

HOMOECONOMICUS MEETS HOMOEMPATRICUS



**Homoeconomicus Meets Homoempathicus:
An Empathy Based Altruism Model Applied to Dictator Games**

Anamaria Barbu
(425359)
Erasmus School of Economics

Master Thesis
Supervisor Dr. Jan P.M. Heufer
August 2016

HOMOECONOMICUS MEETS HOMOEMPATRICUS

Contents

1. Abstract.....	3
2. Homoeconomicus meets Homoempathicus: An Empathy Based Altruism Model	4
3. From an emotion to a motivational state.....	5
4. Empathy - the relation between cognitive, affective and compassionate empathy	5
4.1. Cognitive and affective empathy.....	6
4.2. Compassionate empathy.....	7
5. Empathic concern and altruistic motivation	7
5.1. Empathic concern.....	7
5.2. Altruistic motivation.....	8
5.3. Altruistic behavior motivated by altruistic motivation.....	8
6. Current approach to the study of altruism in economics.....	8
7. The empathy based model.....	9
7.1. Variables choice and measurement.....	9
7.1.1. Cognitive empathy.....	9
7.1.2. Compassionate empathy.....	10
7.1.3. Empathic concern.....	10
7.2. Assumptions	10
7.3. Illustrating the model choice by comparing it with possible alternative models.....	11
7.3.1. Perfect complements: $f(x, y) = \frac{x+y}{2}$	11
7.3.2. Perfect substitutes: $g(x, y) = \min\{x, y\}$	12
7.3.3. The product function: $h(x, y) = xy$	12
8. Two motivations for altruistic behavior	14
8.1. Outline of the experiment design using DG	14
8.2. Altruistic behavior in DG as a function of egoistic and altruistic motivation.....	15
8.2.1. Altruism comparison between the two conditions of the experiment.....	16
8.2.2. Empathic concern as the product of compassionate and cognitive empathy.....	16
8.2.3. Altruistic behavior and empathic concern defined as a function of cognitive and compassionate empathy	17
9. Discussion and limitations.....	18
10. Conclusions.....	20
Acknowledgements	20
References	22

SOURCE COVER IMAGE www.gallery.yopriceville.com

1. Abstract

The behavior directed to benefit another has two main classes of motivation: egoistic and altruistic. We focus on context dependent behavior motivated altruistically, generated by empathic concern as outlined by the empathy based altruism hypothesis. We dissect the concept of empathy and design a model that captures the relation between its three elements and empathic concern. Using empathic concern as proxy for altruistic behavior we illustrate practically how offers made in dictator games can be estimated after a participant is exposed to an empathy evoking event. The model calls for the design of incentives that are taking into account the motivation behind behavior.

Keywords: empathy, empathic concern, motivation, altruistic behavior, dictator game, empathy based altruism hypothesis.

2. Homoeconomicus meets Homoempathicus: An Empathy Based Altruism Model

Humans are highly social individuals. We observe and evaluate our own behavior as well as the behavior of others (Tomasello, 2014) and based on these observations we make assumptions about the intentions of the ones we observe. This natural way of assessing motivations applies to all behaviors.

Altruistic behavior, defined here as the behavior people engage into to benefit another person in need, makes no exception from this process. People observe the altruistic behavior of others and most often will infer that the observed behavior is motivated out of care and concern for the person towards whom is directed. However, research from various fields have broaden our understanding of the motivation behind altruistic behavior. There are a significant number of studies supporting other motives, such as for example warm-glow (Andreoni, 1990), signaling (Millet & Dewittem 2006), fairness and reciprocity (Fehr & Schmidt, 2000), fear of punishment, aversive arousal reduction, and genuine concern for the other (Batson, 2011). These motivations can be grouped in two broad categories: egoistic and altruistic.

Egoistic motive means that the goal of the altruistic behavior is to benefit the self (e.g. due to warm-glow – the pleasant feeling resulted from for example charitable giving – or by avoiding aversive arousal – the negative feeling resulted from witnessing someone’s distress), while altruistic motive means that the behavior is directed to benefit the other not the self (Andreoni, 1989; Batson, 2011).

Most of these scientific explanations for altruistic behavior have been provided using the classic approach mentioned above, of inferring motivation from the observed behavior (Wilkinson & Klaes, 2012). However, we believe that recent findings in psychology enable us to take the opposing approach: to understand or anticipate behavior based on a person’s motivation.

This is useful, since although neo-classical economics has furnished us with a thorough research which explains egoistically motivated behavior, it comes short in documenting altruistic behavior. Furthermore, it can prove to be beneficial when it comes to motivating individuals, or in anticipating possible response based on the expected change in the environment.

The empathy based altruism (EBA) hypothesis from social psychology has provided a very interesting and comprehensive model focusing in particular on the altruistic motivation. EBA, in brief, states that a particular event which has the potential to evoke an emotion - empathic concern, can lead to an altruistic motivation to benefit another. Empathic concern is a persons’ emotional state evoked by an event concerning the welfare of another person. The relation between high levels of this emotion and helping behavior has been found to be positively related. For example, participants who scored high on empathic concern offered help for a longer period of time (Batson, 2011).

In a previous pilot study using dictator games (DG), we have found supportive evidence for EBA theory. We have observed that participants scoring higher on empathic concern offered on average more to the receiver than the ones scoring low (Barbu, 2015). Moreover, we found that participants induced to feel empathic concerned offered on average more than the control group.

As it seems that the positive correlation between the empathic concern scores and helping behavior, in this case the amount offered in DG, is robust, we believe it is important to define the mechanism behind this relationship in a model. Understanding the different motivations of altruistic behavior can help economists to better design incentives and to make use of this altruistic behavior in a more efficient way. At the same time, we want to stress that altruistic behavior is just one of the multitude of behaviors, such as for example violent behavior that can potentially be studied in a similar way.

HOMOECONOMICUS MEETS HOMOEMPATRICUS

In this paper we use insights from the psychology and neuroscience literature to design a theoretical model which captures the relation between the different dimensions of empathy related to empathic concern. This enables us to estimate altruistic behavior motivated out of concern for the other – applied to DG – based on the underlying emotion that generated the motivational state for this behavior: empathic concern.

For the graphic illustrations we make use of the Software Wolfram Mathematica. Furthermore, in order to exemplify the practical value of the model we outlined an experimental design explaining how the model could explain the findings.

The next section will briefly present the relation between emotion and motivation. In Section 4 we will dissect empathy and try to explain its various components and their interaction in relation to altruistic behavior, while Section 5 will present the relation between empathic concern and altruistic behavior. The goal of the section is to help the reader visualize how empathic concern relates to EBA theory. In Section 6 we take a look at the current approach to the study of altruism in the economics literature. The 7th Section will elaborate on our model, while Section 8 will discuss a practical application of it. We end with discussion in Section 9 and conclusions in Section 10.

3. From an emotion to a motivational state

Emotions are important not only in our survival (Izard, 1993), but also because of their interference with our decision making process (Goleman, 2006). When we are emotional, we take decisions we wouldn't have taken if we were in a neutral emotional state.

Without arguing, whether taking decisions driven by emotions is good or bad and focusing on the idea that decisions under different emotional states is a fact, we want to look at the relation between our emotional state and the decisions we make particularly in the context of altruistic behavior.

In real life, emotions, emotional states, and moods are an integrated part of our life. Nowadays, our environment is constantly changing and these changes, if critical, have the potential to lead to emotional arousal. Furthermore, "emotions are ... agents of purpose" that create motivational drive which in turn put in motion behaviors (Reeve, 2008, p. 299). To quote Frijda (2006), emotions are "geared to actions. ...They harbor power stores" (p 26).

Recently, Paul Ekman has published on his website The Atlas of Emotions, an interactive interface which maps the triggers and the intensity of various emotions, but also the actions that these emotions can lead to it (Design, S).

Given the fact that emotions seem to be such a powerful drive of behavior, we believe rationality and utility maximization should be looked at through the lenses of the emotional charge of an individual's environment.

