Gift Giving with Emotions

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January 1999

Abstract

This paper presents a two-player, psychological game-theoretic model of gift giving where emotions matter. Beliefs enter directly into players’ payoff functions. Surprise, disappointment, embarrassment and pride arise from comparing players’ beliefs about the gift they will give or receive to the actual choice of gift. Depending on beliefs and the cost of the gift, a gift-giving, a non-gift-giving, or only a mixed-strategy equilibrium may exist. Even after allowing for a definition of welfare which incorporates emotions and fairness, all equilibria of the model make the giver worse off. Implications of the model for holiday gift giving, tipping and labor relations are explored. 

JEL Classification: A12, C70, D63.

keywords: gift giving, psychological equilibrium, reciprocity, welfare, labor relations

*This paper, based on chapter 1 of my Ph.D. dissertation at Princeton University, has benefited from the advice and expertise of Pierpaolo Battigalli, Colin Camerer, Rachel Croson, Arupratan Daripa, Avinash Dixit, Martin Dufwenberg, Deborah Garvey, Yaakov Khazanov, Matthew Rabin, Ariel Rubinstein, Dan Sasaki, Timothy Van Zandt, two anonymous referees and the editor.
1 Introduction

“Things have values which are emotional as well as material.” (Mauss, 1969, p.63)

Gift giving is an ancient custom which has interested anthropologists, philosophers, sociologists, psychologists and, more recently, economists. Historically, gifts performed primarily economic functions. For example, Posner (1980, pp.16-17) discusses the role of gifts as insurance against hunger, given out of one group’s surplus with the implied obligation of repayment at some future date. The reciprocal nature of gifts implied the notions of loan and credit between two groups (Mauss, pp.34-35). Gifts were also used to signal wealth, character and seriousness of intent between two groups attempting to establish trading relations (Mauss, pp.34-35, Posner, pp.24-25).

Interpreted less literally, gift giving’s place in commercial relations is no less central today. Much has been written about the reciprocal gift exchange that occurs between employers and employees (see, for instance, Akerlof, 1982). Tipping may also be seen as a gift exchange: a service is rendered, the appreciation for which is conveyed through a voluntary tip. Charitable contributions and the entire voluntary sector constitute other forms of (one-sided) gifts. Moreover, modern rituals and events are inextricably linked to gift giving: birthdays, holidays, dating, weddings, social gatherings and celebrations, and even death testify to gift giving’s importance throughout the life-cycle. Garner and Wagner (1991) establish that expenditures on Christmas gifts alone account for 3.5% of annual household expenditure. While strategic considerations may play a role in some of the above gift-giving scenarios, emotions enter all of them.

This paper presents a two-player, gift-giving game which incorporates a set of emotions viewed by sociologists and social psychologists as relevant to modern gift giving. The framework used to model emotions is a psychological game introduced by Geanakoplos, Pearce, and Stacchetti (GPS) (1989). In conventional game theory, players’ payoffs depend solely on their actions and their opponents’ actions. In a psychological game, beliefs appear explicitly in players’ payoff functions.

I present a model in section 3 in which the giver may choose an action costly or (relatively) costless to himself. The action can be thought of as the choice of effort level
by a worker, whether to leave a tip at a restaurant or the purchase of a present. The receiver values the costly action more than the costless one. The firm earns a higher profit the greater the effort level put forth by its workers; a server prefers a tip to no tip; and an expensive present is preferred to a cheap one. Receivers have beliefs about the action the giver will take and givers have beliefs about the action the receivers expect (second-order beliefs). Emotions such as surprise, disappointment, pride and embarrassment arise from comparing a player’s ex ante expectations with the ex post physical outcome. Expecting a small, cheap present from a friend on your birthday, you may feel (pleasantly) surprised upon receiving an expensive one. Your friend in turn may derive pride from having surprised you. After having provided good service, the waiter may feel both cheated and disappointed with the discovery that no tip was left, while the patron may feel guilty and embarrassed.

