. To illustrate these points consider the following example: When presented with a choice between playing a game with a 95% probability of winning $1000 or one in which there is a 100% probability of winning $945, people tend to be risk averse and choose the latter option even though the expected value for the former is higher. On the other hand, when presented with a 95% probability to lose $1000 or a 100% probability to lose $945, people tend to be risk-seeking and choose the former option even though its expected value is lower. The above two examples illustrate what is known as the certainty effect which reveals our tendency to underestimate high probabilities.

By contrast if we had considered much lower probabilities, the possibility effect would be in play revealing our tendency to overestimate small probabilities in the hope of receiving a large gain or avoiding a large loss. This is illustrated by the tendency to choose Option 1 in Problem 1 below and Option 2 in Problem 2.

**Problem 1: Choose between**
Option 1 - 5% probability of winning $1000
Option 2 - 100% probability of winning $55
**Problem 2: Choose between**
Option 1 - 5% probability of losing $1000
Option 2 - 100% probability of losing $55

These examples illustrate how both our estimates of probability and value are subjective and in calculating expected value, we integrate both a nonlinear function of the value of outcomes as well as a nonlinear function of their probabilities.

Additionally it should be noted that since the value curve is asymmetrical, with the pain of loss being more than the pleasure of acquiring equivalent gains, the framing of the choice (or whether the choice is presented as a loss or as a gain) influences our decisions (Kahneman & Tversky, 1981).

## 2.2. The role of behavioral economics

Substantial research contradicting the assumptions of the rational choice model comes from the field of behavioral economics, which helps to explain the systematic deviation in observed behavior from what is predicted by standard economic models by incorporating various psychological, cognitive and emotional aspects of decision-making into such models (Pope & Syndor, 2016). Ideas like reference dependence, loss aversion, framing effects, endowment effects, range effects and the systematic use of a wide range of heuristics to make quick decisions are today commonly used to explain a number of phenomena and have proven very useful in predicting human behavior where mainstream economics has failed. As a consequence of evidence from behavioral economics and other fields like psychology and neuroeconomics, there is now a strong argument for the need to include emotion into the analysis of the human decision-making process (Virlics, 2013).

Underpinning every concept in behavioral economics is an emotion and/or some interaction between emotion and cognition that drives the ‘rational’ economic

agent, even if it does so at times without the conscious knowledge of the economic agent (Kahneman, 2011). However, the specific role of the underlying emotion and its associated appraisals and action tendencies is rarely explored in great detail, leading to a still somewhat incomplete analysis of human decision-making.

## 2.3. The need to account for emotion

From an evolutionary perspective, the development of emotions is what enabled our very survival - from an organism acting on its fear of danger to the anticipation felt while pursuing an opportunity, there is an emotion underlying every choice and every aspect of its behavior (Damasio, 1995).

A new field exploring the role of emotions in economic behavior is now beginning to gain momentum as many psychologists reach the consensus that emotions are the dominant driver of the large majority of meaningful human decisions (Lerner, Li, Valdesolo & Kassam, 2015).

Besides their obvious role in interpersonal decision-making (i.e. decision-making in a social context), emotions also shape decisions via their influence on the actual content of thought, the depth of information processing and through goal activation (Lerner, Li, Valdesolo & Kassam, 2015). Additionally, evidence from the field of neuroeconomics, described often as the subject that studies the neuroscience of decision-making, reveals that the same brain regions that are involved in estimating values and probabilities are also connected with emotions (Camerer, Loewenstein & Prelec, 2004).

## 2.4. Theories of emotion

There are several theories of emotion that have evolved and developed over time. A review of some of the main theories can provide more insight into the contemporary definition of emotion and the role they play in judgment and decision-making.

According to the James-Lang Theory of Emotions (James, 1884; Lange, 1885/ 1967), the experience of emotion is due to the perception of the physiological reactions that accompany an emotional event. In other words, the mind's interpretation of a physiological response is what produces an emotion. According to this theory, for example, you don't cry because you feel sad but rather you feel sad because you cry or you feel happy because you smile. The theory also allowed for the idea that emotions could be produced by autonomic feedback such as an increase in heart rate. This theory was criticized by Cannon (1927) for a number of reasons some of which are that 1) it was observed that many different emotions had similar patterns of physiological responses and 2) physiological reactions were too slow to produce an emotional experience, which was observed to be instantaneous.

Cannon's criticism was later extended by Bard (1934). The Cannon-Bard Theory of Emotions accounts for the discrepancies in the James-Lang theory by suggesting that the experience of emotions and the physiological changes occur simultaneously in response to an emotionally significant event.

Later theories begin to take into account the cognitive component of the emotional experience too. The Schacter-Singer Theory of Emotions (Schacter, 1964) hypothesizes that it is both the physiological responses and the cognitive appraisal (see section 2.7.2 for more on emotion appraisals) of an emotional event that simultaneously forms the experience of emotion. More specifically, it suggests that if we become physiologically aroused, we don't feel a specific emotion until we are able to identify the reason for this arousal. This theory is also known as the two-factor theory of emotion.

Another cognitive theory of emotion is the Lazarus Theory (Lazarus, 1968), which suggests that the experience of emotion depends on how the experience is cognitively appraised. In other words, thought must occur before an emotion or a physiological reaction takes place. For instance, if we see two men with masks enter a store, we may think they are coming to rob the store and then feel fear but if we think they are just kids playing a game with masks, we will not feel fear – i.e. how we label an event matters and this is dependent on personal experience, cultural differences and/ or situational factors. According to the Lazarus theory, once the appraisal of the emotional event has occurred, then the emotion will occur simultaneously with the physiological response. This theory can explain how the same event, for example bungee jumping or skydiving, can produce similar physiological responses but entirely different emotions in people who have different appraisals of the event.

More on contemporary theories of emotion such as the somatic marker hypothesis (Damasio, 1995) and the appraisal tendency framework (Lerner & Keltner, 2000) are detailed in sections 2.7.1 and 2.7.2.

# 2.5. Defining emotion

There have been several attempts to define emotion objectively. However this has proved difficult mainly because the term was taken from everyday discourse and as such tends to be used in a large range of situations (Gross, 2008). As a consequence, its exact meaning has become more subjective and dependent on circumstance and usage.

According to Ekman (1992), there are nevertheless certain common characteristics that are shared by all basic emotions. These include their quick onset, relatively short durations (distinguishing them from moods), the unbidden nature of their occurrence (meaning individuals cannot simply choose, without some sort of internal struggle for control, what emotions to have and when to have them) and the automatic associated appraisal mechanisms (which allows the individual to respond quickly). Here, the term 'basic emotions' refers not to single affective states but to a group of related states that are aroused by similar events and share similarities in expression and physiological activity.

From these accounts and from the review of the various theories of emotions till date, it can be gathered that all emotions are accompanied by physiological as well as cognitive changes and reactions. The physiological reactions can include distinct changes in patterns of brain activation and autonomic nervous system activity accompanied by facial and bodily expression and the cognitive reaction includes appraisals of what is happening and expectations about the situation.

# 2.6. Types of Emotions

The classification of emotions into expected, incidental and integral emotions by Rick and Loewenstein (2007) provides a useful structure to analyze their impact on standard economic models. The following sections will explore the different types of emotions with a few examples of how each type affects the decision-making process.

## 2.6.1. Expected Emotions

Expected emotions are those that one anticipates will occur as a result of a particular choice. At the moment of choice, they are only cognitions about future emotions that are not actually experienced until the outcomes of a decision materialize (Rick and Loewenstein, 2007). This differentiates expected emotions from immediate emotions (i.e integral and incidental emotions) that are experienced at the moment of choice.

According to Rick and Loewenstein (2007), the notion of expected emotions is perfectly consistent with the consequentialist perspective of economics. However, they point out that key aspects of such emotions are still left out in traditional economic analysis. For example, according to regret theory (Loomes & Sudgen, 1982), individuals may anticipate the possibility of feeling regret and thus incorporate in their choice the desire to eliminate or reduce this possibility. This violates the assumption that utility is strictly defined over realized outcomes.

This assumption is also violated in the model of intertemporal choice which fails to take into account the utility or disutility of anticipatory emotions i.e there are situations in which people prefer to have gains postponed and losses expedited (Loewenstein and Thaler, 1989). In this case, anticipatory hope (or "savouring" which refers to the positive utility derived from contemplating pleasant future outcomes) and anticipatory worry (or "dread" which refers to the disutility derived from the negative contemplation of undesired outcomes) provide an explanation for why we prefer to finish off unpleasant outcomes like a visit to the dentist quickly and prefer to wait to experience pleasant outcomes for example saving the best part of the desert for the last bite.

## 2.6.2. Integral Emotions

Integral emotions are those emotions that are experienced at the moment of choice from thinking about the future consequences of a particular decision (Rick and Loewenstein, 2007).

In an experiment known as the Iowa Gambling Task (Bechara et. al., 1994), it was shown that conscious knowledge alone is not sufficient for making good decisions and that integral emotions play a vital role where decision-making is concerned. In this task, participants are presented with 4 decks of cards and are instructed to select cards one at a time. Turning a card results in a reward (large in decks A and B and small in decks C and D) or a penalty (larger than the rewards in decks A and B and smaller than the rewards in decks C and D). After encountering a few losses, normal participants begin to avoid decks with large losses (i.e. decks A and B), at first without concrete knowledge of why they do so, while patients with damage

to the amygdala or ventromedial prefrontal cortices (the parts of the brain involved in emotional learning) do not. It should be noted that the patients in question had sound cognitive abilities and average or above average intelligence levels. It was found that the decision of normal participants to cease selection of cards from decks A and B is due to the emotion that is felt on contemplating a large loss if they were to pick from these decks. This overrides the prospect of short term gain (since rewards are higher in these decks) and they eventually end up with a better outcome than the emotionally impaired participants who prefer to select card from the decks A and B because they offer higher wins. Thus such emotions play an essential role in decision making because they help inform decision makers about their preferences before the decision is actually made.

Integral emotions are often used as proxies for values when making an evaluative judgment (Pham, 2007) and despite their informative function, these emotions sometimes act as strong biases when used in this way, especially in certain perceptually vivid decision cases where they tend to lower rather than raise optimal decision making capability. For example, valuations based on these responses exhibit, among other properties, polarization, myopia, scale insensitivity (with regard to both probability as well as magnitude), and reference dependence (Pham, 2007). This means when these emotions are in play, the basic assumptions of economic models can no longer hold. For example reference dependence counters the assumption that utility is strictly defined over realized outcomes and scale insensitivity implies that the probability weighted average of the utilities of all possible outcomes can no longer be used to ascertain value in the expected utility model.

The groundbreaking work by Damasio (1995) on emotionally impaired patients highlighted the importance of integral emotions in the process of decision-making. His explanation of how these emotions arise, which is as a reaction to mental images of the various outcomes associated with the choice, can explain why people give much more importance to the nature of the outcome rather than the probability of it occurring.

### 2.6.3. Incidental Emotions

Sometimes, certain transient emotions can influence the decisions we make even though the source of the emotion is incidental or unrelated to the decision at hand (Bodenhausen, 1993; Andrade & Ariely, 2009).

Loewenstein and Lerner (2003) in their review posit that there are two sources of these incidental emotions namely the dispositional affect and situational affect. With regard to the dispositional affect they argue that people have specific emotion dispositions that makes them react in a particular way to different situations across time – for example angry and happy individuals tend to make similarly risk-seeking judgments while fearful individuals make more risk-averse choices. This is consistent with the appraisal associated with these emotions.

The other source of incidental emotions, namely situational affect involves residual emotions or lingering moods, the source of which is unrelated to any aspect of the decision at hand. Here, Loewenstein and Lerner (2003) have given examples of the evidence of minimal sensory cues such as scents, sights, sounds and other

environmental factors which have been shown to have an effect on cognitive processes.

However, one of the strongest examples of the influence of situational affect on consumer choice was illustrated by Lerner, Small and Loewenstein (2004) by means of a social experiment. In order to examine the carryover effects of specific emotions on economic decisions, they conducted an experiment in which sadness, disgust and neutral emotions were elicited using video clips following which participants were asked to make a series of choices. Half the participants were endowed with an object and given the opportunity to sell it back at a range of prices (sell condition); the other half were shown, but not given the object and then asked whether they would prefer to receive the object or to receive various cash amounts (choice condition). The experiment was based on one of the most well documented and robust findings of behavioral economics namely the endowment effect which is that people often place a higher value on objects they own versus those they do not. Based on the appraisal associated with the emotions of sadness and disgust, they hypothesized that disgust would evoke an action tendency to expel current objects and avoid taking in anything new while sadness would evoke the implicit goal of changing one's circumstances. The results showed that disgust, induced by the video clip and irrelevant (or incidental) to the economic decision at hand, reduced both selling and choice prices in line with the 'expel' hypothesis (thus eliminating the endowment effect) while sadness reduced selling prices but increased choice prices in line with the 'change circumstances' hypothesis (thus producing a "reverse endowment effect").

# 2.7. Functions of Emotions

Although incidental emotions tend to produce biases and often result in sub-optimal choices, there are certain aspects of expected and integral emotions that serve important roles in the decision-making process and should be taken into account while modeling human behavior.