When we are emotionally aroused, we are exposed to a completely different mind-set (Goleman, 2006). Therefore, generally speaking, we suggest to add to economics experiments this variation in the environment, because once we understand (1) what emotional state is triggered by what type of event and (2) what motivation this emotional state can lead to, we can better assess the impact of environmental change on behavior, and how people make decisions. Once we better understand motivators of behavior we can also design better incentives. As a particular case, we want to discuss empathic concern and altruistic behavior motivated by genuine concern for the wellbeing of a person in need: the emotional and motivational states relating to altruistic behavior.

4. Empathy - the relation between cognitive, affective and compassionate empathy

As we have seen, empathic concern relates to altruistic behavior motivated by concern toward the person in need. While the literature from economics offers many possible explanations for the egoistic motivation of helping behavior, the inclusion of the study of emotions and motivations allows us to look at this type of behavior in a more complex way, enabling us to distinguish between the two well-known classes of motivators mentioned in the introduction.

HOMOECONOMICUS MEETS HOMOEMPATHICUS

However, before understanding what empathic concern is and its relation to behavior, it is necessary to look at empathy and its components, as empathy plays a key role in triggering the emotion responsible for altruistic motivation.

From neuroscience, we know that empathy has three major sides: cognitive, affective, and compassionate (Zaki & Ochsner, 2012). In this sense, Baron – Cohen, one of the leading researchers on autism has focused on studying solely cognitive and affective empathy (Baron-Cohen, 2012), as these two sides have particular relevance in conditions such as autism or sociopathy. His research is interesting in that it points out some fundamental specificities of empathy. The next section will talk about cognitive and affective empathy, while in Section 4.2 we will define compassionate empathy.

4.1. Cognitive and affective empathy

Cognitive empathy, which is thoroughly explained in the Theory of Mind (ToM) research, refers to the cognitive abilities of a person to understand the mental states and the need of someone else (Nummenmaa et al., 2008). Affective empathy can be seen as an emotional endowment which makes it possible for an individual to have an emotional response to the need of someone (Zaki & Ochsner, 2012). Thus to be able to feel affective empathy a person must be able first to understand that someone has a need.

Once the need is understood, the person will respond to it with an emotion only if the mechanism of affective empathy is in place. This relation works both ways. As we will see further, the presence of affective empathy while lacking cognitive empathy will produce no emotional response.

We want to highlight here the genetic or biological aspect of these two sides of empathy. It seems that not all individuals are born with both cognitive and affective empathy as they appear to be genetically predetermined (Baron-Cohen, 2012). The most common example used to illustrate the lack of either cognitive or affective empathy is the juxtaposing cases of sociopathy and autism.

Sociopaths have remarkable cognitive empathy. They have the ability to understand the emotions and needs of others, however they lack the mechanism of affective empathy (Baron-Cohen, 2012). For this reason, they are incapable to respond with emotions to the needs of others. Actually, their high cognitive empathy in absence of affective empathy is what makes them such good manipulators.

As a side note, we want to mention that according to Halpern (2014) there is a possibility that sociopaths deliberately switch off their affective empathy. This phenomenon has been called detached concern. Thus alongside the individuals who are genetically predisposed to lack affective empathy there might be also a group of individuals who deliberately switch off their affective empathy. Nonetheless, based on this idea one could contest the genetic aspect of affective empathy.

For example, a common misperception is that all sociopaths end up committing crimes or being a threat in the society they live in. However, the sociopaths ending up in this category are only a very small fraction. Most sociopaths are high achieving individuals holding positions such as for example surgeons. Their ability to switch off their emotions when working, is what makes them so successful (Eliot, 2016; Halpern, 2014), but also very valuable to the society. No one would want a heart or brain surgeon to burst into tears or to sweat excessively during surgery. Both scenarios can have dramatic consequences.

Contrasting, autistic individuals have affective empathy. However, they score virtually zero on cognitive empathy, which means that they are not able to understand the emotions and needs of others and for this reason they do not know what it is socially expected from them (Baron-Cohen, 2012).

These examples are used to illustrate the fact that it is not given that an individual will have both cognitive and affective empathy. Some individuals can lack either of the two. For

HOMOECONOMICUS MEETS HOMOEMPATHICUS

this reason they are part of the group of individuals who have zero degrees of empathy. Moreover, it has been found that empathy, as a function of affective and cognitive empathy, is normally distributed across the population (Baron-Cohen, 2012), thus the number of individuals with very low levels of cognitive and affective empathy is expected to be very small.

In sum, to relate this information to altruistic behavior, it is worth noting that for an individual to understand the need of another person, he/she should have cognitive empathy. Furthermore, in order for this need to evoke an emotional response he/she must have affective empathy. Once these two have a positive value, greater than zero, we can turn our attention to talk about altruistic behavior. Let us now define compassionate empathy.

4.2. Compassionate empathy

Paul Ekman (Ekman & Dalai Lama, 2009) said about compassion that is neither a mood nor an emotion. Furthermore, it seems to have a biological component in the sense that we are born with a certain potential to be compassionate. Moreover, this potential for being compassionate is shaped early in life (Goleman, 2006) hence, nurture can define the extent to which we are compassionate toward others (Eliot, 2016). This is also the reason why some individuals will have a scarce resource of compassion. However, it appears to be a malleable individual characteristic which can also be cultivated later in life (Goleman, 2006) with the specific characteristic that once cultivated it cannot be switched off (Ekman & Dalai Lama, 2009). In fact, compassion has become a topic of wide interest and an increasing academic research is documenting the benefits of compassion training programs (Pace et al., 2008; Pace et al., 2013; Reddy et al., 2012).

We define here compassionate empathy as a biological bidimensional focus of attention enabled by the value placed on the welfare of another person. For example, in a specific situation, a person that has no compassionate empathy for another person will have his or her attention focused completely on the wellbeing of the self. Thus the fact that the person does not place value on the welfare of another person does not require his/her attention to be divided between the self and another person.

Factors that have the potential to influence how much value we place on the wellbeing of another person can be for example: parental upbringing (Eliot, 2016), economic and socio-cultural factors, personality and the set of values one holds. Furthermore, when a person has unidimensional attention - on the self - even though he/she has high levels of cognitive empathy will fail to identify the situation in which another might need help.

In this section, we saw that empathy has three facets: cognitive, affective, and compassionate. Moreover, all three of them appear to be genetically predisposed. Furthermore, affective empathy, if it exists, can be deliberately switched off. With regard to compassionate empathy, besides the genetic component this side of empathy seems to be very sensitive to nurturing experiences which might make it the most malleable side of empathy. We will further discuss in which conditions the emotion of empathic concern is evoked and how it relates to altruistic behavior.

5. Empathic concern and altruistic motivation

As mentioned at the start of Section 3, emotions have the power to trigger motivational states. In the context of altruistic behavior, such an emotion is empathic concern, as it triggers altruistic motivation (Batson, 2011).

5.1. Empathic concern

Empathic concern is the emotion triggered by the perceived need of another person. For this emotion to arise, there are two fundamental conditions that have to be met. First, an individual has to have the ability to understand that another person is in need. And second, he must value the welfare of the other individual (Batson, 2011).

HOMOECONOMICUS MEETS HOMOEMPATRICUS

As an illustration, we could think of it as an appraisal model of emotion felt for the other person, where the concerned welfare is the one to another person, and the critical change in the environment is mirrored by the threat of other person's wellbeing. In short, the appraisal model of emotion says that a change in a person's environment is being appraised, thus its possible effect on the wellbeing of the self is being assessed. Moreover, based on this appraisal, if for example a treat is perceived an emotional response will emerge which puts in motion behavior (for further reading on emotion appraisal we refer the reader to [Frijda, 2006](#)).

Note that because this emotion is tied to another person's situation, the empathic concern felt will have the same positive or negative valence as the emotional state of the person in need. For example, it will have a negative valence if the person in need is scared, afraid or in pain ([Batson, 2009](#)).

We can say that empathic concern is the force which puts in motion altruistic motivation ([Batson, 2014](#)). However, before moving on discussing the concept of altruistic motivation, let us underline the role cognitive, affective, and compassionate empathy play here.

We believe that in order to understand the need of another person, one has to make use of cognitive empathy. Once the cognitive empathy is sufficiently high for an individual to understand the need, and if compassionate empathy sets a positive value on the welfare of the other, empathic concern is going to be felt which will put in motion the altruistic motivation to benefit the other. Where empathic concern is only one of the different emotions that are part of affective empathy.

