

Strategies for Human Giving

Introduction:

Imagine it is your best friend's birthday. They have had a long and difficult week and are expecting everyone to be busy for their birthday. Little do they know, you have been hard at work, organizing a surprise party for them. With their low expectations, you are extremely excited, waiting in anticipation for the moment they come home to discover all of their family and friends waiting for them, culminating in a rewarding celebration. Alternatively, imagine a closely related situation. It is still your best friend's birthday, and they have still experienced a long and difficult week. Yet, because you are their best friend and have surprised them with a party in the past, they are expecting a rewarding celebration when they come home to discover all their family and friends waiting for them. But you didn't organize this party, and your friend's hopes will be crushed when they find an empty and lonely room when they walk through that door. Due to your friend's significant disappointment, you will also feel a sense of secondary shame or sadness from failing to meet their expectations.

This situation describes a specific example of a "gift-giving" game between an altruistic giver and a receiver, considering the decision of the giver and the expectations of the receiver. Gift giving can be a rational act for a giver, as a human individual may experience secondary joy from their contribution to another, which is exemplified in the situation above. While this type of game is most convenient to think about in the context of celebrations and gifts, it extends to many situations pertaining to human care and sacrifice, such as leadership and service work. These types of situations have the potential to be extremely rewarding, but can also be taxing and draining to the individual. This contributes to significant burnout for people in roles that require giving over long periods of time. This paper explores the nature of giving and the strategies that

a giver may employ to experience high payoffs for their contributions to another. Beyond a one-shot game, simulations over many iterations will be developed with differing payoff structures, and the results will be discussed in the context of philosophical theories and practical ideas of giving.

One-Shot Game:

| | Expect | Don't Expect |
|-------------------|---------------|---------------------|
| Give | 2, 3 | 8, 10 |
| Don't Give | -3, -4 | 0, 0 |

Table 1: One-shot game between giver and receiver

The situation above depicts a one-shot game between a giver and a receiver. The giver has two options: give a gift or do not give a gift. Likewise, the receiver has the option to expect or not expect a gift. In a way, this expectation can be understood as the existing convention of whether the gift giver is expected to give a gift in the situation (support with quote or claim). The payoff table above assumes that the giver is altruistic, caring about the expectations of the receiver. The best payoff for both players is *(Give, Don't Expect)*. In this cell, the receiver does not expect a gift and is pleasantly surprised. Additionally, the giver is altruistically joyful, feeling a high payoff when giving a gift. However, they do not receive the same high payoff as the receiver since the giver still has to pay some cost to provide the gift. In the cell *(Give, Expect)* the recipient would feel a smaller payoff, as they are not experiencing the feeling of a pleasant surprise, but are still receiving the benefit of a gift. Meanwhile, the giver would experience a small positive payoff, fulfilling the expectations of the other but understanding they were expected to give. The cell *(Don't Give, Expect)* has the worst payoff for both parties, as the recipient would expect a gift but not receive one, experiencing disappointment. Additionally, the

giver would understand the disappointment for their lack of action, experiencing secondary negative feelings like the situation described in the introduction. However, they would not have as low of a payoff as the recipient since they are not experiencing the disappointment firsthand and would not have to contribute some type of gift. Finally, the cell (*Don't Give, Don't Expect*) has a mutual payoff of zero since no expectations or action is taken. As seen below, it is obvious that the Nash Equilibrium of a one-shot game would be the cell (*Give, Don't Expect*). The giver would have the dominant strategy to always give while the receiver would have the dominant strategy to always not expect a gift.

| | Expect | Don't Expect |
|-------------------|---------------|---------------------|
| Give | 2, 3 | 8, 10 |
| Don't Give | -3, -4 | 0, 0 |

Table 2: Nash Equilibrium in one-shot game between giver and receiver

Repeated Iterations:

However, can the receiver always expect to control their expectations in such a scenario? In a one-shot game, a potential recipient may be able to dictate these expectations, establishing them in a context that is stripped of conventions or previous history. But in repeated games, the recipient may not be able to control such expectations, and their strategies over multiple iterations may change as a result. Exploring this type of interaction in repeated games, let us establish the assumption that the receiver will start without any expectations, but then come to expect the giver to repeat their move in the last iteration. This changing expectation can be compared to the Tit-for-Tat strategy described by Axelrod in his discussion of the evolution of cooperation¹. Without any expectations, both players will receive a mutually beneficial high payoff. In the first iteration, the giver would continue their dominant strategy of giving, receiving