The role of these emotions is explained in detail in this section. Most often, a different theory results as a consequence of what is seen as the primary role of emotion. For example the somatic marker hypothesis (Damasio, 1995; Bechara & Damasio, 2005) is based on the informative function of emotions and the appraisal tendency framework of emotions (Lerner & Keltner, 2000) is based on the appraisal function of emotions. While it may seem strange that there is more than one 'primary' function of emotions, it should be pointed out that these functions seem to make up essential parts of the overall experience of emotions and do not exist independently of each other.

## 2.7.1. The Informative Function of Emotion

Emotions provide information that we rely on during the decision-making process. The main theory surrounding the informative function of emotions is the somatic marker hypothesis (Damasio, 1995), which refers to an emotion as a "somatic marker," or a bodily response. In case of negative somatic markers, it "forces attention on the negative outcome to which a given action may lead and functions as an automated alarm signal" (Damasio, 1995, p. 173). In cases where the somatic

marker is positive, it acts as an incentive. Somatic markers do not deliberate for us; in fact the feeling occurs before any sort of cost-benefit analysis has been carried out. But they do increase the efficiency of the decision-making process by quickly eliminating dangerous options and highlighting the favorable ones. For example, if we are faced with the prospect of a high risk, high return investment and asked to say yes or no to it quickly, a negative somatic state which may accompany the thought of saying yes will enable us to reject the option and subsequently make us more likely to focus on the negative consequences of going ahead with such an investment. Damasio (1995) stresses that this ability of emotion to act as a somatic marker improves decision-making by enabling us to avoid procrastination and make the decision that matters now rather than waiting to make the most optimal decision.

Schwarz and Clore (2007) similarly maintain that when people are evaluating their options, they do not consult all the available information but simplify the judgment by using their affective reaction to the target. Elster (1998) also discusses this informative function of emotions when he talks about their role as tie breakers in cases where there is no uniquely optimal course of action.

To better illustrate this role of emotions, we can consider experiments conducted by Schwarz and Clore (1983), to show that people use emotions like any other source of information. In one experiment, for example, moods were induced by calling respondents on sunny and rainy days. It was found that respondents reported higher life-satisfaction when they were called on sunny than on rainy days. This showed that moods convey valence information that usually results in more positive judgments when people are in a happy state and negative judgments when they are in a sad state. The negative influence of bad weather was eliminated however, when the interviewer, who pretended to call from out of town, first inquired about the weather at respondents' place of residence. This shows that people cease to rely on sad or negative emotions when they become aware that such emotions may be due to an unrelated source. However, it was also observed that this was not the case for happy or positive feelings. In explaining this observation, Schwarz (2012) suggests that in addition to serving as a basis of judgment, emotions also inform us about the nature of our current situation and our thought processes are then tuned to meet the situational requirements. Thus sad moods signal a problematic situation and facilitate the analytic reasoning needed for attributional analyses, whereas happy moods make such reasoning less likely (see section 2.8.2.1 for the effects of the certainty appraisals of different emotions on information processing)

## 2.7.2. The Appraisal Function of Emotion

When emotions occur, they serve to highlight the importance of events so that they receive priority in further processing. According to Frijda and Mesquita (1994), the emotion occurs only when an individual appraises an event and finds it to be relevant to his/ her concerns. Different appraisals lead to corresponding changes in 'action-readiness' and physiological changes, which together form the core of the emotional response. There are several models of emotion appraisal. Frijda and Mesquita (1994) posit that there is first primary appraisal involving sensing and interpreting an emotion-eliciting event as positive or negatively relevant (an automatic process) and

this is followed by secondary appraisal which consists of evaluating the event in various ways for example as a threat so as to be equipped to deal with it.

The Appraisal Tendency Framework (ATF) put forward by Lerner and Keltner (2000) draws on the emotion appraisal theory suggested by Smith and Ellsworth (1985) to make specific predictions about the influence of emotions on incidental judgments. The emotional appraisal theory of Smith and Ellsworth (1985) suggests that each emotion can be uniquely identified using six appraisal dimensions namely pleasantness (valence of the emotion-eliciting event), certainty (the extent of certainty about the event), perceived controllability (the extent to which individuals feel that the event is in their own or others' or the situation's control), attentional activity (the extent to which individuals are motivated to devote their attention to the emotion-eliciting event), anticipated effort (the extent to which individuals feel that they need to exert themselves in the emotion-eliciting situation), and responsibility (the extent to which individuals feel that the event was brought about by others or themselves). The ATF assumes that emotions give rise to specific cognitive predispositions or ways of evaluating the environment called appraisal tendencies. The central hypothesis of the ATF is that these appraisal tendencies then determine how a specific emotion will affect social judgment.

To test their hypothesis, Lerner and Keltner (2000) considered the effects of the emotions of anger and fear on risk perception. From Smith and Ellsworth (1985), both emotions were identified as highly negative but while fear arises from appraisals of uncertainty and a sense that factors beyond one's control shape outcomes (i.e low controllability), anger arises from appraisals of high certainty and as well as high individual control. The results showed that fear was positively related to pessimistic risk assessments (i.e people were more likely to make highly risk averse decisions), and anger, despite being similarly negatively valenced, was negatively related to pessimistic risk assessments (i.e people were more likely to make more risk-taking decisions) thus proving that beyond valence, it is the underlying appraisal themes (in this case, certainty and controllability appraisals) that define the influences of different emotions on judgment. Examples of emotions and their appraisal tendencies as per the ATF are given in the table below:

**Table 1: Two illustrations of the appraisal-tendency approach**

| | *Illustration 1: with negative emotions* | | *Illustration 2: with positive emotions* | |
|---|---|---|---|---|
| | Anger | Fear | Pride | Surprise |
| Certainty | High | Low | Medium | Low |
| Pleasantness | Low | Low | High | High |
| Attentional Activity | Medium | Medium | Medium | Medium |
| Anticipated Effort | Medium | High | Medium | Medium |
| Control | High | Low | Medium | Medium |
| Responsibility | High | Medium | Low | High |

| Appraisal Tendency | Perceive negative events as predictable, under human control, & brought about by others | Perceive negative events as unpredictable & under situational control | Perceive positive events as brought about by self | Perceive positive events as unpredictable & brought about by others |
|---|---|---|---|---|
| | *Influence on risk perception* | | *Influence on attribution* | |
| Influence on Relevant Outcome | Perceive low risk | Perceive high ris | Perceive self as responsible | Perceive others as responsible |

**-***Lerner & Keltner, 2000; p, 479*

### 2.7.3. The Social Function of Emotion

*The primary function [of emotions] is to mobilize the organism to deal quickly with important interpersonal encounters*

*-Ekman, 1992, p.171*

Today we live in a world where a large portion of our decisions are made in the context of social interactions. Our emotions are necessary in order to have empathic responses, which are arguably the most important aspect of motivating prosocial behavior (Pham, 2007). In enabling social interactions with other individuals, Keltner and Haidt (1999) emphasize three important social functions of emotions that have evolved in human beings namely:

1. Coordination of social interactions by helping individuals understand one another's emotions and intentions
2. Imposing a cost on or serving as an incentive for the behavior of others – these consist of emotional responses that signal that a certain behavior is socially desirable or undesirable
3. Evoking reciprocal or complementary emotions in others - this allows us to respond to in a socially acceptable manner to meaningful social events or situations

In order to understand how emotions work in a social context, it is necessary to know which are the key social emotions. Ekman (1992), talks about seven social emotions namely love, guilt, shame, embarrassment, pride, envy, and jealousy. These are sometimes also called moral emotions because they are thought to drive the enforcement of moral obligations by overriding our own self-interests in both social as well as economic interactions (Pham, 2007).

A number of social experiments over the last few decades have illustrated the role of these social emotions. For example, in an attempt to understand the role of the social emotion of guilt, Gneezy and Rustichini (2000) conducted an experiment in a daycare center that successfully managed to remove the social emotion of guilt from the equation. Their results showed, surprisingly enough, that significantly more parents showed up late to pick up their children from daycare when a fine for

lateness was imposed than in the normal situation in which there was no fine. The authors supposed this was because parents saw the fine as a price for lateness, a price they were more than willing to pay. Because the parents now viewed the situation as a market exchange in which they had an option of buying lateness, they no longer felt the guilt they would normally feel as a result of violating the obligation to pick up their children on time. Thus guilt was shown to serve an important social function acting as a kind of self-inflicted cost when the individual's own behavior is not socially acceptable.

#### 2.7.3.1. Social Preferences

Over the last few decades, research has shown that with regard to social interactions and decisions, the assumption underlying modern economic theory that humans are narrowly self-interested and always seek to maximize personal gain has proved unreliable.

This deviation from the pure self-interest assumption has lead to a substantial body of research exploring the underlying reasons for cooperative as well as altruistic behavior. As a result, it is now more common for economists to incorporate social preferences into models predicting choice behavior. A social preference is a characteristic of an agent's behavior which signals that "the utility function [of the agent] does not only depend on their own material payoff but also on how much the other players receive" (Fehr & Schmidt, 2003, p. 223). The major social preferences that have been studied are reciprocal fairness and inequity aversion. A reciprocal individual is one who responds to actions in the same manner in which he perceives them to have been delivered (i.e. in a kind or hostile manner) and this reciprocal behavior of the individual is not driven by the expectation of some future material benefit (Fehr and Fischbacher, 2002); in the case of inequity aversion, the idea is that a person who is inequity averse wants to achieve an equitable distribution of material resources. This means he is altruistic toward other persons if their material payoffs are below what he perceives to be an equitable benchmark but seeks to decrease their material payoff when these payoffs exceed equitable level (Fehr and Fischbacher, 2002).

A study by Urda and Loch (2012) provides experimental evidence that such social preferences trigger emotions in complex patterns that serve to regulate social relationships. They use the appraisal tendency framework of emotion in two scenarios to explain the emotions that are triggered as a result of social preferences. In one of the scenarios, for example, their results show that when a social position or status is denied, it triggers anger and disgust if undeserved (violating fairness) and sadness if it is deserved. Similarly, a negative act by another person is accepted neutrally if it reciprocates a previous negative act by the subject, but triggers aggression if it comes after a positive act by the subject (thus violating reciprocity). They argue that fairness, reciprocity and another concept called group identity are just as important as extrinsic incentives, such as monetary rewards or titles, in motivating individual (or group) behavior.

#### 2.7.3.2. Cooperative Behavior

These social preferences alone, however, fall short of explaining a number of phenomena. Declerck and Boone (2015) say that when it comes to cooperative behavior, rationality should not be interpreted without considering an individual's intrinsic values. Bowles and Gintis (2003) also put forward a theory along the same lines but with regard to the internalization of certain social norms, suggesting that adherence to these norms is supported not only by the cognitively mediated pursuit of self-interest (i.e the expectation of future reciprocation) but also by emotions. They believe that emotions are activated when social norms are violated and that emotions like shame and guilt play a central role in cooperative behavior. They put this down to internalized norms that we are always striving to conform to, not only because we will be punished if we do not conform, but also because we actively wish to conform. Our instinctive need to follow this internalized value system tells us for example that it is good to help someone in distress or it is important to show respect to the elderly. The authors believe that this is our way of simplifying the endless cost benefit calculation involved in our day-to-day interactions within a complex society full of rules and guidelines for how to behave.

Apart from shame and guilt, there are also other visceral emotions like empathy and regret (or remorse) which tells us that we may be doing something that is socially unacceptable or that does not match with our own values (Bowles and Gintis, 2003).

#### 2.7.3.3. Altruistic Tendencies

More controversial than cooperative behavior is the presence of altruistic tendencies within human beings. Adherence to our intrinsic value system and the concept of inequity aversion and/or reciprocity does help to explain altruism depending on the context in which the term altruism is used, but it can be argued that since violating these values triggers negative emotions, our behavior is still in the end, self-serving.
Today, there are many conflicting views on altruism. Many are of the opinion that true altruism, that can be defined simply as unadulterated selfless concern for the well-being of others, either does not exist, or arises merely as a miscalculation of otherwise selfish behavior (see section 2.12.1 for details on the concept of reciprocal altruism). This is consistent with the notion that there is no such thing as a selfless good deed because helping behavior is often accompanied by positive emotions which if anticipated prior to the deed, would negate the selfless nature of the deed.

However, in a recent study to explore how humans evaluate others' suffering, Crockett et al (2014) conducted an experiment where they invited subjects to trade off profits for themselves against pain experienced either by themselves or an anonymous other person. Surprisingly, they found that most people sacrificed more money to reduce a stranger's pain than their own pain, despite the fact that their decisions were completely anonymous, with no possibility of being judged adversely or punished. Considering this in the context of emotions, Batson et al (1981) suggest that whether or not this behavior amounts to altruism rather than an egoistic motivation to help depends on which emotion is activated when watching another's suffering - personal distress (guilt or shame) or empathetic concern. Altruistic concern, they maintain, can only arise from empathetic concern. However, the fact that people actually sacrificed more to reduce the pain of others cannot be explained

by theories of empathy alone because the empathy perspective predicts that the cost of pain for another will be no more than the cost of pain for oneself. This suggests a mixture of both guilt (and/ or some form of personal distress) and empathy at play. The inference from this experiment was that even if people find others' pain inherently less aversive or equal to their own pain, the added cost of moral responsibility in the particular setting could make people value others' pain more than their own.