5.2. Altruistic motivation

[Batson \(2011\)](#) defines altruistic motivation as: "*a motivational state with the ultimate goal of increasing another's welfare*" (p. 20).

Some of the characteristics of this definition worth emphasizing are captured in word choice. "*Motivational state*" implies more than just a motivational drive or an impulse, while "*ultimate goal*" draws the attention to the persistence of this state, such that it does not stop with the first obstacle raised, but will look for alternative ways to reach the goal. And finally, "*increasing another's welfare*" is used to distinguish the altruistic motivational state from the egoistically motivated one, which would have implied that the ultimate goal would have been to increase own welfare.

It appears that empathic concern has the ability to evoke a very enduring, if we can say so, motivational state which is goal driven and aims at benefiting another person.

5.3. Altruistic behavior motivated by altruistic motivation

As mentioned in the introduction, we now have valuable evidence that part of the altruistic behavior is egoistically motivated; supportive evidence that the altruistic behavior is motivated by the conscious or unconscious desire to benefit the self ([Zahavi & Overgaard, 2014](#)).

Through a clever design, research from social psychology shows that when controlling for egoistic motives - e.g. aversive arousal reduction, fear of punishment or reward - there is still a significant number of participants who are going to behave altruistically, if their empathic concern has been induced ([Batson, 2011](#)). These results bring supportive evidence to the idea that empathic concern is a powerful fuel for altruistic behavior.

For now, let us use the relation between high empathic concern scores and altruistically motivated behavior to design our model. Through this, we aim to introduce the altruistic motivation into economics experiments alongside the existing egoistic motives. Next, we present some of the economics models and studies about altruistic behavior.

6. Current approach to the study of altruism in economics

Given the fact that altruistic behavior motivated out of concern for another is "a phenomenon ... alien to economics" ([Wilkinson & Klaes, 2012](#), p. 422) it is difficult to make a pertinent

HOMOECONOMICUS MEETS HOMOEMPATRICUS

comparison with what has been done in relation to it in the field of economics. However, it is worth exemplifying a few significant differences.

For instance, in economics altruistic behavior has been captured through self-interest models, due to their simplicity. Furthermore, all factors used in economics models have to be in some way incorporated into a person's utility (Wilkinson & Klaes, 2012).

In the economics research, altruistic behavior falls under the branch of Social Preferences and several models have incorporated it as other regarded preferences which can be explained in terms of inequity aversion and reciprocity (Fehr & Schmidt, 2000). Andreoni and Miller (2002) on the other hand argue that unselfish and altruistic behavior are rational behaviors which can be modelled using the general axiom of revealed preferences. Although both approaches to altruistic behavior are interesting and insightful, they differ in the perspective they take on this type of behavior. Both present the behavior from the perspective of a static individual characteristic or preferences, while we are presenting it as context dependent behavior.

Furthermore, neither makes the clear distinction between the underlying motivation for altruistic behavior. For our analysis, the distinction between egoistic and altruistic motivation is fundamental.

Winter et al. (2013) introduce a very new and interesting idea, of rational emotions and mental equilibrium, in which emotionality is presented as a utility over non material interests in addition to the material and selfish preferences of the individual. This mental state is being used to maximize the selfish interest of an individual. Although we focus heavily on emotions in our analysis, we do not approach emotions as a rational state induced through cognitive reasoning, but rather as an automatic powerful reaction to a change in the environment over which a person has very little control.

In sum, in comparison to the current approach to the study of altruistic behavior in economics, we present altruistic behavior contingent on an empathy evoking event rather than as a personal stable preference. Furthermore, we introduce emotions as powerful instinctive drivers of behavior rather than as means to a conscious and well thought goal. Moreover, we make a clear distinction between egoistic and altruistic motives, without excluding the possibility of a benefit for the self, resulted from engaging in altruistic behavior, such as for example "warm glow" (Andreoni, 1990).

7. The empathy based model

7.1. Variables choice and measurement

In this section we briefly present the variables used in our model and suggest possible ways to measure them. Note that these tools used to measure the variables should be seen as means to an end, which enables us to obtain an approximate value for cognitive and compassionate empathy. Nevertheless, our model can be interpreted in more general terms.

7.1.1. Cognitive empathy

As a measure for cognitive empathy we propose the use of Dziobek et al. (2006) Movie for the Assessment of Social Cognition (MASC). Measuring cognitive empathy using MASC implies letting participants watch for 15 minutes a movie which depicts a social encounter between multiple individuals (a social gathering). During this period the video is stopped 46 times and participants are asked questions regarding the intentions and the mental and emotional states of the actors. The answers are recorded and compared to a standardized answer key (Dziobek et al., 2006).

For our variable, cognitive empathy (y), we propose to standardize the answers. For this reason, we will have:

$$y \in [0,1]$$

HOMOECONOMICUS MEETS HOMOEMPATHICUS

7.1.2. Compassionate empathy

Compassion can be measured using The Compassionate Love Scale (CLS) developed by Sprecher and Fehr (2005). This is a self-report questionnaire using a seven point Likert Scale. However, as most self-reports addressing the moral side of human behavior, such measure might be subject to social-desirability bias (Hardy, 2006; Arnold, & Feldman, 1981; Batson, 2011).

To measure our variable, *compassionate empathy*, we could use as proxy the CLS, normalizing the scores. This means that for *compassionate empathy* (x) we will have:

$$x \in [0,1]$$

7.1.3. Empathic concern

It is important for the reader to know that in order to measure empathic concern there must be some event, which concerns another person, to trigger it. This is because, as mentioned in Section 5.1, empathic concern is an emotional response to the needy situation of another person (Batson, 2011). To achieve this emotional arousal in laboratory, we suggest to expose the participants to a narrative text. It has been found that narrative texts have the potential to evoke empathic feelings (Koopman & Hakemulder, 2015). In addition, it has been previously used successfully for this purpose (Batson et al., 1995).

To measure the intensity of empathic concern as evoked by the narrative text we suggest the use of a questionnaire based on Gough Adjective Check List (Batson, et al. 1983; Batson, 2011). The questionnaire uses six adjectives describing empathy, which the subjects will have to rate on a seven points Likert Scale (Barbu, 2015).

For the purpose of our analysis, *empathic concern* (z), must also be normalized. Thus we will have:

$$z \in [0,1]$$

7.2. Assumptions

Let us consider for now, three possible functions for our model which we will separately analyze further:

$$f(x, y) = \frac{x+y}{2} \quad (\text{E1})$$

$$g(x, y) = \min\{x, y\} \quad (\text{E2})$$

$$h(x, y) = xy \quad (\text{E3})$$

$$f, g, h: [0,1] \times [0,1] \rightarrow [0,1]$$

Before illustrating the specific choice of our model, let us consider for now our model as being defined by the general function:

$$p(x, y) \\ p: [0,1] \times [0,1] \rightarrow [0,1],$$

such that we can use it to pinpoint our assumptions and check which model meets them.

First, for empathic concern to exist - to be larger than zero - both cognitive and compassionate empathy, as defined in the paper must exist, thus must have a value larger than zero.

$$p(x, y) = 0 \Leftrightarrow x = 0 \text{ or } y = 0 \quad (\text{A1})$$

Second, given the fact the cognitive and compassionate empathy can influence each other, we assume that there exists an interaction between the two variables. This interaction translates into the fact that, to a certain extent compassionate and cognitive empathy can be substituted, such that for example, more cognitive empathy can substitute for a bit less compassionate empathy, albeit the cognitive empathy needed to compensate grows the more compassionate empathy is missing. In economics terms, this implies that the marginal rate of substitution (MRS) between the two variables is diminishing. Furthermore, the MRS is always larger than zero in absolute terms. Where the marginal rate of substituting cognitive empathy for compassionate empathy is defined as:

$$MRS_{y,x} = -\frac{dx}{dy} = \frac{\frac{\delta p(x,y)}{\delta y}}{\frac{\delta p(x,y)}{\delta x}} > 0$$

$$\frac{\delta MRS_{y,x}}{\delta x} < 0 \tag{A2}$$

7.3. Illustrating the model choice by comparing it with possible alternative models

In this section we will go through several models giving arguments why some, although might seem suitable, are not the best fit to capture the relation between our variables. We start by looking at a linear relationship (perfect substitutes), then we consider the case of perfect complements and finally we look at the product function.