¹ Axelrod

the mutually high payoff of *(Give, Don't Expect)*. However, after this iteration, the receiver will change their expectations, expecting a gift to come their way. Therefore, the “Don't Expect” column will be trimmed from the table, and the payoffs will be limited to the “Expect” column. This is where this game differs from the evolution of cooperation described by Axelrod. Instead of a player willingly defecting to gain a temporary higher payoff which causes the Tit-for-Tat player to change their strategy (as in the case of the prisoner's dilemma and the evolution of cooperation), the recipient in this situation cannot help changing their expectations. Their expectations are simply a product of the previous action of the giver, which ends up altering the recipient's strategy, diminishing the payoffs for both players.

| | Expect | Don't Expect |
|-------------------|---------------|---------------------|
| Give | 2, 3 | 8, 10 |
| Don't Give | -3, -4 | 0, 0 |

Table 3: Trimmed payoff table, representing changing expectations of recipient

With this table trimmed, the giver will still receive the immediate higher payoff if they decide to give in this game. However, continuing to give in this situation will cause the receiver to maintain their expectations that they will receive a gift, further limiting the payoffs of this table to the “Expect” column. Thus, would it ever be rational for the giver to choose to suffer the low payoffs of the *(Don't Give, Expect)* cell in the hopes of changing the expectations of the recipient in a repeated game?

If the giver knew that the mindset of the recipient resembled tit-for-tat expectations, it may be rational for them to temporarily suffer these losses in a repeated game to gain a higher payoff in the future. For instance, over the course of the first three iterations in this type of game, a player may choose to give all three times, receiving respective payoffs of 8, 2, and 2, totaling to a sum of 12. However, another player may opt for a different strategy, choosing to give in the

first iteration, break the expectations of the recipient and not give in the second iteration, followed by giving again in the third iteration. An alternating strategy such as this one would receive respective payoffs of 8, -3, and 8, totaling to a sum of 13. With this observation, it can be seen that it may be rational for a player to choose the low payoff of *(Don't Give, Expect)* for a single iteration to gain more value in the long term. Representing these strategies as a series, the giver strategy, $g[i]$, and alternating strategy, $a[i]$, can be described below.

$$g[i] = \begin{pmatrix} 0 \text{ when } i = 0 \\ 8 \text{ when } i = 1 \\ g[i-1] + 2 \text{ when } i > 1 \end{pmatrix} \quad a[i] = \begin{pmatrix} 0 \text{ when } i = 0 \\ 8 \text{ when } i = 1 \\ a[i-1] - 3 \text{ when } i = 2, 4, 6, \dots \\ a[i-1] + 8 \text{ when } i = 3, 5, 7, \dots \end{pmatrix}$$

Figure 1: Giver and alternating strategies represented as series, when the recipient holds tit-for-tat expectations

Seeing these representations, it can be understood why the alternating strategy will perform better over the long term. After the initial iterations at $i = 0$ and $i = 1$, the giver total payoff will increase at a rate of $2*i$. However, the alternating strategy will increase, on average, at a rate of $[(-3+8)/2]*i = 2.5*i$. Using these series and Python, a simulation of this game over 20 iterations was run and the resulting payoffs were plotted below. In this plot, it can be seen that the alternating strategy oscillates around a line with slope 2.5 while the giver strategy increases at a constant rate of 2 after the initial iteration.

```

[2] import matplotlib.pyplot as plt

[24] iterations = 20

# initialize the first iteration
x = [0, 1]
alwaysGive = [0, 8]
alternate = [0, 8]

# calculate future iterations
for i in range(2, iterations):
    x.append(i)
    alwaysGive.append(alwaysGive[i-1] + 2)
    if i % 2:
        alternate.append(alternate[i-1] + 8)
    else:
        alternate.append(alternate[i-1] - 3)

# plot results
plt.plot(x, alwaysGive, label="Giver")
plt.plot(x, alternate, label="Alternating Strategies")
plt.legend(loc="upper left")
plt.xlabel('Iteration')
plt.ylabel('Total Payoff')
plt.show()