The idea that the pain of others can cause a certain degree of personal distress within us suggests that we are at our core highly influenced by other-regarding preferences. This implies that our choices and behavior in many social situations might in fact be completely at odds with what economists predict according to various models of the utility maximizing agent.

# 2.8. Emotion Regulation

As demonstrated in section 2.6 on types of emotion, both incidental and integral emotions can act as systematic biases. On the other hand, section 2.7, which details the different functions of emotions, indicates that without any emotions at all, decision-making would be less efficient and result in adverse outcomes. From these seemingly opposing points of view, it can be gathered that while emotions are essential for decision-making, it is also necessary to control or regulate an emotional response in instances in which they result in less than optimal outcomes. Emotion regulation, as defined by James Gross (1998a), encompasses the processes by which individuals can influence which emotions they have, when they have them, and how they experience and express them.

## 2.8.1. The points at which intervention is possible

According to Gross (2008), there are five major points in the emotion-generative process at which individuals might intervene to influence the course of the emotion trajectory. These include:

1. Situation selection - this involves making those choices that increase the chances of being in a situation that will gives rise to emotions we would like to have (and conversely making choices to make the opposite less likely).
2. Situation modification – this involves directly modifying a situation to change its emotional impact, for example if we make a joke after committing a social blunder, it will be less likely to upset us.
3. Attentional deployment - this refers to selecting which aspect of the situation should be focused on. For example it could include physically redirecting attention to something else (by say, closing one's eyes or turning away) when tempted by a delicious looking desert when on a diet.
4. Cognitive change - refers to selecting which of the many possible meanings will be attached to a given situation
5. Response modulation or controlling how the emotion is finally expressed.

## 2.8.2. Strategies to regulate emotions

Gross, (1998b), describes two possible strategies that can be used one the emotion-eliciting event has arisen. These are:

1. Cognitive reappraisal – This involves construing an emotion-eliciting situation in a way that alters its emotional impact and
2. Suppression – This is the process of attempting to suppress or inhibit outward displays of emotion.

The author further shows that the former method is much more effective and adaptive than the first because while both help to lower the intensity of the emotion, cognitive reappraisal is also accompanied by decreased physiological responses while suppression actually increases physiological responses and tends to be counterproductive in the long term.

Lerner et al (2015) in their review, provide a few additional strategies dividing them into two broad types naemly:

1. Reducing the magnitude of the emotional response - through time delay, reappraisal or inducing a counteracting emotional state or
2. Insulating the judgment or decision process from the emotion - by crowding out emotion (involves saturating the decision maker with cognitive facts about a particular decision domain), increasing awareness of misattribution or modifying the choice architecture

A few of these strategies will be explored in more detail below:

### 2.8.2.1. Modifying the choice architecture (Framing)

According to the Lerner et al. (2015), the most practically useful strategy to moderate effects of incidental emotions is to simply change the frame of problem (i.e modify the choice architecture) in order to achieve a more desirable outcome. Framing refers to how a problem is presented. Most behavioral economics literature on the subject considers that the choice architecture or the framing of the choice (and not just the costs and benefits of each option) plays an important role in how people choose (Thaler & Sunstein, 2008; Tversky & Kahneman, 1986).

Tiedens and Linton (2001), also show that the depth of cognitive processing when faced with a given set of choices depends on the certainty appraisal associated with emotion that is evoked or being experienced at the time. Emotions characterized by certainty appraisals (such as anger and happiness) tend to promote heuristic processing, whereas emotions characterized by uncertainty appraisals (such as sadness) result in systematic processing. When people are in incidental emotional states that prompt them to rely on heuristic cues, the framing of the choice can be more impactful because the frame can be suitably modified so that a more desirable outcome will be chosen. This strategy does not involve moderation of the emotion, but rather involves modifying the frame of the choice to get a more favorable outcome. This means that the actual choice is shifting out of the hands of the consumer and into the hands of the framer and the use of such strategies could thus present an ethical problem. This being said, when people reframe their own choices, it can be used as a practical and extremely effective way of understanding their true preferences.

#### 2.8.2.2. Increasing Awareness of Misattribution

Affect misattribution occurs when we cannot differentiate the "true" (integral) emotions from the "false" (incidental) feelings. Schwarz and Clore (2007), show that if we are made aware of the true source of our experience, it allows us to discount this affective information instead of treating it as a pure or genuine reaction to the target. On the other hand, increasing awareness of misattribution as a strategy to moderate or reduce the carry-over effects of incidental emotions may have a few limitations. For example, in one study, it was shown that affect misattribution may even occur when it is perceived that the affective cues are irrelevant, as long as the source of these cues seems ambiguous (Ruys et al., 2012). Since in reality affective cues can arise from a number of different sources, both internal and external, increasing awareness of misattribution may prove more difficult and ultimately of little use.

Another experiment by Schwarz and Clore (1983), also shows that people tend to be more motivated to seek explanations for negative than for positive moods i.e people tend to be more sensitive to manipulations seeking to increase awareness of misattribution of their current mood when that mood is a negative one (see section 2.7.1 for details on this experiment). This implies that even if we can make subjects aware of the exclusive source of a positive affective state, it may do little to stop them evaluating an unrelated target in a favorable way.

#### 2.8.2.3. Inducing a Counteracting Emotional State

Lerner et al. (2015) maintain that theoretically, one could counteract an unwanted decision effect by inducing another emotion with opposing tendencies. While not specifically focusing on emotions, Kahneman and Lovallo (1993) put forward a similar argument based on the theory that systematic decision errors can sometimes cancel eachother out - for example they point out that if potential entrepreneurs are excessively risk averse, then it might also be beneficial for them to be overly optimistic about their chances of success. The experiment that involved inducing gratitude (see section 2.11.2 for details of this experiment) to reduce existing present biases illustrates how inducing a prosocial emotion could be effective in improving outcomes.

#### 2.8.2.4. Cognitive Reappraisal

As explained briefly in the beginning of section 2.8 on emotion regulation, cognitive reappraisal can also be used a strategy for emotion regulation. For example, consider a situation in which an acquaintance passes us in the street and seems to ignore our smile and wave of greeting. A natural response in this situation is to feel hurt or angry. However, if we use cognitive reappraisal we could change our interpretation by thinking about the acquaintance as distracted, or perhaps preoccupied with some problem. This reappraisal of the event could affect both the type and intensity of our subsequent emotional response in such a situation.

In an effort to show the effectiveness of this strategy in generating better outcomes, Halperin et al. (2013), conducted an experiment in which Israeli participants in randomly assigned to the reappraisal condition were trained in

cognitive reappraisal by exposing them to anger-inducing pictures and asking them to respond to these pictures in a cold and detached manner. Following this all participants were shown a 4-min anger-inducing PowerPoint presentation, including pictures, text, and music, describing Israel's disengagement from the Gaza Strip and the Palestinians' response to it. They were then asked to choose from among a list of three aggressive and one conciliatory policy with regard to the conflict. Participants in the reappraisal condition were not only found to be to feel less anger towards Palestinians but also more supportive of conciliatory policies towards Palestinians and less supportive of aggressive policies compared with participants in the control condition.

## 2.9. A note on emotional intelligence

The increasing awareness of the different benefits and pitfalls of emotions in decision-making has resulted in the term 'emotional intelligence' becoming more commonly used. This term refers to a characteristic or quality of individuals that enable them to understand the underlying emotional context of a situation and respond in a manner that results in the most advantageous outcome. According to Peña-Sarrionandia, Mikolajczak and Gross (2015), emotional intelligence is just the outcome of successful emotion regulation and an emotionally intelligent individual is one who is able to scrutinize a particular context before deciding whether or not to regulate their emotions.

For instance, in one study, Yip & Côté (2013) show that emotion-understanding ability helps counter the effects of incidental anxiety by helping individuals correctly identify the source of their anxiety and determining that it is irrelevant to the decision at hand. Rather than arguing against using emotion in decision-making, these authors suggest that we should pay attention to only those feelings that are relevant to the decision at hand.

## 2.10. Efforts at revising economic models of decision-making

Since the emergence of behavioral economics, there has been a substantial effort to incorporate the intuitive and robust findings of this field into mainstream economic models in order to increase their predictive power and present a more realistic picture of human behavior. Some of these are reviewed below:
DellaVigna (2009) reviews existing evidence from laboratory experiments in the field of behavioral economics and classifies deviations from standard models into

1. Deviations due to non-standard preferences – this covers self-control problems (i.e., non standard time preferences), reference dependence (i.e., non-standard risk preferences), and social preferences (or other-regarding preferences).
2. Deviations due to incorrect beliefs – this covers overconfidence in one's own ability, the law of small numbers (i.e., out tendency to believe that results from a small sample are significant and therefore applicable to the larger

population) and projection bias (where current beliefs are projected onto future periods)

3. Deviations due to systematic biases in decision-making – this covers framing effects, limited attention resulting in the neglect or in some cases the overweighting of information, sub-optimal heuristics (these refer to simple rules of thumb that we use in the process of satisficing – see section 2.1.3 for more on satisficing), social pressure, and emotions

In the above review, the new models suggested, that take into account these deviations, have also been described. However, while these models do explain what people are doing in these situations (or what the more realistic outcome should look like), they do not provide an explanation of what exactly motivates people to make these decisions and emotions are not seen as underlying many of the deviations from the standard model.

Loewenstein (2000) uses a different tack, highlighting the importance of visceral factors in economic decision-making. He talks about such factors as referring to "… A wide range of negative emotions (e.g. anger, fear), drive states (e.g. hunger, thirst, sexual desire), and feeling states (e.g. pain), that grab people's attention and motivate them to engage in specific behavior." (Loewenstein, 2000, p. 426). When studying human behavior, he argues that it is these visceral factors that are the source of stable and predictable patterns in behavior and the instability stems from the fact that we are conscious beings who are aware of the consequences of our actions and are capable of higher-level cognitive processes. The predictive feature of these visceral emotions, he explains, not only makes them easy to model but improves the predictive power of models that study a variety of situations including bargaining behavior, intertemporal choice and decision making under risk if we take into account that 1) people underestimate the influence of future visceral factors and 2) that a hot-cold empathy gap exists, i.e when in a "cold" state, it is difficult to imagine what it would feel like to be in a "hot" state. While the model is not detailed here, the argument does provide an interesting direction for future economic modeling and the incorporation of emotion into such models.

In another review, Walde (in press) looks at the different formal representations of emotions in economic research. Here, he classifies economic analyses into 4 groups namely: models with ex-ante emotions (anxiety, worry, fear and suspense; savoring and dread), models with immediate emotions (craving, strong desire, lust and greed; hunger and thirst; disgust and horror), models with ex-post emotions (regret x rejoicing; disappointment x elation) and models with belief based emotions (trust and guilt; self-confidence). The models described in the review explain the choices made in various situations by taking into account the role of these specific emotions and hence provides a more comprehensive and realist picture of human behavior

## 2.11. The role of emotions in the framework intertemporal choice

Intertemporal choice is the study of how people make decisions at various points in time, when the decisions (or choices) made today have consequences for the

possibilities available in the future. While it is considered rational to have some rate of discounting leading us to prefer for example $100 today rather than $110 a year from now, verified findings from behavioral economics have shown that we generally tend to engage in excessive discounting resulting in less than optimal outcomes when faced with decisions involving intertemporal choice (Loewenstein & Thaler, 1989).

Moreover, we also exhibit time inconsistent preferences which means that as the time period increases, our preferences tend to reverse. More about preference reversal and time inconsistent preferences is detailed in section 2.1.2. This could explain for example why we are deterred from the immediate misery of saving or dieting or why we put off uncomfortable or unpleasant activities until the last possible minute. In such situations, most people recognize that they have self-control issues. For example Ariely and Wertenbroch (2002) show that people recognize that they have a tendency to put off difficult or uncomfortable tasks and they attempt to control their procrastination by self-imposing costly deadlines.

While it is true that in general we are more impatient than is prudent, there is evidence to indicate a large variance of impatience between individuals. To emphasize the adverse effects of higher impatience, a number of experiments have shown that people who are more impatient are less likely to make good decisions. For example it has been found that people who have higher discount rates have been found to have an affinity for highly risky behavior including smoking (Baker, Johnson & Bickel, 2003), alcoholism (Vuchinich & Simpson, 1998), illicit drug use (Coffey et al., 2003) and pathological gambling (Petry, 2001)

Research has shown that there are certain emotions that lead to higher levels of impatience. For instance in one study by Lerner, Li and Weber (2013), sadness was induced in a lab-setting following which participants were asked to make a series of financial decisions. Results revealed that sadness, which was incidental to the financial decisions and hence should not have had any effect on the choices, did in fact result in steeper discounting (or an increase in the level of economic impatience) compared to the control (neutral) condition. The authors explain the results by suggesting that sadness increases the preference for immediate gratification and results in a state referred to as ‘myopic misery’ in which the sense of loss generated by the emotion triggers an urgent need for reward replacement.