7.3.1. Perfect complements: $f(x, y) = \frac{(x+y)}{2}$

Here, we consider the first of the three functions introduced in Section 7.2. Figure 1 shows the plane of the function which maps empathic concern as the average of cognitive and affective empathy. Thus the function is:

$$f(x, y) = \frac{x+y}{2} \tag{E1}$$

Figure 1 Empathic concern scores defined by the function $f(x,y)$

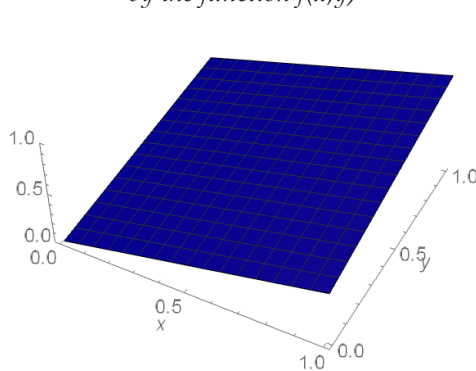
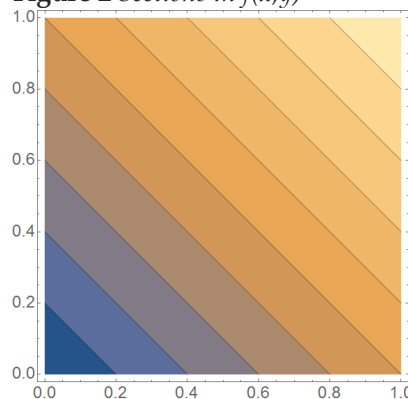


Figure 2 Sections in $f(x,y)$



In Figure 2, with x defined on the horizontal axis and y on the vertical axis, we illustrate several section in the function's plane. Each line traces the combination of cognitive and compassionate empathy for which the level of empathic concern stays unchanged. As it can be easily noticed our first assumption (A1) does not hold, as for example we can reach a level of empathic concern larger than zero even when either cognitive and compassionate is zero.

To illustrate let, $x = 0$ and $0 < y \leq 1$ then we have:

$$f(x, y) = \frac{y}{2} > 0 \tag{E1.1}$$

Alternatively, if $y = 0$ and $0 < x \leq 1$, then:

$$f(x, y) = \frac{x}{2} > 0 \tag{E1.2}$$

From (E1.1) and (E1.2) we see that (A1) does not hold. This model, implies that, although cognitive empathy does not exist we would still have an individual with an average level of empathic concern. However, as discussed in Section 4, based on literature (Baron-Cohen, 2012) these cases do not exist in practice.

The linear model fails to satisfy the second assumption as well. From Figure 2, we can see that the slope of the line is one, thus the MRS between x and y is also one. This means that for each unit decrease (increase) in cognitive empathy we can substitute it with one unit of compassionate empathy and obtain the same level of empathic concern. This is valid across the entire plane. To illustrate we know that the $MRS_{y,x}$ for the linear function is:

$$MRS_{y,x} = \frac{0.5}{0.5} = 1 \tag{E1.3}$$

for all $x, y \in [0,1]$.

Further,

HOMOECONOMICUS MEETS HOMOEMPATICUS

$$\frac{\delta MRS_{y,x}}{\delta x} = 0 \quad (\text{E1.4})$$

As it can be seen from (E1.4), (A2) is not met as the marginal rate of substitution although positive in absolute terms is not diminishing.

7.3.2. Perfect substitutes: $g(x, y) = \min\{x, y\}$

In our analysis we have considered also the possibility that the effect of one of the variables would limit the effect of the other one, having some ceiling effect, so to speak. This would accommodate the findings according to which when cognitive empathy is zero there is no emotional response (Baron-Cohen, 2012) and that empathic concern does not exist when someone does not value the welfare of another (Batson, 2011). In this sense we choose a function which minimizes the values of the two variable:

$$g(x, y) = \min\{x, y\}, \quad \forall x, y \in [0, 1], \exists g: [0, 1] \times [0, 1] \rightarrow [0, 1] \quad (\text{E2})$$

Figure 3 shows the plot of our function. As we can see, although the function is a perfect fit for the extreme cases of zero cognitive empathy and zero compassionate empathy, meeting the requirements of the first assumption (A1), it fails to accommodate the interaction between the two variables required by the second assumption (A2). To illustrate this, we can look at Figure 4, with x on the horizontal axis and y on the vertical axis.

Figure 3 Empathic concern scores defined by the function $g(x, y)$

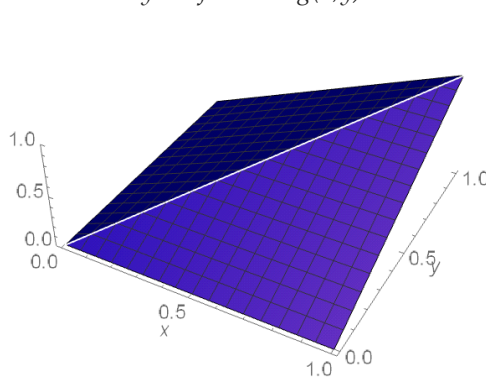
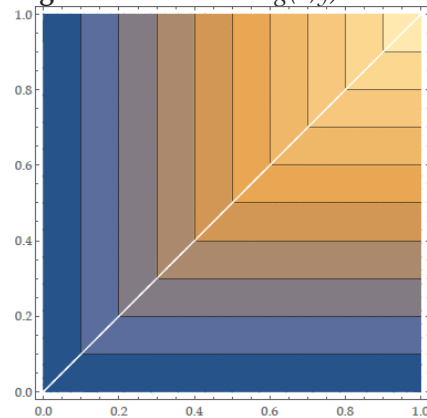


Figure 4 Section in the $g(x, y)$



The second assumption would require that the slope of the lines in Figure 4 would decrease as we move from a higher to a lower value of y while remaining positive. However, the slopes of the lines in Figure 4 are either zero or ∞ .

As an example, regardless of the contour line we choose, we see that to keep empathic concern at the same value the Δy will always be zero, regardless of the change in x . This will result in $MRS_{y,x}$ equal to zero, which is not in line with our second assumption (A2).

In sum, we have shown that the linear model (E1) fails to capture the relation between cognitive and compassionate empathy at zero, as well as the interaction between the two variables. The second model (E2), although it captures the relation between x and y , fails to capture the interaction between the two variables. Therefore, next we consider a model which is a compromise between these two models.

7.3.3. The product function: $h(x, y) = xy$

In this section we consider the function:

$$h(x, y) = xy, \quad \text{for } \forall x, y \in [0, 1], h(x, y): [0, 1] \times [0, 1] \rightarrow [0, 1], \quad (\text{E3})$$

represented below in Figure 5.

It can be easily noticed from the figure that this third function is a model in-between the previous two functions. However, it is important to verify whether it meets our assumptions.

We can do this algebraically as we did for $f(x, y)$. Thus, if $x = 0$ and $0 < y \leq 1$, then:

$$h(x, y) = 0 \quad (\text{E3.1})$$

Further, if $y = 0$ and $0 < x \leq 1$, then:

$$h(x, y) = 0 \tag{E3.2}$$

From (E3.1) and (E3.2) we see that if either x or y is zero the function h takes also the value of zero, therefore our first assumption (A1) is met.