```

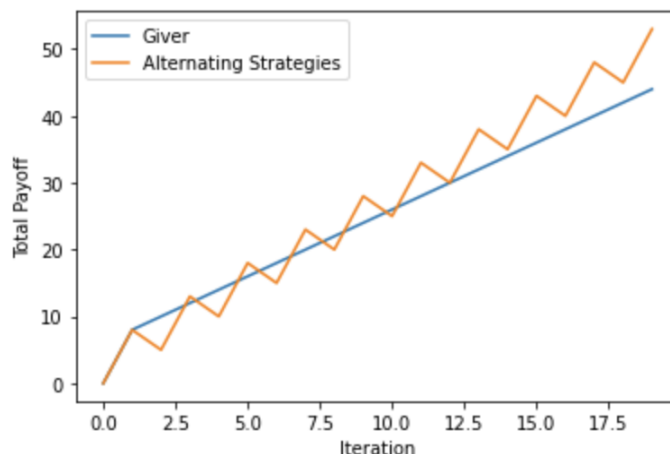


Figure 2: Python simulation of gift-giving over repeated iterations when the recipient holds *tit-for-tat* expectations

These observations point toward the conclusion that continuously giving is not always the most beneficial strategy for a player when it impacts the expectations of the recipient. Even though the temporary payoffs may be higher for one-shot games in the short term, it is more advantageous for the giver to break the expectations of the recipient to gain a higher total payoff over many iterations.

Repeated Iterations with Expectations Causing Diminishing Payoffs:

But what if the cell of (*Give*, *Expect*) was not made up of constants, but instead had dynamic values that relied on the past iteration? In other words, what if the expectations for a gift decreased the payoffs after every iteration, instead of the payoffs being held at constant values like 2 and 3? This game can be depicted in the table below, replacing the constant values in the cell (*Give*, *Expect*) with dynamic values, where p represents the payoff in the past iteration for the given player. The payoff for both parties will decrease by 1 after every iteration, which occurs for a variety of reasons. The recipient may expect the gift from the person, reducing the

joy in giving. Additionally, the decrease may represent the exhaustion of the giver in depleting their resources for another, starting to experience the act of giving as a costly chore.

| | Expect | Don't Expect |
|------------|--|--------------|
| Give | $p(\text{Giver}) - 1, p(\text{Recipient}) - 1$ | 8, 10 |
| Don't Give | -3, -4 | 0, 0 |

Table 3: Payoff table for expectations causing diminishing payoffs

The total payoffs of the giver and alternating strategies will be a summation of the individual payoffs for all the previous iterations. Using these dynamics payoffs, a simulation was run in Python with the same giver and alternating strategies focusing on the payoffs for the row player. The alternating strategy maintains a pattern as before, oscillating around a line with a positive constant slope. However, the total payoff for the giver strategy is much different. As the output depicts, the giver's total payoff increases until it reaches a maximum value at iteration 8, at which point it starts decreasing, entering negative values in higher iterations.

```

iterations = 20
highPayoff = 8
lowPayoff = -3

# initialize the first iteration
x = [0, 1]
alwaysGive = [0, highPayoff]
alternate = [0, highPayoff]

# initialize first payoffs
payoffGiver = highPayoff
payoffAlternate = highPayoff

# calculate future iterations
for i in range(2, iterations):
    x.append(i)
    # calculate payoff for giver, which depreciates every iteration
    payoffGiver -= 1
    alwaysGive.append(alwaysGive[i-1] + payoffGiver)

    # calculate payoff for alternating strategy
    if i % 2:
        payoffAlternate = highPayoff
    else:
        payoffAlternate = lowPayoff
    alternate.append(alternate[i-1] + payoffAlternate)

```

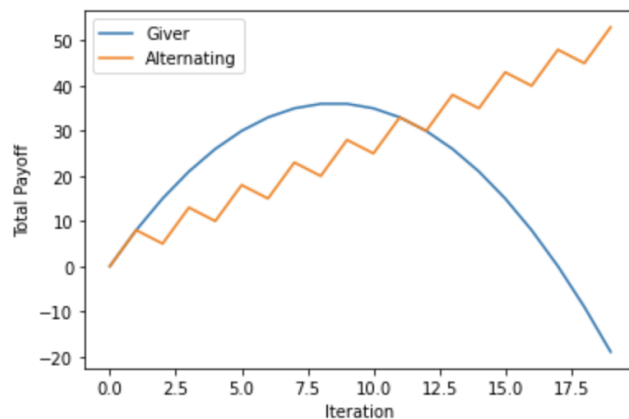


Figure 3: Python simulation of gift-giving over repeated iterations with diminishing payoffs due to recipient expectations