One feature absent from the basic model is strategic interaction between players’ actions. Instead, a giver’s choice of action depends solely upon its cost and his beliefs about what his opponent expects (second-order beliefs). Scenarios in which, say, an employer’s setting of a wage depends upon his first-order beliefs about the employee’s choice of effort level are not considered in section 3. Section 4 extends the basic model to allow for such fairness considerations. The remainder of the paper explores the implications of the inclusion of emotions for welfare analysis, holiday gift giving, labor relations, and tipping. Rabin (1993) makes the point that, “Welfare economics should be concerned not only with the efficient allocation of material goods, but also with designing institutions such that people are happy about the way they interact with others. For instance, if a person leaves an exchange in which he was treated unkindly, then his unhappiness at being so treated should be a consideration in evaluating the efficiency of that exchange.” Section 5 introduces an expanded notion of welfare which incorporates players’ feelings about a physical outcome. The subsequent welfare analysis demonstrates why recent estimates of the welfare yield of holiday gift giving by Waldfogel (1993) and Solnick and Hemenway (1996) are unsatisfactory. Furthermore, the model sheds light on particular gift-giving customs, like gift wrapping and why it is considered rude to ask for what you want. Applications of the model to tipping and industrial relations are explored in section 6. Specifically, normative implications for remuneration policy are derived
and the desirability to offer a tip up front (before the service has been rendered) under some circumstances is shown. Section 7 concludes. The next section surveys related gift-giving literature in economics and other disciplines.

2 Gift-Giving Literature

2.1 Gift-Giving Motives in Other Disciplines

Written accounts of the role of gift giving as an institution date at least as far back as the ancient Indian epic the Mahabharata. In specifying when (the occasions), to whom, by whom and how (the appropriate etiquette) to offer gifts, the Mahabharata lays out the following five motives of gift giving (Mauss, p.126): duty, self-interest, fear, love and pity. Social and behavioral scientists have similarly attributed a variety of motives to gifts. Anthropologists have focused on gifts as a means of exchange. Mauss studies the function and form of gift giving in the archaic societies of Polynesia, Melanesia and the native American tribes of Northwest America. In these societies, gifts served both a social and an economic function. They were given and received on credit as loans and as a means of trade. The term “barter” came into existence when the exchange of gifts between two tribes, clans or communities became more frequent so that a gift given was repaid on the spot with a gift of similar value (Mauss, p.35).

In addition to their economic function, gifts take on a broader social importance in Malinowski’s study of Trobriand Island and other islands of the South Pacific.

The view that the native can live in a state of individual search for food, or catering for his own household only, in isolation from any interchange of goods, implies a calculating, cold egotism, the possibility of enjoyment by man of utilities for their sake. This view . . . ignore[s] the fundamental human impulse to display, to share, to bestow. [It] ignore[s] the deep tendency to create social ties through exchange of gifts. Apart from any consideration as to whether the gifts are necessary or even useful, giving for the sake of giving is one of the most important features of Trobriand sociology, and, from its
very general and fundamental nature, I submit that it is a universal feature of all primitive economies. (Malinowski, 1992, p.175)

Sociologists and social psychologists support Malinowski’s view of gift giving as a natural form of self-expression. Caplow (1984) refers to gift giving as “a language that employs objects instead of words as its lexical elements.” (p.1320) The choice of gift transmits one’s identity and shapes the identity of the recipient (Schwartz, 1967). Along these lines, Schwartz describes a danger in excessive one-sided giving, as can develop between parents and children: the child is denied the reward to one’s self-image as being a source of gratification to others (p.3). This pride in giving is a feature of the model in section 3.

As part of the well-known Middletown study on social change, 110 adults were interviewed to discover how they celebrated Christmas. Caplow reports the existence of a number of rules of Christmas gift giving to which the overwhelming majority of Middletown families conform. One such rule, “the gift selection rule”, Caplow describes as follows:

A Christmas gift should (a) demonstrate the giver’s familiarity with the receiver’s preferences; (b) surprise the receiver, either by expressing more affection – measured by aesthetic or practical value of the gift – than the receiver might reasonably anticipate or more knowledge than the giver might reasonably be expected to have; (c) be scaled in economic value to the emotional value of the relationship.

In the model below, surprise is the receiver’s chief emotional benefit and the source of the giver’s pride.