Figure 5 Empathic concern scores defined by the function $h(x,y)$

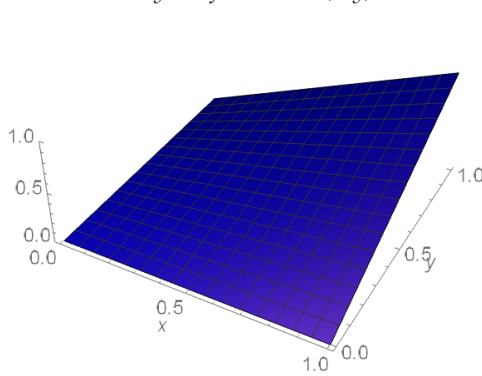
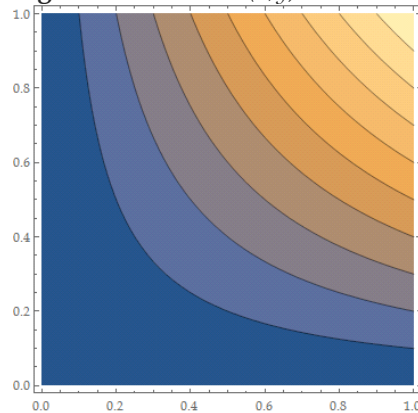


Figure 6 Section in $h(x,y)$



To test the second assumption, we take the same approach as with the previous two models and we will look at the sections of the plane, depicted in Figure 6. We have compassionate empathy on the horizontal axis and cognitive empathy on the vertical axis.

It is easy to notice the slopes of the lines are decreasing. To illustrate, we know:

$$MRS_{y,x} = \frac{\frac{\delta h(x, y)}{\delta y}}{\frac{\delta h(x, y)}{\delta x}}$$

which for the product function is:

$$MRS_{y,x} = \frac{x}{y}$$

As it can be noticed, the closer x gets to zero, the larger y must become, in order for the function $h(x,y)$ to remain at the same level. Furthermore, although the $MRS_{y,x}$ is decreasing - as indicated also by the convex shape of the contour lines - it remains larger than zero. Thus, this function of empathic concern fits both assumptions with regard to the relation between cognitive and compassionate empathy.

From the perspective of our analysis, however, it is important to stress that the function is well-behaved. The monotonicity - indicated by the decreasing MRS - and the convexity - indicated by the MRS larger than zero - tells us that as we move up and to the right of either contour line we are on a higher level of empathic concern.

In sum, this third model mapping empathic concern scores as a product of cognitive and compassionate empathy scores, is well suited for the purpose of our analysis as it meets our two primary assumptions. Furthermore, the model is simple and tractable, which makes it intuitively appealing, with a functional form easy to analyze. Moreover, as we will see further, the model enables us to understand the dynamics of empathic concern as shaped by compassionate and cognitive empathy.

We acknowledge that the simplicity of the model fails to capture the precise relation between cognitive and compassionate empathy in relation to empathic concern, and that a generalized model has the potential to accommodate these dynamics in more detail. This will be relevant in regard to the claims according to which cognitive empathy is less important in altruistic behavior, or that it is less malleable (Edele et al., 2013; Pecukonis, 1990; Light & Zahn-Waxler, 2014). However, until further research allows us to understand better to what extent one variable plays a more important role than the other in altruistic behavior, we believe that the simplified model suffices for our analysis.

HOMOECONOMICUS MEETS HOMOEMPATRICUS

In this sections, we have seen that although treating cognitive and affective empathy either as complements or substitutes might explain one of our two assumptions, neither approach met both of them. However, when considering the product of the two we were able to find an intermediate fit which met (A1) and (A2). Further, we will look at function $h(x, y) = xy$ in more detail and we will discuss how it relates to altruistic behavior in DG.

8. Two motivations for altruistic behavior

In the context of altruistic behavior in DG we can see offers made by proposers to receivers as a measure for altruism. Furthermore, to analyze the implications of our model we can take a stepwise approach.

First, in order to see whether the empathy manipulation was successful we could compare the average contributions in the control group with the average contributions in the empathy treatment. Empathy treatment would be the condition of the experiment in which participants have been exposed to an empathy evoking event.

Second, if empathy manipulation was successful, we can verify whether our function adequately captures the relation between x and y . Therefore, in this section we will illustrate how to test the predictive power of our model.

In the following subsection we will discuss each step, after we first set a brief experiment design to define the context of our analysis.

8.1. Outline of the experiment design using DG

DG is the most common and simple way to test altruistic behavior. Reason for which we will use it in our experiment design.

Foremost, we suggest the selection of a homogenous sample in terms of gender, age, occupation, education, nationality, relationship status, income or any other criteria that might have an influence on the participants' general emotional state.

We suggest to divide the experiment in two sessions. A morning and an afternoon one. In the morning session, participants will be administrated the MASC and the CLS as well as other personality inventories (questionnaire used to assess personality) such as for example The Five Trait Factor, also known as "Big Five" (Goldberg, 1992). The additional questionnaires serve the purpose of distracting the participants from the actual goal of the study.

In the afternoon session, participants will be randomly assigned to two conditions: control and empathy treatment. The control group will play a classical DG phrased as a decision making experiment, in which each participant - all playing the role of proposers - receives a certain amount to divide between themselves and the receiver.

The participants in the empathy treatment - all but one playing the role proposers - will first have to read a narrative text, describing a personal experience of the receiver. Alternatively, they could watch a short video of the receiver narrating the event. After they have read the text or watched the video, they will have to fill in the questionnaire described in Section 7.1.3. After this, they will play the DG exactly the same as the control group.

As it can be noticed, virtually all participants are playing the role of proposers in both conditions. It is important that, without deceiving, this information will be withheld from the proposers, such that their decisions are not influenced by their expectation about the overall amount the receiver might accumulate. Nevertheless, there is a chance that they will suspect what the real scenario is, which can produce noise in the data.

Alternatively, the receiver could be chosen from a disadvantaged socio-economic group, such that the larger amount of money he/she might end up with in comparison to the average proposer might not be perceived as a significant issue.

The receiver is going to be one real person, the same for all participants and he or she will know upfront his/her role in the experiment. This is necessary in order to develop before

HOMOECONOMICUS MEETS HOMOEMPATRICUS

the experiment, the narrative text about the receiver, in accordance with the literary and content requirements.

The narrative text should be written in such way that it does not carry additional unnecessary information that might influence proposers' decisions. For example, it should be avoided to include information about economic status of the receiver or his/her plea to fairness or morals. This is necessary because, this type of communication per se has been found to have an effect on proposers' contributions (Andreoni & Rao, 2011), which in our case might create noise in the collected data. For an example of empathy evoking text, we refer the reader to Batson et al. (1995).

It is important to emphasize that the particularities of the experiment design in respect to the dynamics between proposers and receiver are rather sensitive. This is partly due to the specific functioning of empathic concern. It is necessary that the empathy manipulation has at its core the receiver, in order for the proposer's empathic concern evoked to be felt for the receiver.

A work around the proposers-receiver dynamics could be, if possible, to run the experiment within a group which openly supports a certain cause or belongs to a certain club. For example, take the case of a large non-profit organization that helps disadvantaged children to travel to school or members of a football club. The sample of the experiment could be chosen from one such restrained set. In this case all participants, members of the organization or the club, will be the proposers and the receiver will be the corresponding organization that will represent one particular affiliated individual.

Of course, with this setting the interpretation of the results will slightly change, in the sense that now we will study the effect of empathic concern on altruistic behavior, given the fact that the participants already showed a preference for supporting a certain cause. Nevertheless, we can still test whether empathic concern has an effect on altruistic behavior.

On an end note, we want to emphasize that double blinded procedure should be the way to go when designing the experiment. This will reduce the noise that might be created in the data by fear of punishment (Batson, 2011) or signaling (Millet & Dewitte, 2006). An example of fear of punishment would be when the proposer fears that the experimenter will think badly about him/her if he/she will not offer anything or a certain amount. Fear of punishment, also applies internally, when someone knows it will feel unpleasant if it will not offer a certain amount to the receiver. Signaling theories argue that engaging in altruistic behavior is a costly way of transmitting information about the self.

In this section, we outlined an experiment design using DG and empathy manipulation to test our model, while stressing the importance of a homogenous sample and a double blinded procedure. However, clever experiment designs could further consider other aspects such as for example giving the participants an easy way out. As an illustration in previous experiments (Dana et al., 2006) participants have been given the option to pay a small amount and exit the experiment, in order to avoid making the actual decision. These small adjustments would clear the data from possible noise resulted from altruistic behavior motivated by egoistic motivation. We next show how the amount offered in DG can be defined as a function of egoistic and altruistic motivation.

8.2. Altruistic behavior in DG as a function of egoistic and altruistic motivation

Just as a reminder, we argued that altruistic behavior can be egoistically or altruistically motivated. Further, these motivational states are put in motion by emotions, which when they are stronger (the measured level is high) have stronger effects on behavior in comparison with when they are weaker or non-existent. For this reason we suggest using emotions as proxy for motivation.