From the standpoint of the giver, the simulation of the gift-giving game with diminishing payoffs reiterates how it is more beneficial in the long run to alternate one's gift giving strategy, breaking the expectations of the recipient and allowing themselves a moment of rest. The diminishing payoffs cause the continuous giver to experience a negative impact on their total payoff at high iterations. It can be argued that this type of simulation more accurately represents a real-life scenario of a giver, where continuously giving starts to incur a cost to the individual. Thus, over many iterations, continuously giving becomes detrimental to the health of the giver, imposing serious damage to the long-term wellbeing of the individual which is exhibited through the negative total payoff at high iterations. This observation models the decline and burnout of individuals in roles that require continuous giving and care for others. While some may experience great joy at first (exhibited in the higher payoffs at low iterations), the weighty expectations on their giving creates a toll on them, ultimately hurting them when they remain committed to giving.

So how can one in such a role combat this and find more sustainability? While altering one's gift-giving is one strategy that is more beneficial in this context, there are even more optimal strategies that one could employ. One such strategy that is "more optimal" can be described with the following instructions. Assume `highPayoff` describes the row player's payoff for the *(Give, Don't Expect)* cell and `lowPayoff` describes the row player's payoff for the *(Don't Give, Expect)* cell. Continue giving until the payoff for a single iteration drops below the value $(\text{highPayoff} + \text{lowPayoff})/2$. At this point, break the expectations of the recipient and don't give for a single iteration, but then continue to give after this iteration. This strategy was simulated against the giver and alternating strategies, and the corresponding Python code and output are shown below.


```

## initialize the first iteration
optimal = [0, highPayoff]

# initialize first payoffs
payoffOptimal = highPayoff

# calculate future iterations
for i in range(2, iterations):

# calculate payoff for optimal strategy
payoffOptimal -= 1
if payoffOptimal < (highPayoff + lowPayoff)/2:
    if payoffOptimal <= lowPayoff:
        payoffOptimal = highPayoff
    else:
        payoffOptimal = lowPayoff
    optimal.append(optimal[i-1] + payoffOptimal)

```

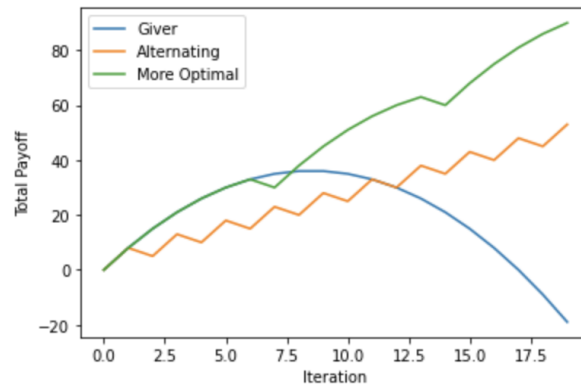


Figure 4: Python simulation with “more optimal” strategy

This output illustrates how the “more optimal” strategy greatly outperforms the giver and alternating strategies. This strategy lies along the “giver” curve during its most significant payoffs, only taking temporary losses to reset the recipient’s expectations. In this manner, the player will continue to receive only the highest payoffs for their giving when the recipient cannot continuously expect a gift. Therefore, in a role that requires giving over long periods of time, an individual may find more sustainability if they decide to give most of the time, but do not give periodically. This would reset the expectations of the recipients and allow the giver a moment for rest, allowing both to have a higher appreciation for the act of giving through the next iterations.

Applications and Discussion:

In her paper *In a Different Voice*², care ethicist and psychologist Carol Gilligan develops a theory of moral development in a feminist perspective that contrasts with Kohlberg’s theory, which centered around masculine development. With the traditional societal expectations placed upon women as the primary caretakers of the family, Gilligan proposes steps of development that women undergo in their conception of morality and their own role in society. A deep

² Gilligan

examination of this development is beyond the scope of this project, but the most important point for this project arises in her argument for the final step in moral growth, in which one can “encompass the needs of both self and others, to be responsible to others and thus to be "good" but also to be responsible to herself and thus to be ‘honest’ and ‘real’” (Gilligan 500). At this stage in moral development, one realizes that they do not have the human capacity to continuously give and sacrifice their own needs for the expectations and needs of others. Thus, they must come to terms with their own humanness, realizing that there are limitations to their giving and that they must care for themselves as to not deplete their own resources. Such topics in care ethics exemplify the strategies covered in this paper, covering how continuously giving becomes harmful to the individual. Sustainable participation in a role with high expectations of care requires that one includes their own needs in the definition of care, not losing themselves in the expectations of another. Thus, this requires that an individual does not give intermittently or at least reduces their giving at some points, exhibiting strategies that were simulated in this paper. This action may cause immediate negative payoffs in the form of shame or hurt, due to the expectations of the other, but is essential for the long term health for the person in the role, allowing them to sustain higher payoffs.