### 2.11.1. Prosocial emotions to solve dilemmas of intertemporal choice

Valdesolo and DeSteno (2014) argue that certain prosocial emotions can contribute to increasing the chances of better outcomes in dilemmas of intertemporal choice because they are associated with “foregoing immediate gains for the long-term social value associated with building warmth or building competence” (p. 207). The basic argument put forward here is based on the fact that in our social lives, we often face choices that present opportunities to increase our long-term social value. For example if someone does us a good turn, we can either reciprocate the action or decide not to do so. In making this decision, a cost-benefit analysis is involved. Not reciprocating implies that we retain resources in the present. However, it comes with the social cost of being labeled an individual who does not reciprocate within a community and this could be very costly for us in the future. On the other hand if we

reciprocate, we expend resources in the present but our future selves benefit from the long-term social value that we will gain down the road. Thus it really comes down to a problem of giving up a something today in order to receive more in the future which is exactly the dilemma of intertemporal choice.

Valdesolo and DeSteno (2014) suggest that emotions such as compassion, gratitude, love and elevation can build long-term social value represented by an increase an individual's perceived warmth within a community. Along a similar vein, emotions like pride, grit, hope and inspiration similarly builds long-term social value represented by an increase in an individual's perceived competence within a community. Additionally they argue that there is evidence to indicate that these socially oriented emotions facilitate behaviors (such as increased cooperation or the maintenance of long-term relationships) that are designed to build social and economic capital in the long run. The experience of these emotions is therefore believed to lower our innate preference for immediate rewards leading to more beneficial outcomes when faced with dilemmas of intertemporal choice.

### 2.11.2 Gratitude as a tool to reduce economic impatience

Gratitude is believed to motivate reciprocal altruism (Trivers, 1971), which is the idea that we are more likely to help someone who we think will be likely to return the favor and involves accepting short-term costs in exchange for potential future gains. It was also shown to increase the likelihood of cooperative behavior (DeSteno, 2010) which indicates its ability to enhance behaviors that are costly in the moment but have potential benefits in the future such as the building of long-term cooperative relationships.

In an experiment to understand the prosocial effects of gratitude in the framework of intertemporal choice, DeSteno et al. (2014) successfully induced gratitude in 25 participants and then asked them to make a series of financial decisions from which each participant's discount factor was ascertained. He compared the discount factors of these participants to that of 25 participants in the neutral condition and also to that of 25 participants in whom incidental happiness was induced. The results revealed that participants in the gratitude condition did in fact discount less steeply compared with participants in the neutral condition. The effect of gratitude was also differentiable from the more general positive affect i.e., the happiness condition in which participants' level of impatience were found to be no different from the neutral condition.

Besides confirming that gratitude can be effectively used to lower economic impatience, this study also showed that it was not necessary to suppress affective responses to increase the probability of better outcomes but rather that inducing an incidental emotion (in this case gratitude) could effectively accomplish the same thing by reducing an existing bias.

## 2.12. Compassion

*How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortunes of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it. Of*

*this kind is pity or compassion, the emotion we feel for the misery of others, when we either see it, or are made to conceive it in a very lively manner.*

*- Adam Smith, 1759, I.I.1*

### 2.12.1. An evolutionary basis for compassion

There is an evolutionary basis for compassion that centers on the fact that compassion essentially evolved as a care-taking emotion. According to this view, compassion is instinctive and deeply embedded in the structure of our humanity.

*[sympathy] will have been increased through natural selection; for those communities, which included the greatest number of the most sympathetic members, would flourish best, and rear the greatest number of offspring.*

*- Darwin, 1871, p. 130*

Despite the fact that it is an other-oriented emotion, the Darwinian rationale for compassion at the genetic level is ultimately self-serving. This follows from the idea that compassion as an affective state and trait emerged because it enhanced the welfare of vulnerable offspring thus enabling the survival of one's genes.

Biologists also believe that it could have emerged through a process known as kin selection (Smith, 1964), the basic idea of which is that if an organism feels compassion for a close relative and this compassion leads the organism to help the relative, then the compassion actually helps the genes underlying the compassion itself.

The current theory on compassion is based on the idea that it is an emotion that motivates reciprocal altruism (Trivers, 1971). In this context, compassion is thought to have emerged as a state to motivate altruism in mutually beneficial relationships not limited to one's own kin. While this idea posits once again that compassionate behavior is ultimately self-serving, it allows room for compassion to be expressed toward non-kin as well.

### 2.12.2. Defining compassion

Strauss et al. (2016) propose a definition of compassion through a synthesis of the existing conceptualizations of compassion to date. In this definition, compassion consists of five elements namely: "1) Recognizing suffering; 2) Understanding the universality of suffering in human experience; 3) Feeling empathy for the person suffering and connecting with the distress (emotional resonance); 4) Tolerating uncomfortable feelings aroused in response to the suffering person (e.g. distress, anger, fear) so remaining open to and accepting of the person suffering; and 5) Motivation to act/acting to alleviate suffering" (Strauss et al., 2016, p. 19).

While the authors admit that each of these elements need not be statistically distinct and requires further empirical research, their definition provides a useful basis to explore how compassion is experienced and how it could affect decision-making. From reviewing the existing literature on compassion, the key part of this definition in my view is the fifth element namely, the motivation to alleviate the suffering that is being witnessed. Without this element, compassion is simply reduced

to an understanding of another's suffering, for which a term already exists i.e. empathy.

## 2.12.3. Theoretical accounts of compassion

According to Goetz, Keltner, & Simon-Thomas (2010), there are three theoretical accounts of compassion: The first is that compassion is simply another name for empathic distress; the second is that compassion is not a distinct emotion but rather a variant blend of sadness and love; and the third, the one the authors are most in favor of, is that compassion is a distinct affective state that motivates specific patterns of behavior. In the following paragraphs, the different theoretical accounts of compassion will be explored in more detail.

### 2.12.3.1. The empathic distress perspective

The empathic distress perspective of compassion is the idea that compassion is simply "a label that people apply to their vicarious experience of distress in response to another person's suffering" (Goetz et al., 2010). It is the idea that we simply mirror the emotions (such as pain, sadness distress or fear) of the one who is suffering and are consequently consumed by these mirrored emotions to the extent that it precludes any motivation on our part to act to reduce that suffering. This seems to be a somewhat extreme view of compassion. Given that we are aware of several instances in which people act to reduce the suffering of others and given that this desire to act must necessarily involve some measure of compassion or sympathy, it seems unreasonable that every instance of compassion should result in a mirroring of emotions rather than a motivation to help. It does however raise the question of whether empathic distress can be differentiated from compassion as a distinct affective state in its own right with its own associated appraisals and action tendencies.

Ekman (2003) claims that neither empathy nor compassion is an emotion in its own right but rather these terms refer to our reactions to another's emotional experience. He does, however, name three different types of empathy: cognitive empathy where we can recognize suffering in another, emotional empathy where we feel what another person is feeling (be it pain, sadness, distress or fear) and compassionate empathy where we want to help the person deal with his/ her emotions. He goes on to say that if we have compassionate empathy then we must also have cognitive empathy (i.e. an understanding of another's suffering), however it is not necessary to have emotional empathy (or to experience the emotions of another). Thus in this conceptualization emotional empathy and compassionate empathy are distinct and we can react either with both, one or neither of them to the suffering of another.

Research in fact indicates that whether or not we feel compassion (here, compassionate empathy) is actually hindered by the experience of emotional empathy because whether or not we are motivated to act to alleviate another's suffering depends on our coping process which may at times be in conflict with action (Smith & Lazarus, 1990). This is corroborated by Batson et al. (1987), who attribute the negative correlation between (emotional) empathy and prosocial behavior to the

fact that the personal distress evoked on witnessing another's suffering results in a tendency to focus on the needs of the self rather than motivating helping behavior toward the one who is suffering. Thus it can be gathered that the empathic distress perspective of compassion could be considered as a possible conceptualization only in those instances in which we are unable to form a clear distinction between our own suffering and that of the object of our compassion and our coping process thus prevents us from acting to reduce that suffering.

#### 2.12.3.2. Compassion as a blend of sadness and love

Goetz et al. (2010), while drawing on the empirical evidence indicating that compassion is functionally distinct from sadness and love, do not directly dispute the possibility that compassion could be a blend of sadness and love and could therefore potentially share the appraisals of both these emotions resulting in an altogether distinct action tendency. Here I consider the evidence of the conception of compassion as a blend of these two emotions. I then consider sadness and love separately followed by the implications of an emotion that could be a mixture of both.

The evidence for the conception of compassion as a blend of sadness and love comes primarily from the prototype emotion study of Shaver et al., (1987) which revealed that people categorized the word compassion most often with love, tenderness and caring and categorized words like sympathy and pity most often with sadness.

Sadness is based on an appraisal of personal loss that has clear perceived negative consequences for the self (Shaver et al., 1987). It is associated with appraisals of low individual control (Keltner et al., 1993) and low certainty (Tiedens & Linton, 2001) and is a self-oriented emotion whose expression motivates a withdrawal from social contact (Lazarus, 1991).

Love, on the other hand, motivates a desire to be physically and psychologically close to another person and is instrumental in creating the bonds necessary for long-term relationships (Gonzaga et al., 2001). Moreover, the antecedents of love, which include a feeling of security, shared good experiences or especially good communication, tend to be primarily positive (Shaver et al., 1987).

From these accounts it is clear that sadness and love will have opposing action tendencies with sadness promoting retreat and love promoting approach behavior. If we consider the two emotions occurring simultaneously, it is possible that their associated appraisals will work against each other out, resulting in neither approach nor retreat. This is assuming they are felt in equal measure or at least that neither is felt intensely enough to overwhelm the other. In such a scenario, the effect of compassion on judgment is difficult to predict.

#### 2.12.3.3. The argument for compassion as a distinct affective state: A possible tool to reduce economic impatience?

Goetz, Keltner and Simon-Thomas (2010) define compassion as "as the feeling that arises in witnessing another's suffering and that motivates a subsequent desire to help". Moreover they argue that compassion exists as a distinct affective state and

propose, based on their review of the literature, that a distinct compassion-related appraisal pattern involves the following:

1. Self relevance and goal congruence i.e. they hold that compassion is most often felt for offspring and family members but can also be extended to other members of an individual's social group including those with whom they believe they share the same values and beliefs or those who they believe are likely to reciprocate in the future
2. A distinct awareness of one's separateness from the sufferer - this is a necessary condition for compassion because without self-other distinctions, one may not experience compassion upon witnessing another's suffering, but instead may experience empathic sadness or distress.
3. Blame i.e. the extent to which the person who is suffering is responsible for their situation and
4. Coping ability - this refers to the ability to respond either with compassion or in the case of low coping ability, distress, to the distress or suffering of others.

As a prosocial emotion that motivates a desire to help, compassionate behavior is likely to have immediate costs for the self in terms of time, effort and/or other resources. In light of this, compassion cannot be considered an evolutionarily stable strategy unless there are some limitations to its expression.

DeSteno (2015) suggests that we decide, perhaps non consciously, whether or not to feel compassion for another person based on probabilities of potential 'pay-offs' provided by any given situation. Building on the idea that compassion motivates reciprocal altruism, the author claims that one of the major factors that determine whether or not another person is worthy of compassion is perceived similarity of the other to the self. Perceived similarity has also been found to increase the likelihood of cooperative behavior (Valdesolo & DeSteno, 2011).

From the account of DeSteno (2015) and from similar research with respect to gratitude (DeSteno et al., 2015), there exists a strong argument for the idea that compassion is a distinct prosocial emotion that motivates us to expend our resources in the present, especially in favor those who we perceive are more similar to ourselves, because we believe that there is a high likelihood that it can lead to larger rewards in terms of reciprocal help in the future. Thus compassion can be thought of as an emotion that could potentially increase the likelihood of making decisions that offer a potential for future gain in the face of immediate cost. In other words, compassion, like gratitude, could possibly serve as a useful tool to reduce economic impatience.

# 3. Method

From the above arguments, we can gather that there are conflicting views on compassion. One view is that it is a prosocial emotion that motivates helping behavior and another is that it results in an empathic mirroring of sadness and personal distress which instead promotes withdrawal rather than helping behavior. As explained in the section on emotions and intertemporal choice, the former appraisal would then predict that compassion should have the effect of lowering economic impatience (see section 2.11.1 on prosocial emotions and intertemporal choice), while the latter predicts that it will result in a state of 'myopic misery' that has been shown to increase economic impatience (Lerner et al., 2013). Still another view posits that compassion is instead a variant blend of two seemingly opposing emotions namely, sadness and love, where sadness will have the effect of increasing impatience and love will have the effect of decreasing it. From this author's perspective, given research till date and the supporting experimental evidence, the first view that compassion is a prosocial emotion seems the most plausible which is to say that it should have the effect of reducing our existing present bias and result in reduced levels of economic impatience as compared to a neutral state.