Now, we know that the emotion generating altruistic motivation is *empathic concern* (z). Further, let us assume that the existing egoistic motivation is put in motion by another

HOMOECONOMICUS MEETS HOMOEMPATRICUS

emotion which we will call for simplicity *self-concern* (w). If we see proposers' offers in DG as a measure of altruism, this will mean that the observed offers (A_{DG}) – the altruistic behavior – can be explained in terms of the two emotions. Thus:

$$A_{DG} = f(w, z) + \varepsilon$$

For the purpose of our analysis and in order to better illustrate the application of our model, we introduce here a new strong assumption, namely that self-concern is zero.

$$w = 0 \tag{A3}$$

In experiments, egoistic motivation can be substantially diminished with a well thought experiment design as we illustrated at the end of the previous section. Thus, although the assumption is strong to some extent it can be met in practice. Therefore, given the third assumption, we now have:

$$A_{DG} = f(z) + \varepsilon$$

8.2.1. Altruism comparison between the two conditions of the experiment

In experiments, people behave differently than in real life situations, because usually, economics laboratory experiments are carried in a neutral emotional environment, while in real life a person's environment exposes the individual to an array of emotions.

In this sense, we expect the average altruistic behavior of the participants to differ significantly between the two conditions. Such that:

$$\begin{aligned} \bar{A}_{DG}^C &< \bar{A}_{DG}^T & \text{(P1)} \\ \bar{A}_{DG}^C &= \frac{1}{n} \sum_{i=1}^n \bar{A}_{DG_i}^C \\ \bar{A}_{DG}^T &= \frac{1}{n} \sum_{i=1}^n \bar{A}_{DG_i}^T \end{aligned}$$

where:

\bar{A}_{DG}^C – average altruism in control

\bar{A}_{DG}^T – average altruism in empathy treatment

n – number of participants in each condition

This will illustrate the effect of changing the environment of the participants from neutral to empathy evoking. Furthermore, it will show not only that there is an effect, but also the directionality of the effect. We expect an increase in the average contributions when we move from control to empathy treatment. Based on previous research (Batson, 2011) we are confident that a significant result at this point will also indicate the success of the narrative text in evoking empathic concern.

If empathy manipulation is successful, we can move to the next step and analyze the accuracy of our model and of the tools used to measure x and y .

8.2.2. Empathic concern as the product of compassionate and cognitive empathy

As illustrated in Section 7.1, we have the opportunity to roughly measure all three dimensions we are considering in our model, at least for the participants in the empathy treatment condition. For this reason, our second task is relatively easy. The measure used for empathic concern has been successfully employed previously, therefore we suggest to use it as a reliable indicator of empathic concern levels.

Suppose we have:

z_i – the empathic concerned level measured for participant i

x_i – the compassionate empathy level measured for participant i

y_i – the cognitive empathy level measured for participants i

We create a new variable m_i , such that:

$$m_i = x_i y_i$$

m_i – the product of cognitive and compassionate empathy scores for participant i

Using econometrics we can estimate the model:

$$\hat{z}_i = \beta_1 + \beta_2 m_i \tag{R1}$$

HOMOECONOMICUS MEETS HOMOEMPATICUS

If MASC and CLS are a good measure for y and x , and if our interpretation of the relation between the three variables is correct, we would expect the regression to have a good fit, indicated by a large R-squared. Furthermore, we expect the value of β_2 to be fairly close to one. In more specific terms, the hypotheses we would test would be:

$$\begin{aligned}H_0: \beta_2 &= 0 \\H_A: \beta_2 &> 0\end{aligned}$$

Note that our hypothesis only tells us that there is an effect and that the effect is positive. However, based on how confident one is about the measures of cognitive and compassionate empathy, the testing can be done more specifically. Such that, instead of choosing zero and doing a one sided test to see whether there is a positive effect, one could do a one sided test with a preferred valued between zero and one.

Alternatively, we could take a more general approach and compare the averages of z_i and m_i . Note, that here we will want the test not to be significant, as our goal is to have on average two groups with similar scores of empathic concern. The hypotheses we would test is:

$$\begin{aligned}H_0: \mu_z &= \mu_m \\H_A: \mu_z &\neq \mu_m\end{aligned}$$

Where:

μ_z - the mean of the population scores for empathic concern measured using the questionnaire mentioned in Section 7.1.3

μ_m - the mean of the population scores for empathic concern measured as a product of the scores obtained for cognitive and compassionate empathy

If the result obtained in this section is encouraging, we can take the next step and analyze the relation between the offers made in DG and empathic concern as a function of cognitive and compassionate empathy.

8.2.3. Altruistic behavior and empathic concern defined as a function of cognitive and compassionate empathy

In general terms we have,

$$A_{DG_i} = \beta_3 + \beta_4 x_i + \beta_5 y_i + \beta_6 x_i y_i + \varepsilon_i \quad (\text{R2})$$

This relation will tell us how much higher the offers are when empathic concern increases by one unit while keeping constant cognitive empathy (and vice versa). Specifically, the effect of y (or x) depends on x (or y). For example, the marginal effect of compassionate empathy on offers will be:

$$\frac{\delta A_{DG}}{\delta x} = \beta_4 + \beta_5 y$$

If we would estimate (R2), we would expect the resulting coefficients ($\beta_4, \beta_5, \beta_6$) to be significantly larger than zero. Further, if we look at the marginal effect of compassionate empathy on offers we see that the value of the partial derivative increases as cognitive empathy increases. This makes intuitive sense, as a person with higher cognitive empathy might offer more due to his/her better ability to understand the need of another.

It is important to point out that the relation between altruistic behavior and empathic concern is unidirectional, in the sense that empathic concern does explain partly altruistic behavior, although altruistic behavior does not necessary indicates the existence of empathic concern. This should not be surprising, given the fact that as we argued previously altruistic behavior can be motivated egoistically.

As a side note, we have presented the model in the form of a simple OLS regression. However, in a practical setting, the testing and the model chosen should be the one that fits the best the distribution of the data. For example, given the fact that the offers in DG are censored, Tobit is a better model. Furthermore, if the sample is small or the data is not normally distributed non-parametric test for significance should be used.

HOMOECONOMICUS MEETS HOMOEMPATHICUS

Going back to the main text and assuming the model from (R2) is a good fit for the altruistic behavior, we can conclude that this last model successfully captures the relation between altruistic behavior in DG in the form of the offers made by the proposers to the receivers and the levels of empathic concerns expressed as a function of cognitive and compassionate empathy.

9. Discussion and limitations

We have named our paper *Homoeconomicus meets Homoempathicus* and proposed a model that enables us to account for the altruistic motivation of behavior directed towards benefiting another. To our knowledge, it is not a common practice to tie emotions to behavior in the way we suggest, however if the relation between an empathy evoking event, empathic concern and altruistic behavior can be represented in this well-behaved and systematic way, we would have to consider the implication of such behavior in terms of utility maximization.

We start with the idea that our feelings of empathic concern lead to a merging of the interests of the self with the interest of another, and we will explain why this is different than the case in which an individual maximizes utility in a more neutral emotional state.

Let us take the example of an experiment using DG. In a neutral emotional state, the proposer will maximize utility, as predicted by the economics theory. Thus, based on his/her preferences he/she will maximize utility dividing the amount received from the experimenter between himself/herself and the receiver.

Now, when the context changes and the proposer has been induced to feel empathy for the receiver, the dynamics between the two individuals change completely. Actually, the demeanor of the proposer has changed. He switched from being motivated to maximize own utility to being motivated to find a way that maximized the utility of both, the self and the receiver. This idea might be hard to grasp in economics, nevertheless as illustrated previously in the text, psychology research indicates that to say the least this is not an unrealistic scenario.

Without the intention to come across as presumptuous, we would like to briefly consider some possible implication of our model with respect to Prospect Theory (PT) ([Kahneman & Tversky, 1979, 1981](#)), albeit we understand that due to the novelty of the topic, this part is speculative and further research could shed more light on the relation between empathic concern and prospect theory.