Similarly, individuals in positions of leadership must utilize strategies that sustain their long-term ability to lead. Leaders carry significant expectations that they will be available to give to those they are leading. While being in this type of position can be exciting and rewarding at first, continuously giving in this way can be draining to the energy of the person, causing them to experience burnout over long periods of time. Thus, it is essential that leaders employ strategies such as establishing strong boundaries³, being unavailable to their constituents which allows themselves the time to recharge. Similar to the simulation of the “more optimal” strategy,

³ Lofgren

establishing boundaries can reset the expectations of the recipients while also providing the giver a chance to rest. Through this strategy, both parties can appreciate the act of giving with renewed payoffs after the hiatus.

Future Research:

_____ There are many areas of future research that could extend the findings in this project. For one, the simulations in this project focus on the payoffs for the giver. Including simulations of the payoffs for the recipient in light of the giver's decisions would provide insight into which strategies are mutually most beneficial rather than most sustainable for the giver.

Additionally, further investigation into the payoff structure for this type of game, especially with dynamic payoffs, would allow for broader applications to real-world situations. For example, payoffs could be altered based on the value of the gift that the giver contributes, causing a higher payoff for the recipient while also raising the future expectations. This would have implications for the type of optimal strategies, since they would have to account for the cost of the gift on the expectations of the recipient. Another interesting experimental extension could be carried out if the payoff in the cell (*Give, Don't Expect*) was turned into a dynamic value, incrementing at some constant value based on the past iteration. With this alteration, the strategies for the gift-giver would have different payoffs due to both dynamic values in the *Give* row. An exploration into the changing Nash equilibrium with dynamic values would provide an interesting analysis into the rational decision making at different points in the iterations for the giver. This analysis would help formulate more realistic simulations of these interactions, modeling how the decisions of the giver would change over time due to the differing payoffs.

Finally, exploring the impact of signaling in this game would be a thought-provoking exercise that could shed more light on the types of methods that both players could employ in their interactions with one another. The incentive for bluffing would be explored here, with both the giver and the recipient. Scenarios could be analyzed where the giver may be motivated to signal that they are not giving a gift, potentially lowering the expectations of the recipient. Additionally, the recipient may signal that they have higher expectations than they do in order to push the giver to not disappoint them. Studying signaling throughout these scenarios would provide insight into the different equilibriums that could be reached as a result of the information that the signal conveys to the players.

Conclusion:

Giving to others can be a joyful and rewarding experience for a human. However, due to the expectations of the recipient and natural capacity of the giver, continuously giving is not the most beneficial strategy for an altruistic person. Failing one's expectations through not giving will lead to temporary negative payoffs, causing this decision to be a difficult one to make. However, it is essential to periodically choose this route so that one can sustainably experience a positive payoff through giving. Such strategies have broad applications to roles across society that carry expectations of care and giving. It is of the utmost importance that individuals in such roles do not continuously give and recognize their own capacities as humans while also not feeding unrealistic expectations to those that they are caring for. While such a decision can seem like an ugly selfish one, it is ultimately vital for the long term presence of care and altruism across society.

Works Cited

- Axelrod, Robert. "The Success of Tit for Tat in Computer Tournaments." *The Evolution of Cooperation*, Basic Books, New York, NY, 2006, pp. 31–40.
- Gilligan, Carol. "In a Different Voice: Women's Conceptions of Self and of Morality." *Harvard Educational Review*, Allen Press, 1 Dec. 1977,
<https://meridian.allenpress.com/her/article/47/4/481/31056/In-a-Different-Voice-Women-s-Conceptions-of-Self>.
- Lofgren, Jenn. "Council Post: The Role That Boundaries Play in Leadership Growth." *Forbes*, *Forbes Magazine*, 17 May 2021,
<https://www.forbes.com/sites/forbescoachescouncil/2021/05/17/the-role-that-boundaries-play-in-leadership-growth/?sh=a771f007066b>.