# Paradox of love and how religion seems to avoid it

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**Abstract** Analysis of the notion of love from the decision theory viewpoint has revealed paradoxical situations, when strong positive emotions about others can make people unhappy. Interestingly, many religious communities seem to avoid this negative effect. In this paper, we provide a possible explanation for this avoidance.

## 1 Formulation of the problem

**How decision theory describes our preferences: the notion of utility.** According to decision theory (see, e.g., [3, 4, 6, 7, 8, 9, 10]), preferences of a rational decision maker can be described by a function – called *utility* – that assigns a numerical value to each possible situation. This function is defined in such a way that we always prefer an alternative with the largest utility value.

**Utility also depends on others.** When we make decisions, we take into account not only how the decision will affect us, but also how it affects others. Since utility reflects our preferences, utility should also take into account the effect on others. In other words, the utility $u_i$ of each person is determined both:

- by this person's circumstances – we will denote this part by $c_i$ – and
- by the utilities $u_j$ of others.

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**How to describe the dependence of utility on others: first approximation.** In the first approximation, the dependence of $u_i$ on $u_j$ can be described by a linear function:

$$u_i = c_i + \sum_{j \neq i} a_{ij} \cdot u_j. \tag{1}$$

The corresponding coefficients $a_{ij}$ describe positive or negative empathy – i.e., in effect, degrees of love and hate:

**Case of perfect love.** In particular, a perfect Romeo-and-Juliet-type love means that the person $i$ cares about the person $j$ more than they care about themselves:

$$a_{12} = a_{21} > 1.$$

In this case, we have

$$u_1 = c_1 + a_{12} \cdot u_2 \tag{2}$$

and

$$u_2 = c_2 + a_{21} \cdot u_1. \tag{3}$$

**The above natural setting leads to a paradox.** Multiplying the equation (3) by $a_{12}$ and plugging in the resulting expression for $a_{12} \cdot u_2$ into the equation (2), we get

$$u_1 = c_1 + a_{12} \cdot c_2 + a_{12} \cdot a_{21} \cdot u_1. \tag{4}$$

Hence $u_1 \cdot (1 - a_{12} \cdot a_{21}) = c_1 + a_{12} \cdot c_2$, and

$$u_1 = \frac{c_1 + a_{12} \cdot c_2}{1 - a_{12} \cdot a_{21}}. \tag{5}$$

So, even when $c_i > 0$ – i.e., when circumstances are perfect – for $a_{12} = a_{21} > 1$, we get $u_1 = u_2 < 0$ – i.e., both are unhappy. And when $a_{12} = a_{21} \approx 1$, this unhappiness can be as large as possible; see, e.g., [1, 2, 5, 8].

It is worth mentioning that this is not just a mathematical trick: Romeo and Juliet are just one of the many examples of how great love can leads to tragic unhappiness.

**What if we have several people feeling good about each other?** The situation is even worse if we consider $n$ people feeling good each other, with some $a_{ij} = a > 0$. If circumstances are similar, i.e., if $c_1 = \ldots = c_n = c$, then, due to symmetry, all utilities are the same $u_i = u$. So, the equation (1) takes the form $u = c + a \cdot (n-1) \cdot u$, hence

$$u = \frac{c}{1 - a \cdot (n-1)}. \tag{6}$$

So, for $a > 1/(n-1)$, everyone in this group is unhappy.

For large $n$, this is true already for small $a$. So even small good feelings towards each other make the whole community unhappy.

**How to avoid this paradox.**

- For two people, a natural solution to this paradox seems to be limiting one's emotions, letting reason to be more in control of one's behavior.
- A natural solution for large $n$ is to focus more on families (and other small groups) than on humanity as a whole.

**Challenging situation.** What is unexpected is that somehow, some religious communities seem to avoid this paradox (and resulting unhappiness) without limiting their emotions and without limiting the focus to a family.

**What we do in this paper.** In this paper, we provide an explanation for this challenging situation.

## 2 Analysis of the problem and the resulting explanation

**What is special about religion.** What religious communities seem to do is to focus positive feelings on the divine being ($D$) – who, in its turn, has positive feelings towards human beings. In this paper, we explain how this focus helps to avoid the negative feelings associated with the paradox of love.

**Let us describe this in precise terms.** In the first approximation, let us consider $n$ people with:

- similar circumstances $c_H$,
- similar level of love-to-Divine-Being $a_{HD}$, and
- similar levels of love-from-Divine-Being $a_{DH}$.

In this case, since we ignored the differences between human beings, the utility of all human beings will be the same $u_H$.

So, the above equations (1) for determining utilities $u_H$ and $u_D$ take the following form:

$$u_H = c_H + a_{HD} \cdot u_D \tag{7}$$

and

$$u_D = c_D + n \cdot a_{DH} \cdot u_H. \tag{8}$$

If we multiply the equation (8) by $a_{HD}$ and replace the term $a_{HD} \cdot u_D$ with the resulting expression, we conclude that

$$u_H = c_H + a_{HD} \cdot c_D + a_{HD} \cdot n \cdot a_{DH} \cdot u_H. \tag{9}$$

If we move all the terms containing the unknown $u_H$ to the left side, we get

$$u_H \cdot (1 - a_{HD} \cdot n \cdot a_{DH}) = c_H + a_{HD} \cdot c_D,$$

so

$$u_H = \frac{c_H + a_{HD} \cdot c_D}{1 - a_{HD} \cdot n \cdot a_{DH}}. \tag{10}$$

**Resulting mathematical explanation.** For an appropriately selected $a_{DH}$, the denominator of this expression will be positive and close to 0 – which will lead to high happiness.

**Commonsense explanation:**

- while we human often *cannot* control our emotions well,
- the divine being *D can* select an appropriate $a_{DH}$ – so that this selection makes everyone happy.

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