However, given the divergence of the existing views, there is a need to experimentally test how compassion is experienced and then how it affects intertemporal judgment. Based on an analysis of both the experience of compassion and its influence on judgment of participants, it may also be possible to determine which of the three conflicting views best describe the individual experience of compassion. To do this, the influence of incidental compassion was experimentally induced and its effects on intertemporal judgment were tested using incidental sadness as a comparison condition. Thus the experiment aimed to test the following claims:

**Hypothesis 1:** In line with previous findings, incidental sadness will result in a higher level of economic impatience i.e., participants in this condition will have higher discount rates as compared to the neutral condition.

**Hypothesis 2:** Based on the idea that compassion is a distinct prosocial emotion, incidental compassion will result in a lower level of economic impatience i.e., participants in this condition will have lower discount rates as compared to the neutral condition.

## 3.1. Participants

The participants were 96 Bachelor or Master students enrolled in different departments within Mendel University in Brno. There were 30 males and 66 females between the ages of 19 and 26 with a mean age of 22.3. Students were incentivized to participate by informing them that there would be a possibility to win a maximum of ~1600 Kč on completion of the tasks.

## 3.2. Experimental Setting

The experiment took place in a lecture hall on the ground floor of the Department of Economics. The room was equipped with computers in different cubicle-like structures. There were a total of 16 experiment sessions conducted over 4 weeks with a median of 6 participants per session. Additionally there were 4 test sessions (with a total of 24 participants) at the start of the experiment to iron out any problems with the experiment and make changes to the procedures if required. The data from these test sessions was not included in the analysis as significant changes were made to the procedure in the following sessions. Three experimenters, one of whom was the author, were present at each of the sessions. A script was written for the experiment sessions so the experimenters were aware of how to behave and what exactly to say in each session to make sure that the same procedure was followed in each session. The following sections describe the procedure that took place at each session.

After all the participants in a particular session arrived, one of the experimenters would briefly introduce herself and the other two experimenters and would inform participants that this was a social experiment that was being conducted as part of the Diploma thesis of the author who was enrolled in the Master's program at the Faculty of Business and Economics. Following introductions, all participants were randomly assigned to one of three emotion conditions namely, the compassion, sadness and the neutral conditions.

After providing informed consent (see Annexures 3 and 4 for Informed Consent forms in Czech and English respectively), participants went to their assigned computers where the appropriate questionnaire had been set up for them depending on the emotion-induction condition to which they had been assigned. The participants were seated in such a way that they could not see each other and would not be disturbed or affected by the movements or reactions of any of their fellow participants. All interactions between the participants and experimenters took place in Czech and all sections of the computer-based questionnaires were also carefully translated into Czech (the complete questionnaires in Czech and in English are attached in Annexure 1 and 2 respectively).

### 3.2.1 Emotion Induction

After completing a short questionnaire consisting of basic questions regarding their gender, age and nationality, participants then moved on to the next section and began their respective emotion induction procedures. Drawing on previously used methods of emotion induction (Lerner et al., 2013; Gross & Levenson, 1995; Lerner et al., 2004), participants first watched a short video clip followed by an autobiographical recall task. The video clip consisted of a series of moving or compassion-eliciting photographs (Oveis, Horberg & Keltner, 2010) set to the music of Yanni's Felitsa in the compassion condition, a short clip about the death of a boy's mentor in the sadness condition (Lerner et al., 2013) and a short clip about the Great Barrier Reef (Lerner et al., 2013) in the neutral condition. In the second part of the emotion-induction, participants were asked to think for a while and then write a paragraph about a situation during which they had experienced compassion or sadness in their

own lives (in the compassion and sadness condition respectively) or describe the events of a typical day in their lives (neutral condition).

### 3.2.2. Emotion Measurement

Following the emotion induction, participants completed a measure of emotion in which they indicated, on 5-point scales (1 = not at all, 5 = very much), how well 19 affective descriptors captured how they currently felt. These 19 descriptors were the same as those used by Lerner et al., 2013, except that the descriptors for disgust were replaced by descriptors for compassion. The 19 descriptors were: afraid, amused, angry, blue, bored, cheerful, depressed, compassion, fearful, furious, happy, indifferent, mad, sympathy, nervous, neutral, moved, sad and unemotional in that order (the Czech translation of each of these descriptors is given in the emotion measurement section of Annexure 1). Embedded within these were affective descriptors specifically related to the induced emotions. Compassion was assessed as the mean response to compassion, sympathy and moved (Oveis, Horberg & Keltner, 2010) and sadness was assessed as the mean response to blue, depressed and sad (Lerner et al., 2013). The other descriptors were distractor items.

### 3.2.3. Intertemporal Choice Task

In the next section, participants made a series of 27 choices regarding smaller cash amounts immediately to larger cash amounts from a point 1 week to 6 months in the future. This list of 27 questions was developed by Kirby and Maraković (1996) however as the questionnaire was customized for students studying in the Czech Republic, the original amounts used by Kirby and Maraković (1996) were reduced by 25 percent to reflect cost of living differences between the United States and the Czech Republic. The smaller immediate rewards ranged from 207 Kč to 1503 Kč while the larger delayed rewards ranged from 470 Kč to 1597 Kč. The complete list of the 27 binary choice questions that were used can be seen in the discounting task section of Annexure 1 or Annexure 2. The order in which the questions were presented to participants (as seen in the questionnaire in Annexures 1 or 2) were as described by Kirby et al. (1999). This order was followed to prevent the order from correlating with the smaller immediate rewards, the larger delayed rewards, their ratio or their difference (Kirby et al., 1999). This procedure has been used widely (Kirby et al., 1999; DeSteno et al., 2014; Lerner et al., 2013) to interpret choices of participants in the framework of intertemporal choice and estimate individual discount rates based on each participant's choices.

Participants were incentivized to provide their true preferences by informing them that each of them would have a one in six chance of having one of their decisions randomly selected and receiving the amount in accordance with the choice they had selected. If the participant had selected an immediate reward, he/ she was paid in cash at the end of the session. If he/ she had selected delayed reward, the money would be transferred to the bank account provided prior to the start of the experiment on the specified date. This method of incentives was in accordance with standard behavioral economics norms and has been used successfully to elicit true preferences in a number of similar experiments (Kirby et al., 1999; Chabris et al.,

2008 to name a few). In order to make sure participants believed they would get the later rewards they chose, they were also informed at the time of signing their consent forms that the research was being funded by the Faculty of Business Economics (FBE) at Mendel University and any monetary award they should win as a result of the experiment was guaranteed by the FBE. A brief typed line of instruction capturing the chance to have one of the next 27 decisions of the participant selected for payout was given before the participants began this section.

### 3.2.4. Completion of the experiment session

Following completion of the intertemporal choice task, participants submitted the questionnaire and returned to their seats. Participants took approximately 13 to 17 minutes to complete the entire questionnaire taking a few minutes longer in the compassion and sadness condition as compared to the neutral condition. Next, each of the participants went to the experimenter at the back of the room and rolled a die. If it came up 6, one of their 27 decisions was randomly selected and they were given the cash amount they chose in that decision, either immediately or they were told they would receive it through bank transfer (they had provided their bank account numbers at the start of the experiment) at the specified date. After this, participants were thanked for their cooperation, were debriefed and then they left the room. In some sessions when there were exactly 6 participants, a game was played where each participant would roll a die in turn and the participant who rolled the highest number would have one of his/her 27 decisions randomly chosen and given the payout according to his/her decision in that question. If there was a tie, the participants with the highest numbers would roll again. In this way, each participant still had a one in six chance of receiving the payout.

## 3.3. Data points excluded from the analysis

The data points of 3 of the participants from the original 96 were excluded from analysis as it was revealed during the debriefing that their monetary choices had been strongly influenced by extraneous factors completely unrelated to the experiment and as such their responses would not provide an accurate picture of their true preferences under normal circumstances. As it happened, each emotion condition had one of these excluded data points and by the end of the experiment there were 93 participants (27 males and 66 females) from whom true data was collected with 31 participants in each of the emotion conditions.

## 3.4. Discount Rate Estimation

The hyperbolic function below was used as a mathematical description of time preferences as in Kirby & Maraković (1995):

Eqn 1:

$$V = \frac{A}{1 + kD}$$

with V representing the present value of the delayed reward A, delayed by time D (in days) and *k* being a free parameter representing the discount rate with higher values of *k* indicating greater discounting (or a higher level of impatience).

This discount rate *k* was estimated individually for each of the participants based on his/ her pattern of choices in the 27 financial decision questions. For example, consider the following two questions taken from the set of 27: (1) Would you prefer 1503 kc now or 1597 Kc in 179 days? And (2) Would you prefer 1015 kc now or 1127 Kc in 136 days? Considering (1) alone, a participant with a discount rate *k* of .00040 (arrived at by plugging in the values in eqn. 1.) would be indifferent between these two rewards so if he/ she chose the smaller immediate reward in this question, it can be inferred that the participant had a discount rate greater than .00040. Now considering (2) alone, the associated value of k is .0010 so if the same participant had chosen the larger delayed reward in this question, it can be inferred that the participant had a discount rate lower than .0010. Now taking (1) and (2) together, it can be inferred that a participant has a discount rate, *k,* between .00040 and .0010 and so the midpoint of this interval is an estimate of the person's discounting rate. As in Kirby et al., 1999, the geometric mean of the two *k's* was used to avoid underweighting of the smaller *k*. Considering the above two questions from the example, the discounting rate (or *k*-value) for this participant would be .00063.

The table below (used by Kirby et al., 1999) can now be used to aid in providing a clear explanation of how discounting rates for each participant were estimated:

**Table 2: Reward values, delays and associated discount rates (*k*)**

| Order | Smaller Immediate Reward (Kč) | Larger Delayed Reward (Kč) | Delay (in days) | *k* at indifference |
|---|---|---|---|---|
| 13 | 639 | 658 | 186 | .00016 |
| 1 | 1,015 | 1,033 | 117 | .00016 |
| 9 | 1,465 | 1,503 | 162 | .00016 |
| 20 | 1,503 | 1,597 | 179 | .00040 |
| 6 | 883 | 939 | 160 | .00040 |
| 17 | 526 | 564 | 157 | .00040 |
| 26 | 1,015 | 1,127 | 136 | .0010 |
| 24 | 413 | 470 | 111 | .0010 |
| 12 | 1,259 | 1,409 | 119 | .0010 |
| 22 | 470 | 564 | 80 | .0025 |
| 16 | 921 | 1,127 | 89 | .0025 |
| 15 | 1,296 | 1,597 | 91 | .0025 |
| 3 | 357 | 470 | 53 | .0060 |
| 10 | 1,033 | 1,409 | 62 | .0060 |

| | | | | |
|---|---|---|---|---|
| 2 | 752 | 1,033 | 61 | .0060 |
| 18 | 639 | 939 | 29 | .016 |
| 21 | 451 | 658 | 30 | .016 |
| 25 | 1,015 | 1,503 | 30 | .016 |
| 5 | 507 | 939 | 19 | .041 |
| 14 | 263 | 470 | 21 | .041 |
| 23 | 770 | 1,409 | 20 | .041 |
| 7 | 470 | 1,127 | 13 | .10 |
| 8 | 620 | 1,503 | 14 | .10 |
| 19 | 282 | 658 | 14 | .10 |
| 11 | 207 | 564 | 7 | .25 |
| 27 | 582 | 1,597 | 7 | .25 |
| 4 | 376 | 1,033 | 7 | .25 |

***-Kirby et al., 1999, p. 81***

The first column in the above table represents the order in which the questions were presented to participants. The other columns are self-explanatory – each row corresponds to one of the 27 questions. The 27 choices in the above table define ten ranges of discount rates of which 8 are bounded above and below. The first and last ranges (i.e., .00016 to .00040 and .10 to .25) are not bounded below and above respectively and represent the end points (choices of all 27 immediate rewards or all 27 delayed rewards). A *k*-value corresponding to the geometric midpoint one of the 8 ranges or to one of the two end points was assigned to each participant based on his/ her choice of immediate or delayed rewards. The *k*-value for each participant was arrived at by calculating the consistency of the 27 choices with each of the 10 *k*-values (the 8 geometric mid points and the 2 end points) and choosing that *k*-value which yielded the highest consistency for each participant. If two or more *k*-values yielded equal consistency, then participant was assigned a value corresponding to the mean of those values. This procedure was repeated for each of the 93 participants.