If we consider again the example of the classic DG with the receiver and the proposer having their reference point, which can be the same or different, the proposer will maximize utility based on his preferences. Now, before moving to the empathy manipulation context, we would like to outline the effect of the empathy evoking episode on the motivational state of the proposer.

The narrative text for example, we said that serves the purpose of evoking empathic concern. To do this, the text (or the empathy evoking event in general) must draw the attention to the needy or disadvantaged situation of the receiver, thus must signal to the proposer that the receiver is in need. Now, as previously mentioned, if the need is understood and the welfare of the receiver is valued, empathic concern will be evoked.

What empathic concern does is to create a motivational state, within the proposer, directed to redress or prevent the jeopardizing of the receiver's wellbeing. We only discuss here the first case in which the proposer tries to redress the situation.

To apply this to PT, let us consider from the perspective of the proposer that both participants are having their reference point on the domain of gains. Now, the empathy evoking episode signals to the proposer that the receiver's wellbeing has been damaged due to an event independent of the proposer's actions. Therefore, the proposer perceives the receiver's reference point as moved to the left, thus he incurred a loss. In a way, one could argue that the empathy evoking event has produced a change in the proposer's expectations about the receiver's situation (see also [List, 2007](#)).

HOMOECONOMICUS MEETS HOMOEMPATHICUS

Empathic concern will motivate the proposer to want to do something about it. He will try to remedy the situation, by behaving altruistically. Of course, in the context of DG the way to do that will be by making a positive offer to the receiver. How this offer is made, might depend on the difference in marginal utilities derived from one having one extra unit of cash of the two agents, and on how the proposer evaluates these differences.

Interestingly, this kind of analysis can be done for various scenarios. For example, one could argue that the proposer will incur a loss if will make any positive offer, as he/she might feel right away entitled to the amount given to divide (see [List, 2007](#)). However, regardless of the scenario, it might be possible to interpret proposer's behavior in terms of how he perceives these differences in the marginal utilities.

Furthermore, we know that on average higher the empathic concern of the proposer, higher his altruistic behavior is expected to be. This information can be interpreted in different ways. For example, can we see altruistic behavior motivated by empathic concern as an indication of how worse off the receiver is perceived in comparison with the proposer? Or, is the proposer's altruistic behavior meant to offset only the perceived loss? For example, if we were to estimate the loss incurred by the receiver as estimated by the proposer to be equivalent to seven monetary units, and we assume the proposer has a score of empathic concern of one, will the proposer make an offer of seven monetary units? We believe that this might be the case, however preferences, such as for example inequity aversion (Fehr & Schmidt, 2000) might also play a role as well.

In fact, the altruistic behavior motivated by empathic concern seems to be done in an efficient way; the behavior being subject to a cost benefit analysis ([Batson, 2011](#)). This will suggest that for example, in a DG that if the proposer believes that the receiver is as happy with 10 euros as he/she is with 5 euros, he/she will offer the 5 euros. Anyhow, the ideas discussed so far might be interesting to explore with further research.

With regard to using financial incentive contingent on the task, it has been argued that this might actually negatively affect performance ([Benabou & Tirole, 2003](#)). Furthermore, neglecting behavior motivation can have serious implications. [Fehr and Falk \(2002\)](#) said:

"Neglecting these motives creates the serious risk that economists may not understand the levels of performance and the changes in performance that are induced by changes in incentives" (p. 516)

We believe that being able to anticipate how an event might influence people's emotions and what is the potential behavior they will engage into in response to the event, might provide an extreme advantage compared with the current view, because it enables us to get a better understanding of how behavior is motivated.

Take for example the current immigrants/refugees crisis in Europe. Are Europeans perceiving the overflow of immigrants as a threat to themselves or do they see it as a situation in which the wellbeing of the immigrants is at great risk? Furthermore, do Europeans value the welfare of the immigrants? Let us assume for a moment that Europeans feel that the threat to themselves is greater than the threat to the immigrants, albeit they place value on the immigrants' welfare. This might prevent them from sympathizing or feeling empathic concern towards the refugees. Naturally, this can cause tension in the European society.

Please note that we use the example of the immigrants as an illustration without trying to say that either part should feel in a certain way. It is important to highlight that the example can be reversed, and the same reasoning can be applied for the immigrants, our choice of Europeans as the main subject being just random.

Now, as a European government you anticipate the emotional response of the population and you take measures to deal with it in a way that diminishes the possible frictions it might create.

A very important application for empathy based altruism relates to aggression. Compassion training programs, such as the ones named earlier in the text, as well as programs

HOMOECONOMICUS MEETS HOMOEMPATRICUS

focused on manipulating affective and cognitive empathy (Pecukonis, 1990) can be used to decrease aggression.

Observing behavior and making inferences about the motives behind it has been an incredibly useful approach to study and understand why we might behave in certain way. However, the study of emotion and motivation is providing us with the information we need to zoom in on the topic of human behavior, such that we can measure, anticipate, and probably manipulate the drivers of behavior: the emotional responses.

We are aware that in the experiences we encounter in real life, people deal with multiple emotions at once. Furthermore, we know that a person can feel different motivations at once (Reeve, 2008), the one eventually driving behavior being the most intense one (Batson, 2011). Our model only focusses on one emotion without taking into consideration how empathic concern might interact with other emotional states a person might experience.

We would also want to point out that we discussed the three sides of empathy and we have considered the possibility of affective empathy to be genetically predetermined. Furthermore, we looked specifically at empathic concern, one of the various possible emotions from the spectrum of affective empathy, which can also include feelings of joy and happiness for the success of another person. However, in our paper we did not elaborate on how genetics might limit the extent to which an individual is capable to feel empathic concern. Naturally, a more complex model could capture this aspect.

Whilst our model does capture the altruistic behavior when participants are exposed to an empathy evoking situation, we do not account for the general altruistic behavior observed in DG. We believe that once we understand how to measure egoistic motivation, we might be able to explain as well altruistic behavior egoistically motivated. Nevertheless, it is possible that there is a natural tendency for some individuals to be more empathic than others (Monroe, 1998; Oliner & Oliner, 1988).

10. Conclusions

We started the present paper explaining the important role emotions play in motivating behavior. Given the fact that empathy is the mechanism behind altruistic behavior we dissected it and discussed separately its three components and their relation to empathic concern, the emotion behind the altruistically motivated behavior. Furthermore, we tied empathic concern to altruistic behavior, after which we illustrated the choice of our model by comparing it with two other possible choices. Once we defined our model, we outlined an experiment design using DG which can be used to test the model. Further, using econometrics analysis we showed practically how our model can be tested. In the end we briefly illustrated how this model can be used to gather data which can be used to estimate possible behaviors put in motion by emotion.

Our approach encourages studying behavior, departing from the emotion that motivates the behavior. In the case of altruistically motivated behavior, empathic concern can be used to anticipate to what extent people will behave altruistically when their environment induced them to feel empathic concern. This is interesting, not only because it has the potential to be generalized to other emotions and the associated behavior, but also because it enables us to design better incentives in order for us to obtain the outcome we desire.

It is important to underline that our model is simple and the relation between emotions, motivation and behavior can be fairly complex. For this reasons, further research and new findings about the relation between the intensity of emotions and motivations could help shaping a more suited and better fitted model.

Acknowledgements

We would like to thank Christel Lutz, Daniel C. Batson, and Simon Baron-Cohen for the valuable information they have provided us with on the topics of human motivation, empathy based altruism, and cognitive and affective empathy, albeit the interpretation of these topics

HOMOECONOMICUS MEETS HOMOEMPATHICUS

as presented in the paper reflects our own understanding and we are accountable for the statements and the ideas presented.