# 4. Results

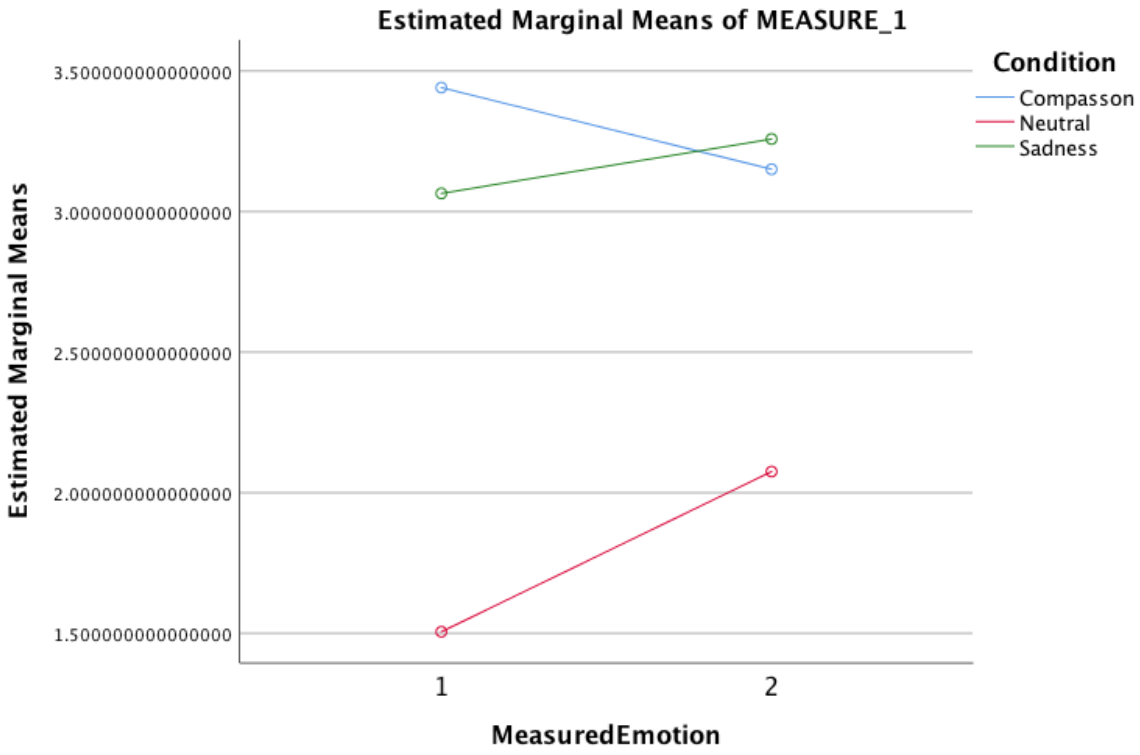
## 4.1. Checking the success of the emotion-induction

Similar to the method used by DeSteno et al. (2015) to check the success of the emotion induction, participant's self-reported emotion intensity scores were subjected to a 3 (Condition: compassion, sadness, neutral) x 2 (Measured Emotion: Mean compassion, Mean sadness) mixed analysis of variance with the second factor namely, Measured Emotion, being repeated to check if the emotion induction had been successful.

The Condition * Measured Emotion interaction was found to be significant, $F(2, 90) = 7.442$; $p < .05$.

A plot of the estimated means with Measured Emotion on the horizontal axis (Mean Compassion -1, Mean Sadness - 2) and the three conditions as the three separate lines is depicted in the graph below.

**Figure 1: Estimated marginal means of measured emotions (3 conditions)**



As can be seen from the above graph, the mean level of compassion is highest in the compassion condition, lower in the sadness condition and lowest for the neutral condition and the mean level of sadness is highest in the sadness condition, lower in the compassion condition and lowest in the neutral condition.
However it was necessary to check if these differences were statistically significant. A pairwise comparison of the different conditions for the Measured Emotion * Condition can be seen from the table below:

**Table 3: Pairwise comparisons of measured emotions in the 3 conditions**

| Measured Emotion | (I) Condition | (J) Condition | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval for Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Mean Compassion | Compassion | Neutral | 1.935* | .186 | .000 | 1.566 | 2.305 |
| | | Sadness | .376* | .186 | .046 | .006 | .746 |
| | Neutral | Compassion | -1.935* | .186 | .000 | -2.305 | -1.566 |
| | | Sadness | -1.559* | .186 | .000 | -1.929 | -1.189 |
| | Sadness | Compassion | -.376* | .186 | .046 | -.746 | -.006 |
| | | Neutral | 1.559* | .186 | .000 | 1.189 | 1.929 |
| Mean Sadness | Compassion | Neutral | 1.075* | .207 | .000 | .665 | 1.486 |
| | | Sadness | -.108 | .207 | .604 | -.518 | .303 |
| | Neutral | Compassion | -1.075* | .207 | .000 | -1.486 | -.665 |
| | | Sadness | -1.183* | .207 | .000 | -1.593 | -.772 |
| | Sadness | Compassion | .108 | .207 | .604 | -.303 | .518 |
| | | Neutral | 1.183* | .207 | .000 | .772 | 1.593 |

As revealed from this comparison, the difference in the self-reported measure of compassion (i.e. Mean compassion) was found to be reliably different in the compassion condition as compared to both the neutral condition ($p < .05$) and the sadness condition ($p < .05$), (relevant cells highlighted in green). However, while the self-reported intensity of sadness (i.e. Mean Sadness) was significantly higher in the sadness condition as compared to the neutral condition ($p < .05$), (relevant cells highlighted in purple), this difference was not significant when compared to the compassion condition ($p = .604$), (relevant cells highlighted in pink).

This suggested that both compassion and sadness had been induced in the compassion condition. Before conducting further tests, an in-depth look at the experience of participants in the compassion condition was required. Since the main emotion induction took place through autobiographical recall i.e. when participants thought for a few minutes and then wrote about a situation in which they experienced a particular emotion (either compassion on sadness), it seemed prudent to examine the different situations described by the participants in the compassion condition. On carefully reading through each of these situations or events, it was observed that two groups or types could be clearly distinguished within this condition. Of the 31 participants randomly assigned to the compassion condition, 19 participants were able to form a clear distinction between the 'self' and 'other' when describing events

or situations in which they experienced sympathy or compassion. Moreover, they felt motivated to and in some cases did act to lower the suffering of the object of their compassion. However the remaining 12 participants described situations or events in which they were very close to the person for whom they felt compassion (most often a family member or a close friend) and seemed to feel a degree of personal distress as a result of their inability to help a loved one or reduce their suffering.

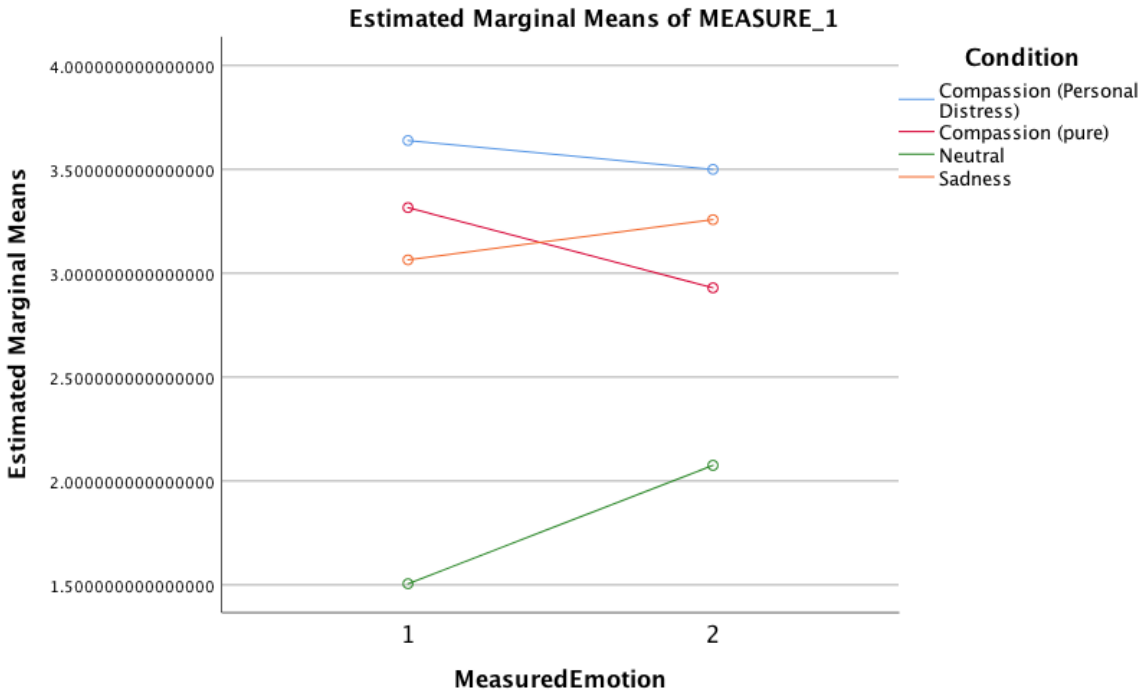
As a result of the marked differences observed in the two types of situations described by participants in the compassion condition, it was necessary to separate participants within this condition into two groups. The groups within the compassion condition were distinguished as the 'compassion – pure' group consisting of the first 19 participants who had been able to form clear self-other distinctions and the 'compassion - personal distress' group consisting of the remaining 12 participants who were unable to make this distinction and experienced a higher than average degree of personal distress as a result. The self-reported emotion intensity scores were once again submitted to a mixed analysis of variance as before however this time the grouping variable namely the Condition had 4 levels instead of 3, namely compassion – pure, compassion - personal distress, sadness and neutral. The descriptive statistics showing the mean and standard deviations of the self-reported measure of compassion (Mean compassion) and sadness (Mean sadness) in the 4 different groups can be seen from the table below.

**Table 4: Mean compassion and mean sadness in the 4 conditions**

| Measured Emotion | Condition | Mean | Standard Deviation | N (No. of participants) |
|---|---|---|---|---|
| Mean Compassion | Compassion - personal distress | 3.64 | .66 | 12 |
| | Compassion - pure | 3.32 | .67 | 19 |
| | Neutral | 1.51 | .63 | 31 |
| | Sadness | 3.06 | .87 | 31 |
| | **Total** | **2.67** | **1.11** | **93** |
| Mean Sadness | Compassion - personal distress | 3.50 | .86 | 12 |
| | Compassion - pure | 2.93 | .61 | 19 |
| | Neutral | 2.08 | .70 | 31 |
| | Sadness | 3.26 | .96 | 31 |
| | **Total** | **2.82** | **.96** | **93** |

The Measured Emotion * Condition was once again found to be significant $F(3, 89) = 5.13$; $p < .05$. A plot of the estimated means of the measured emotion with the 4 different conditions is depicted below.

**Figure 2: Estimated marginal means of measured emotions (4 conditions)**




As seen from the above graph, the self-reported emotion intensity scores of both compassion (1 on the horizontal axis) and sadness (2 on the horizontal axis) is highest in the compassion - personal distress group, depicted by the blue line in the graph above, as compared to all the other conditions.

As expected, *t* tests revealed that the mean level of sadness was not significantly different in the compassion - personal distress group as compared to the sadness condition, $t(41) = .761$, $p > .05$ but was significantly higher as compared to the compassion - pure group, $t(29) = .761$, $p < .05$. Moreover, pairwise comparisons revealed that unlike in the compassion – pure condition where there was a reliable difference in the level of compassion vs. the level of sadness ($p = .060$, alpha = .07), both the compassion – personal distress condition and the sadness condition, did not have a statistically significant difference in the level of compassion vs. the level of sadness, $p = .587$, alpha = .07 and $p = .225$, alpha = .07 respectively.

Contrary to expectations, however, a statistically significant difference in the mean level of sadness was still not observed in the compassion - pure group compared with the sadness condition, $t(48) = 1.329$, $p = .123$, alpha = .07. This implies that despite participants being able to make clear self-other distinctions in the compassion - pure group, the induced emotion was still a mixture of both sadness and compassion. This result is interesting because it shows that compassion, as a pure affective state, cannot be generated without simultaneously inducing a higher than normal level of sadness. Thus at this point, some measure of doubt now existed that my first hypotheses, concerning the ability of compassion as an affective state to reduce the level of economic impatience, would hold.

## 4.2. Consistency of discount rates

The consistency of discount rates basically refers to the percentage of the participants' decisions that were consistent with the *k-value* that was assigned to them. The mean choice consistency of participants in each of the four conditions is depicted in the table below.