References

- Andreoni, J. (1989). Giving with Impure altruism: Applications to Charity and Ricardian Equivalence. *The Journal of Political Economy*, 97, 1447-1458.
- Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *The Economics Journal*, 100, 464-477.
- Andreoni, J., & Miller, J. (2002). Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism. *Econometrica*, 70, 737-753.
- Andreoni, J., & Rao, J. M. (2011). The power of asking: How communication affects selfishness, empathy and altruism. *Journal of Public Economics*, 95, 513-520.
- Arnold, H. J., & Feldman, D. C. (1981). Social Desirability Response Bias in Self-Report Choice Situations. *The Academy of Management Journal*, 24, 377-385.
- Barbu, A. (2015). *A Pilot Study of the Relation between Empathic Concern and the Amount Offered in Dictator Games*. (Unpublished Class Assignment). Erasmus University School of Economics, Rotterdam, Netherlands.
- Baron-Cohen, S. (2012). *Zero Degrees of Empathy: A New Theory of Human Cruelty and Kindness*. London: Penguin Books.
- Batson, C. D., O'Quin, K., Fultz, J., Vanderplas, M., & Isen, A. M. (1983). Influence of Self-Reported Distress and Empathy on Egoistic Versus Altruistic Motivation to Help. *Journal of Personality and Social Psychology*, 45, 706-718.
- Batson, C. D., Batson, J. G., Todd, R. M., Brummett, B. H., Shaw, L. L., & Aldeguer, M. R. (1995). Empathy and the Collective Good: Caring for the One or for the Others in a Social Dilemma. *Journal of Personality and Social Psychology*, 68, 619-631.
- Batson, C. D. (2009). These Things Called Empathy: Eight Related but Distinct Phenomena. In J. Decety, & W. Ickes (Eds.). *The Social Neuroscience of Empathy*. London: The MIT Press.
- Batson, C. D. (2011). *Altruism in Humans*. New York: Oxford University Press.
- Batson, C. D. (2014). The Empathy-Altruism Hypothesis: Issues and Implications. In J. Decety (Eds.), *Empathy: from bench to bedside* (pp. 41-54). Cambridge: MIT Press.
- Benabou, R., & Tirole, J. (2003). Intrinsic and Extrinsic Motivation. *The Review of Economics Studies*, 70, 489-520.
- Dana, J., Cain, D., & Dawes, R. (2006). What you don't know won't hurt me: Costly (but quiet) exit in dictator games. *Organizational Behavior and Human Decision Process*, 100, 193-201.
- Design, S. (no date). *The Ekman's Atlas of emotion*. Available at: <https://www.paulekman.com/atlas-of-emotions/#>
- Dziobek, I., Fleck, S., Kalbe, E., Rogers, K., Hassenstab, J., Brand, M., Kessler, J., Woike, J. K., Wolf, O. T., & Convit, A. (2006). Introducing MASC: A Movie for the Assessment of Social Cognition. *J Autism Dev Disord*, 36, 623-636.
- Edele, A., Dziobek, I., & Keller, M. (2013). Explaining altruistic sharing in dictator game: The role of affective empathy, cognitive empathy, and justice sensitivity. *Learning and Individual Differences*, 24, 96-102.
- Eliot, L. (2016). The Truth about Boys and Girls. *Scientific American Mind*, 25, 64-71.
- Ekman, P. (2007). *Emotions Revealed*. New York: St. Martin's Press.
- Ekman, P., & Dalai Lama. (2009). *Emotional awareness: Overcoming the obstacles to psychological balance and compassion. A conversation between the Dalai Lama and Paul Ekman*. New York: Henry Holt & Co.
- Fehr, E., & Schmidt, K. M. (2000). *Theories of Fairness and Reciprocity – Evidence and Economic Application*. (CESifo Working Paper 403) Retrieved from <https://www.econstor.eu/handle/10419/75882>

HOMOECONOMICUS MEETS HOMOEMPATRICUS

- Fehr, E., & Falk, A. (2002). Psychological foundations of incentives. *European Economic Review*, 46, 687-724.
- Frijda, N. H. (2006). *The laws of emotion*. New Jersey: Lawrence Erlbaum Associates.
- Goldberg, L. R. (1992). The Development of Markers for the Big-Five Factor Structure. *Psychological Assessment*, 4, 25-42.
- Goleman, D. P. (2006). *Emotional Intelligence: Why it can matter more than IQ*. 10th Edition. NY: Random House Publishing Group.
- Hardy, A. S. (2006). Identity, Reasoning, and Emotion: An Empirical Comparison of Three Sources of Moral Motivation. *Motiv. Emot.*, 30, 207-215.
- Halpern, J. (2014). Clinical Empathy in Medical Care. In Decety, J. (Ed), *Empathy: From Bench to Bedside* (pp. 109-130). London: The MIT Press.
- Izard, C. E. (1993). Four Systems for Emotions Activation: Cognitive and Noncognitive Processes. *Psychological Review*, 100, 68-90.
- Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47, 263-292.
- Kahneman, D., & Tversky, A. (1981). The Psychology of Preferences. *Scientific American*, 246, 160-173.
- Koopman, E. M., & Hakemulder, F. (2015). Effects of Literature on Empathy and Self-Reflection: A Theoretical-Empirical Framework. *Journal of Literary Theory*, 9, 79-111.
- Light, S., & Zahn-Waxler, C. (2014). Nature and Forms of Empathy in the First Years of Life. In Decety, J. (Ed), *Empathy: From Bench to Bedside* (pp. 109-130). London: The MIT Press.
- List, J. A. (2007). On the Interpretation of Giving in Dictator Games. *Journal of Political Economy*, 115, 482-493.
- Millet, K., & Dewitte, S. (2006). Altruistic behavior as a costly signal of general intelligence. *Journal of Research in Personality*, 41, 316-326.
- Monroe, K. R. (1998). *The Heart of Altruism: Perception of a Common Humanity*. United States: Princeton University Press.
- Nummenmaa, L., Hirvonen, J., Parkkola, R., & Hietanen, J. K. (2008). Is emotional contagion special? An fMRI study of neural system for affective and cognitive empathy. *NeuroImage*, 43, 571-580.
- Oliner, S. P., & Oliner, P. M. (1988). *The altruistic personality: Rescuers of Jews in Nazi Europe*. New York: Free Press
- Pace, T. W. W., Negi, L. T., Adame, D. D., Cole, S. P., Sivilli, T. I., Brown, T. D., Issa, M.J., & Raison, C. L. (2008). Effect of compassion meditation on neuroendocrine, innate immune and behavioral responses to psychosocial stress. *Psychoneuroendocrinology*, 34, 87-98.
- Pace T. W. W., Negi, L. T., Dodson-Lavelle B., Ozawa-de Silva B., Reddy S. D., Cole S. P., Danese A., Craighead L. W., & Raison C. L. (2013). Engagement with cognitively-based compassion training is associated with reduced salivary C-reactive protein from before to after training in foster care program adolescents. *Psychoneuroendocrinology*, 38, 294-299.
- Pecukonis, E. V. (1990). A Cognitive/Affective Empathy Training Program as a Function of Ego Development in Aggressive Adolescent Female. *Adolescence*, 25, 59-76.
- Reddy, S. D., Negi, L. T., Dobson-Lavelle, B., Ozawa-de Silva, B., Pace, t. W. W., Cole, S. P., Raison, C. L., & Craighead, L. W. (2012). Cognitive-Based Compassion Training: A Promising Prevention Strategy for At-Risk Adolescents. *Journal of Child Family Studies*, 22, 219-230.
- Reeve, J. (2008). *Understanding motivation and emotion*. 5th edn. Chichester, UK: Wiley, John & Sons.

HOMOECONOMICUS MEETS HOMOEMPATRICUS

- Sprecher, S., & Fehr, B. (2005). Compassionate love for close others and humanity. *Journal of Social and Personal Relationships*, 22, 629–651.
- Tomasello, M. (2014). *A natural history of human thinking*. Cambridge, MA: Harvard University Press.
- Zahavi, D., & Overgaard, S. (2014). Empathy without Isomorphism: A Phenomenological Account. In Decety, J. (Ed), *Empathy: From Bench to Bedside* (pp. 3-20). London: The MIT Press.
- Zaki, J., & Ochsner, K., N. (2012). The neuroscience of empathy: progress pitfalls and promise. *Nature Neuroscience* 15, 675-680.
- Wilkinson, N., & Klaes, M. (2012). *An introduction to Behavioral Economics*. 2nd edn. New York: Palgrave Macmillan.
- Winter, E., Luciano, M., Garcia-Jurado, I. (2013). Metal Equilibrium and Rational Emotions. Retrieved from http://www2.warwick.ac.uk/fac/soc/economics/intranet/calendar/eyal_winter.pdf