**Table 5: Mean consistency rates of participants in the 4 conditions**

| Condition | N (No. of participants) | Mean Consistency Rate | Standard Deviation |
|---|---|---|---|
| Compassion – pure | 19 | 94.54% | 2.86% |
| Neutral | 31 | 93.91% | 7.32% |
| Sadness | 31 | 93.55% | 8.76% |
| Compassion – personal distress | 12 | 95.99% | 2.94% |
| Total | 93 | 94.19% | 6.76% |

The overall mean consistency rate was over 94%, indicating that on average less than 2 out of the 27 decisions made by participants were inconsistent with the *k-value* that had been assigned to them. There was not found to be any significant differences in the mean consistency rates across the different conditions

## 4.3. Effect of Emotion on Discounting

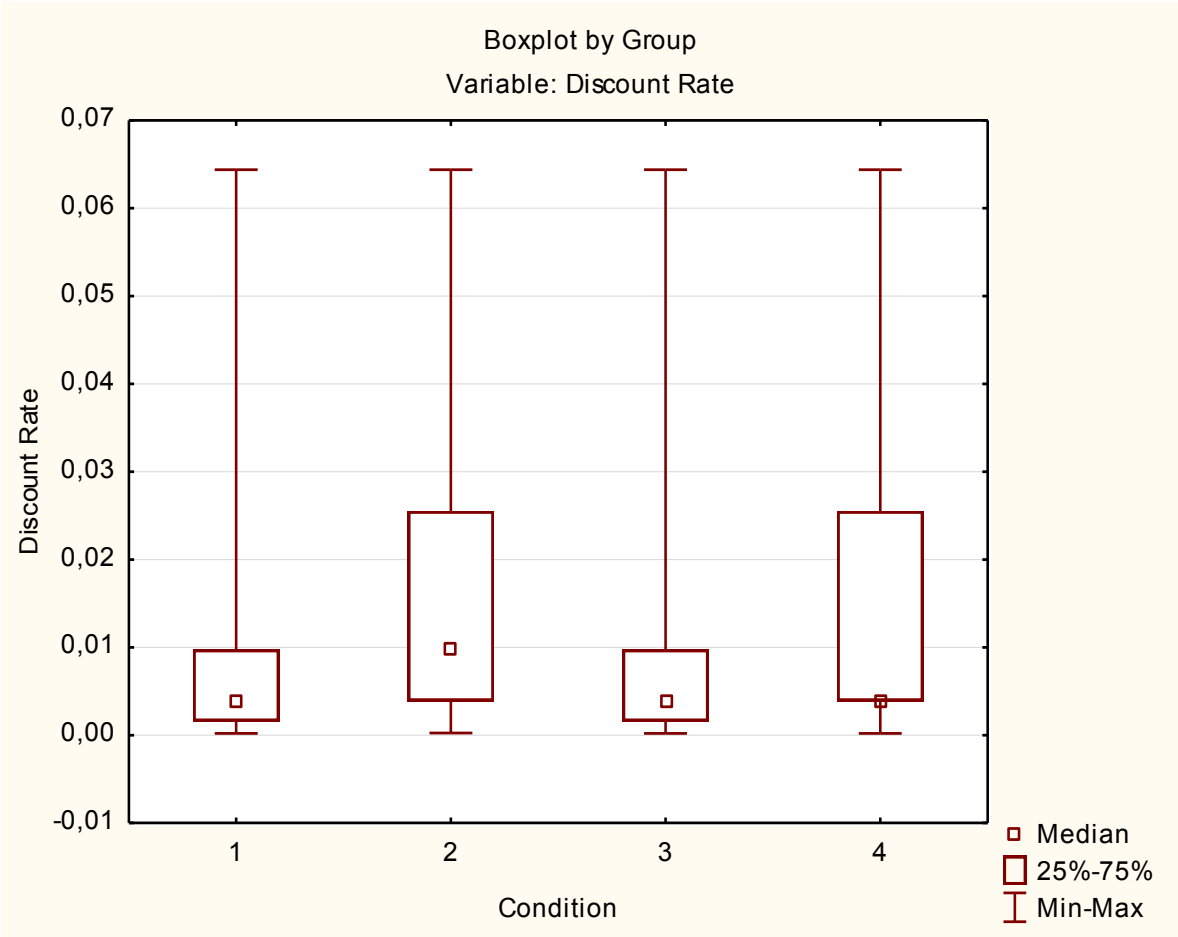
As a result of the previous analysis, the two distinct types of compassion were treated as separate conditions while estimating the effect of the emotion condition on the discount rate (or k-value) of participants. Descriptive statistics showing the mean discount rate (or mean k-values) of participants in each condition are depicted in the table below. It is seen that mean discount rate in the compassion – pure condition is the lowest, although clearly very close to the neutral condition, next is the sadness condition and finally the compassion – personal distress condition with the highest mean discount rate.

**Table 6: Mean discount rates of participants in the 4 conditions**

| Condition | N (No. of participants) | Mean Discount Rate | Standard Deviation |
|---|---|---|---|
| Compassion – pure | 19 | .0079 | .0149 |
| Neutral | 31 | .0087 | .0157 |
| Sadness | 31 | .0134 | .0164 |
| Compassion – personal distress | 12 | .0157 | .0180 |

In order to understand if the differences in discount rates were reliably different across the different conditions, the Kruskal-Wallis test (Hollander & Wolfe, 1999) was conducted on the overall sample. This test was chosen in order to reduce the effects of distributional skews as the discount rates were found to be non-normally distributed (Skewness = 2.431; Kurtosis = 5.480). The box-plots of the discount rates in the four different conditions are as depicted in the chart below:

**Figure 3: Box and whiskers plot of discount rate in the 4 emotion conditions**




As expected the overall difference in the mean ranks of discount rates across the different conditions were found to be significant, H (3, N = 93) = 7.297; p = .063; alpha = .1.

**Table 7: Means ranks of the discount rates in the 4 conditions**

| Condition | No. of participants | Sum of Ranks | Mean Rank |
|---|---|---|---|
| Compassion – pure | 19 | 723 | 38.053 |
| Neutral | 31 | 1294 | 41.742 |
| Sadness | 31 | 1663 | 53.645 |
| Compassion – personal distress | 12 | 691 | 57.583 |

The Mann-Whitney test (Hollander & Wolfe, 1999) was then used to check the validity of the two hypotheses stated earlier.

**Validity of hypothesis 1: Sadness increases economic impatience**

Confirming previous findings, the hypothesis that sadness increases economic impatience was found to be true. The Mann-Whitney test revealed that the difference in mean ranks of discount rates in the sadness and neutral condition were significantly different, p = .069, alpha = .1)

Additionally, the Mann-Whitney test on the compassion – personal distress condition also revealed that the level of economic impatience in this condition was not significantly different from the sadness condition, p = .62, alpha = .1. This result makes sense if we recall that the emotion-induction analysis revealed that the level of sadness in this condition was found to be not significantly different from that in the sadness condition and moreover that there was no reliable difference between the level of sadness and the level of compassion in both these conditions.

**Validity of hypothesis 2: Incidental compassion reduces economic impatience**

This result was disproved. The Mann-Whitney test revealed that the difference in mean ranks of discount rates in the compassion - pure and the neutral condition were not significantly different, p = .58, alpha = .1. It is necessary to interpret this result keeping in mind the results from the emotion manipulation check. Since it was seen that even in the compassion – pure condition, a mixture of sadness and compassion were induced simultaneously, it is theoretically possible that the positive effect of compassion on the level of patience was cancelled out by the negative effect of sadness and it was this interaction between two opposing action tendencies which resulted in a level of economic impatience which was not significantly different from the neutral condition.

# 5. Limitations

There were certain limitations to the current experiment. These are described below:

**Translation of affective descriptors:** A problem faced prior to data collection was the translation of affective descriptors from English into Czech. While there were some words which had approximately or exactly the same meaning in Czech, others were more difficult. In particular the word for 'sympathy' in Czech was the same as the word for compassion and there was some difficulty in coming up with a substitute. The final Czech equivalent of sympathy that was used in the questionnaire was 'politování' which seemed to have a more subjective interpretation. Going forward, it will make sense to undertake a short survey in a larger sample to get an idea of how these words are understood in Czech (or the particular language that is used in the questionnaire).

**Uniformity across all sessions:** As far as the actual experiment went, despite the experimenters' best efforts to ensure that nothing differed from one session to the next, there were things that we couldn't control for including the time of day during which the sessions took place, the weather and the proportion of males to females in each session, all of which could have affected the participants' state of mind and consequently their decisions. Future research can control for these conditions and prevent such external factors from influencing the participants' state of mind.

**Low ratio of male to female participants:** Another issue we could not control in this particular experiment was the ratio of males to females (overall) who participated, which was highly skewed toward females. Future research can try to ensure a more even split of males to females for better results.

**The splitting of the compassion condition:** An issue that may have negatively impacted the significance of results was the fact that the compassion condition had to be split into two different conditions and treated separately for the purpose of analysis. Since it was only possible to do this once the entire sample had been collected, the result was that there were significantly different sample sizes in each of the final four conditions. While Levene's test confirmed the equality of variances across the four conditions whether the dependent variable was the Measured Emotion (i.e. Mean compassion or Mean sadness) or the Discount rate, larger samples in the compassion – pure condition and the compassion – personal distress condition would have had stronger explanatory power. Had these two types of compassion been anticipated prior to data collection, the writing task could have been worded in such a way that only one of these conditions was induced. Future research can take this into account in experiments involving the induction of compassion.

**The lack of affective descriptors for gratitude and love:** If the affective descriptors gratitude and love were included in the emotion measure section of the questionnaire, it might have been possible to draw stronger conclusions with regard to the experience of the emotion of compassion and its associated appraisals. For example if participants in the compassion – pure as well as compassion – personal distress conditions had rated themselves as feeling high levels of either gratitude, love or both, it might have made a stronger case for the existence of two opposing

emotion appraisals namely the prosocial, ‘approach’ appraisal associated with gratitude and love and the more antisocial, ‘retreat’ appraisal associated with sadness. Further research could consider a measurement of these prosocial emotions in addition to the descriptors for compassion in order to understand better the experience of compassion and consequently draw stronger inferences about the ways it could affect intertemporal judgment.

# 6. Conclusion

This thesis aimed first to make an argument for the incorporation of emotions into economic models of decision-making. To this end, a review of the existing literature was carried out as it pertained to the influence of emotions on judgment and decision-making. The model of intertemporal choice was specifically explored by considering the experimental evidence documenting the influence of emotions on intertemporal judgment. The different theoretical accounts of compassion were analysed in some detail. As there existed a strong evolutionary basis for the prosocial nature of compassion as well as experimental evidence documenting the potential of such prosocial emotions to reduce our existing present bias, it was expected that compassion, similar to gratitude, could be used as a tool to reduce economic impatience. In order to test this hypothesis, a social experiment was carried out to test the effect of compassion on levels of economic impatience using sadness as a comparison condition. The purpose of using sadness was both to verify previously documented findings that sadness results in an increase in economic impatience as well as to compare the experience of sadness and compassion among participants.

The analysis of the data collected from the experiment was revealing. While it confirmed that sadness tends to increase economic impatience as compared to the neutral condition, it disproved the hypothesis that compassion can be used as a tool to reduce economic impatience. However, from the results of the emotion-induction analysis, it was possible to infer that pure compassion, as a distinct affective state, may not exist without a certain level of sadness inextricably linked with it. This has important implications for the perception of compassion as a prosocial emotion that may motivate us to give up resources today in the hope that it will increase the chances of higher consumption in the future. The results in fact point to the conclusion that even though compassion might result in a desire to help those who are the object of our compassion, since it is linked with a higher than normal level of sadness, it also simultaneously leads to a sense of urgency to replace what we believe is a personal loss thus cancelling out the positive effects of the pro-sociality on our level of patience.

The more interesting albeit unexpected result from the experiment is the fact that there seems to exist two different types of compassion – one in which the level of sadness was not found to be reliably different from the level of compassion (i.e. the compassion - personal distress condition) and one in which the levels of sadness and compassion were reliably different with compassion being significantly higher (i.e. the compassion – pure condition). The former kind was also associated with higher mean levels of both compassion and sadness as compared to any of the other three conditions and was found to be induced as a result of recalling the suffering of close friends or immediate family. This type of compassion for those who are close to us is perhaps the most important kind from an evolutionary perspective as it is what is thought to have increased the chances of survival of our genes and what promotes cooperation that is similarly essential to survival. However, it seems that a necessary component of this compassion is a concrete sense or perception that we have the ability to reduce the suffering of the object of our compassion. In the absence of this

perception, we are unable to form a clear distinction between the self and the other resulting in a need to compensate, through increased current consumption, for what we perceive to be our own suffering as well. This, as the analysis indicates, results in a level of economic impatience that is not significantly different from the sadness condition.

Thus, contrary to expectations, it seems that compassion is not a distinct prosocial affective state but rather can be considered a blend of sadness and some other prosocial emotion, perhaps gratitude or love (see section 2.12.3.2). However, what exactly this combination is remains to be tested. There is also evidence to validate the empathic distress perspective of compassion (see section 2.12.3.1). However, this was true only under specific circumstances (12 out of 31 cases).

# 6.1. Implications of the experiment

Previous research (Lerner, Li & Wedber, 2013) as well as current findings suggest that financial hardship may be worsened by increasing present consumption more than is wise in situations in which intense sadness is felt - for example after the loss of a loved one or after loss of employment. Financial decisions should not be taken during this period as they are likely to be heavily present biased. Current findings extend this to not only the person who is suffering but also to those who are very close to them. In such cases, unregulated compassion for the one who suffers and an inability to reduce this suffering could lead to a sense of personal distress and ultimately result in detrimental economic outcomes even for the self. Thus compassion in such situations should be regulated as it is ultimately of little or no use to those who we wish to help and is detrimental to our own economic wellbeing.

The results also indicate that even in cases when a clear self-other distinction is perceived, compassion-eliciting events, to the extent that they are linked with an increase in the level of sadness, could potentially cloud judgment and result in sub-optimal decisions. Further research could explore whether the actual act of helping lowers economic impatience for the self as against cases when the act of helping is withheld. In the latter situation, the current findings indicate that it is possible that the positive prosocial effects of compassion may be reduced or cancelled out entirely by sadness at having done nothing or ruminating about a situation of uncertainty in which our own morality is called into question.

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# 8. Annexures

## Annexure 1: Questionnaire in Czech

**Basic questions**

1. Vylosované číslo
2. Kolik je Vám let?
3. Jaké je Vaše pohlaví?
4. Jaká je Vaše národnost?

**Emotion Induction**

1. Krátké video: Než pustíte video, nasaďte si prosím sluchátka a video si dejte na celou obrazovku. Až video skončí, zavřete prosím okno a vraťte se zpět k dotazníku.
   Zatímco budete sledovat toto video, představte si, jak se tito lidé cítí.
   [link to video]

2. V další úloze si vzpomeňte na situaci z Vašeho života, ve které jste s někým/něčím soucítili a pár minut o ní popřemýšlejte. Až popřemýšlíte o této situaci, prosím, napište o ní jeden odstavec. (compassion condition)
   *(or)*
   V další úloze si vzpomeňte na situaci z Vašeho života, ve které jste se cítili smutně a pár minut o ní popřemýšlejte. Až popřemýšlíte o této situaci, prosím, napište o ní jeden odstavec. (sadness condition)
   *(or)*
   Na chvíli se zamyslete a v několika větách popište situaci Vašeho běžného dne. (neutral condition)

**Emotion measurement**

Na škále 1 až 5, prosím, ohodnoťte tyto pocity podle toho, jak se momentálně cítíte. (1 = vůbec, 5 = velmi)
Vystrašeně, pobaveně, naštvaně, sklesle, znuděně, vesele, deprimovaně, soucitně, vyděšeně, rozzuřeně, šťastně, lhostejně, vztekle, politování, nervózně, neutrálně, dojatě, smutně, nijak

**Discounting Task**

*Instrukce k dalším otázkám:*
V následujících otázkách vyberte mezi okamžitou a pozdější peněžní odměnou. Ihned po experimentu si hodíte kostkou a pokud vyhrajete, obdržíte částku, kterou jste si vybrali v jedné z otázek. Pokud si zvolíte okamžitou peněžní odměnu, bude vám v případě výhry vyplacena hned teď. Pokud si zvolíte obdržení peněžní odměny v budoucnu, bude vám hotovost zaslána za uvedený počet dní, nebo si ji budete moci vyzvednout ve škole. Každou otázku vyberte pravdivě, protože právě ona může být tou, kterou vyhrajete.

Dostali byste raději:

1. 1015 Kč teď? / or 1033 Kč za 117 dní?
2. 1033 Kč teď? / or 1409 Kč za 61 dní?
3. 357 Kč teď? / or 470 Kč za 53 dní?
4. 582 Kč teď? / or 1597 Kč za 7 dní?
5. 263 Kč teď? / or 470 Kč za 19 dní?
6. 883 Kč teď? / or 939 Kč za 160 dní?
7. 282 Kč teď? / or 658 Kč za 13 dní?
8. 470 Kč teď? / or 1127 Kč za 14 dní?
9. 1465 Kč teď? / or 1503 Kč za 162 dní?
10. 752 Kč teď? / or 1033 Kč za 62 dní?
11. 207 Kč teď? / or 564 Kč za 7 dní?
12. 1259 Kč teď? / or 1409 Kč za 119 dní?
13. 639 Kč teď? / or 658 Kč za 186 dní?
14. 507 Kč teď? / or 939 Kč za 21 dní?
15. 1296 Kč teď? / or 1597 Kč za 91 dní?
16. 921 Kč teď? / or 1127 Kč za 89 dní?
17. 1503 Kč teď? / or 1597 Kč za 157 dní?
18. 451 Kč teď? / or 658 Kč za 29 dní?
19. 620 Kč teď? / or 1503 Kč za 14 dní?
20. 526 Kč teď? / or 564 Kč za 179 dní?
21. 639 Kč teď? / or 939 Kč za 30 dní?
22. 470 Kč teď? / or 564 Kč za 80 dní?
23. 770 Kč teď? / or 1409 Kč za 20 dní?
24. 1015 Kč teď? / or 1127 Kč za 111 dní?
25. 1015 Kč teď? / or 1503 Kč za 30 dní?
26. 413 Kč teď? / or 470 Kč za 136 dní?
27. 376 Kč teď? / or 1033 Kč za 7 dní?

# Annexure 2: Questionnaire in English

**Basic questions**

1. Number on chit
2. How old are you?
3. What is your gender?
4. What is your nationality?

**Emotion Induction**

1. Before you click on the link to the video, please put on the headphones and make it full-screen. When the video ends, close the video and return to the questionnaire.
   While watching the video try to imagine how these people feel.
   [link to video]

2. Please spend some time thinking about and then writing a short essay on a situation from your own life during which you experienced compassion (compassion condition)

   *(or)*

   Please spend some time thinking about and then writing a short essay on situation from your own life during which you experienced sadness (sadness condition)

   *(or)*

   Please write a short essay about the events of a typical day in your life (neutral condition)

**Emotion measurement**

Please indicate how intensely you feel the following on a scale of 1 to 5 (1=not at all, 5=very much)
Afraid, amused, angry, blue, bored, cheerful, depressed, compassion, fearful, furious, happy, indifferent, mad, sympathy, nervous, neutral, moved, sad, unemotional.

**Discounting Task**

*Instructions for your next task:*
The next 27 questions will require you to choose between immediate rewards and delayed rewards. You have a one in six chance of having one of these questions selected and getting the cash amount that you chose. If you chose a delayed cash amount, you will be contacted at the time your payment comes due to check if you would rather come to the university to collect it or have the cash mailed to the address you provided earlier. To make sure you get the reward you prefer, you should answer every question as though it were the one you will win

Would you prefer:

1. 1015 Kč now? / or 1033 Kč in 117 days?
2. 1033 Kč now? / or 1409 Kč in 61 days?
3. 357 Kč now? / or 470 Kč in 53 days?
4. 582 Kč now? / or 1597 Kč in 7 days?

5. 263 Kč now? / or 470 Kč in 19 days?
6. 883 Kč now? / or 939 Kč in 160 days?
7. 282 Kč now? / or 658 Kč in 13 days?
8. 470 Kč now? / or 1127 Kč in 14 days?
9. 1465 Kč now? / or 1503 Kč in 162 days?
10. 752 Kč now? / or 1033 Kč in 62 days?
11. 207 Kč now? / or 564 Kč in 7 days?
12. 1259 Kč now? / or 1409 Kč in 119 days?
13. 639 Kč now? / or 658 Kč in 186 days?
14. 507 Kč now? / or 939 Kč in 21 days?
15. 1296 Kč now? / or 1597 Kč in 91 days?
16. 921 Kč now? / or 1127 Kč in 89 days?
17. 1503 Kč now? / or 1597 Kč in 157 days?
18. 451 Kč now? / or 658 Kč in 29 days?
19. 620 Kč now? / or 1503 Kč in 14 days?
20. 526 Kč now? / or 564 Kč in 179 days?
21. 639 Kč now? / or 939 Kč in 30 days?
22. 470 Kč now? / or 564 Kč in 80 days?
23. 770 Kč now? / or 1409 Kč in 20 days?
24. 1015 Kč now? / or 1127 Kč in 111 days?
25. 1015 Kč now? / or 1503 Kč in 30 days?
26. 413 Kč now? / or 470 Kč in 136 days?
27. 376 Kč now? / or 1033 Kč in 7 days?

# Annexure 3: Informed Consent in Czech

**Sociální výzkum**

Děkuji, že jste se rozhodli zúčastnit tohoto výzkumu. Mé jméno je Diya Elizabeth Abraham a momentálně dokončuji magisterský stupeň na Mendelově univerzitě. Tento výzkum je sociální experiment, který je součástí mé diplomové práce (můj vedoucí je Ing. Bc. Martin Machay, Ph.D.). Cílem mé práce je porozumět tomu, jak jsou informace odhadovány a jak se vytvářejí rozhodnutí. Tento výzkum je financován Provozně ekonomickou fakultou (PEFkou) Mendelovy univerzity v Brně a veškeré finanční odměny, které můžete vyhrát v této studii, jsou PEFkou zaručeny.

V tomto experimentu Vás požádám o vyplnění online dotazníku, který se bude skládat z jednotlivých částí v následujícím pořadí: Vyplnění základního dotazníku (otázky typu „jaké je vaše pohlaví, věk a národnost“); zhlédnutí krátkého videa; připomenutí si a sepsání krátké eseje o situaci nebo události ve Vašem životě; vyplnění krátkého dotazníku, ve kterém ohodnotíte na stupnici 1 až 5 to, jak různá slova popisují, jak se cítíte; zodpovězení několika jednoduchých otázek, ve kterých vyberete mezi okamžitou nebo pozdější finanční odměnou; Poté, co vyplníte všechny části dotazníku, budete hrát hru, při které budete mít šanci vyhrát bonusovou finanční odměnu. Myslíme si, že celý výzkum zabere přibližně **45** minut.

Prosím berte na vědomí, že náplň výše vypsaných částí nebude mít každý účastník výzkumu stejnou. Tímto bych Vás chtěla poprosit, abyste o otázkách, které se Vám ve výzkumu objevily, nediskutovali s ostatními studenty, zvláště těmi, kteří se výzkumu ještě neúčastnili. Mohlo by to narušit celý experiment.

Pokud dokončíte celý experiment, dostanete body za aktivitu do předmětu, ve kterém jste se o něm dozvěděli. Jak bylo zmíněno dříve, na konci experimentu budete mít možnost vyhrát bonusovou finanční odměnu.

Před začátkem experimentu Vás požádáme o osobní data, která budou obsahovat Vaše celé jméno, adresu, na kterou Vám přijde v následujících 7 měsících dopis, Váš bankovní účet a Vaše telefonní číslo. Veškeré osobní údaje, které ve výzkumu uvedete, budou použity pouze k tomu, abychom Vás kontaktovali, pokud vyhrajete a v jedné z otázek uvedete, že byste přijali vyšší pozdější finanční odměnu (namísto okamžité odměny). Veškeré poskytnuté údaje budou důvěrné a budou přístupná pouze osobám, které provádí tento výzkum.
Pokud Vás zajímá výsledek této studie, budete moci najít na UIS mou kompletní diplomovou práci na konci června 2017.

**Rozumím a souhlasím s účastí na tomto experimentu:** **Ano** ☐

Jméno a příjmení účastníka: _____

Podpis účastníka: Datum:

_____

# Annexure 4: Informed Consent in English

**Social Research Study**

Thank you very much for coming for this study. My name is Diya Elizabeth Abraham and I am currently completing my Master's degree here at Mendel University. This is a social research experiment that is part of my Diploma Thesis (my supervisor is Ing. Bc. Martin Machay, Ph.D.). The objective of my thesis is to understand how information is assessed and decisions are made. This study is funded by the Provozne ekonomická fakulta (PEFKA) at Mendel University and any cash reward you may win as a result of this study is guaranteed by PEFKA.

As part of this social experiment, you will be asked to click on the link to an online form and complete the following tasks in this order: respond to a basic questionnaire (which includes questions such as your gender, age and nationality); watch a short video clip; recall and write about a specific situation or event in you life; respond to a short survey requiring you to rate on a scale of 1 to 5 how various words best describe how you feel; answer a few binary choice questions involving immediate or delayed financial rewards; after completing these tasks, you will play a game that will determine whether or not you will win a bonus financial reward. We think all this will take about 45 minutes.

Please keep in mind that the content of the above tasks may not be the same for every participant. I thus request you to not discuss any of your tasks with other students in your class who may be participating in subsequent sessions as it may distort results.

If you complete the entire study, you will receive activity points for one of the courses for which you are enrolled here at Mendel University. Additionally, as mentioned earlier, you will also have the opportunity to win a bonus financial reward at the end of the study.

Before we begin, we will ask you to give us some personal details including your full name, the address at which you will receive mail for the next 7 months, your bank account number and your phone number. All personal contact details you provide will only be used to contact you in case you win the game at the end of the experiment and had chosen to receive a delayed financial reward (instead of an immediate financial reward). All the data you provide here will be kept confidential and only accessible to the researchers involved in this study. If you will be interested in the results of this study, you will be able to find it in my completed Diploma Thesis that will be available on the UIS by the end of June, 2017.

**I understand and agree to participate in this study:** **Yes** ☐

Full Name of Participant: _____

Signature of Participant: Date

_____

# Annexure 5: Personal Details form in Czech

**Osobní údaje**

Jméno a příjmení: _____

Předmět: _____

Napište prosím celou adresu vašeho trvalého bydliště (bude použita pouze v případě finanční výhry):

_____

_____

_____

_____

Bankovní účet: _____

Telefonní číslo (bude použito pouze pokud upřednostníte jiný způsob vyplacení výhry):

_____

# Annexure 6: Personal Details form in English

**Personal Details**

Full name: _____

Course: _____

Please enter the full address of your permanent residence (to be used only to contact you in case you win a cash prizes):

_____

_____

_____

_____

Bank Account Number: _____

Phone number (to be used only to contact you to ask for your preferred payment method):

_____