2.2 Gift Giving in Economics

There exist two previous game-theoretic models of gift exchange. Carmichael and MacLeod (1997) and Camerer (1988) both explain the necessity that gifts be inefficient for relationship building. Carmichael and MacLeod use an evolutionary framework to
show how the exchange of inefficient gifts (the cost to the giver exceeds the value to
the receiver) at the beginning of any new match can break down mistrust and permit
coopereation. Camerer studies gifts as signaling devices used by players in the first stage
of a two-stage investment game to establish a relationship. Clearly, the relevant motive
in gift giving depends on the relationship between giver and receiver. Camerer admits
that “the signaling view does not explain many gift giving practices, especially in fam-
ilies,” (pp.S194-S195). In this sense, my model complements these two which focus on
relationship building. Mine captures gift exchanges in well-established relationships in
which gifts are at least partly motivated by emotions.

3 The Basic Model

“Gifts are hidden or kept secret for the sake of the giver as well as the receiver for . . . the
recipient’s reaction to the present is crucial to the giver . . . Although suspense develops gradu-
ally, it ends abruptly when the unknown gift is revealed. Therefore, if suspense were the only
constituent of the impending gift exchange, its consummation would immediately plunge the
exchange partners into boredom.” (Schwartz, p.10)

3.1 One-sided game

Empirical evidence indicates and introspection confirms that individuals evaluate out-
comes, not only according to the absolute (physical) level, but also according to the
deviation from their expectations (Kahneman and Tversky, 1979). These deviations of
outcomes from expectations often give rise to emotions. A wage increase may be disap-
pointing if less than anticipated, a gift may come as a pleasant surprise if unexpected,
and a generous tip may make the customer feel proud while the absence of one may send
him hurrying to the exit in embarrassment. These examples of voluntary gift giving il-
lustrate that emotions can be significant in the evaluation, and thus the choice, of a gift.
Caplow’s findings from the Middletown study and the above quotation, among others,
point to a particular set of surprise-related emotions which, along with other (material)
factors, determine the giver’s and receiver’s valuations.

In order to highlight the role of emotions in gift giving, I begin by describing a simple, one-sided, psychological game of gift giving. In this particular game (really a decision problem) there are two players. Let player 1 be the giver and player 2 the receiver.¹ Let \( A_1 \) be the nonempty, finite set of actions available to player 1, where \( a_1 \in A_1 \). In this model, I restrict attention to two possible actions: player 1 can take either an action that is costly (or expensive) to herself \( (a_1 = 1) \), or a costless (or cheap) one, \( (a_1 = 0) \). Player 1’s action set can thus be written as

\[
A_1 = \begin{cases} 
1 & \text{if the action is costly} \\
0 & \text{if the action is costless}
\end{cases}
\]

Since player 2 does not choose any action in the one-sided game, I write \( A_2 = \emptyset \).² To ensure continuity, I introduce mixed strategies as objects of choice. Let \( \Sigma_1 = \Delta(A_1) \) denote the set of probability measures on \( A_1 \). Hence, \( \Sigma_1 \) is player 1’s set of mixed actions. A mixed action \( \sigma_1 \in \Sigma_1 \) indicates the probability with which player 1 takes the costly action, that is, \( \sigma_1 = pr(a_1 = 1) \); and \( 1 - \sigma_1 \) represents the probability with which player 1 takes the costless action, \( 1 - \sigma_1 = pr(a_1 = 0) \). Even though player 1’s optimal strategy may actually involve playing a strictly mixed action, a pure action is all that is observed. That is to say, while player 1’s ex ante choice of action may be given by \( \sigma_1 \in [0, 1] \), her ex post or observed action is a random variable \( \hat{\sigma}_1 \in \{0, 1\} \). Therefore, \( \sigma_1 = .6 \), for example, indicates \( \hat{\sigma}_1 = \begin{cases} 
1 & \text{with probability } .6 \\
0 & \text{with probability } .4
\end{cases} \)

Beliefs represent players’ uncertainty and are given by a probability distribution on either an opponent’s mixed-strategy space (first-order beliefs) or an opponent’s beliefs on the player’s own mixed-strategy space (second-order beliefs). I assume, for simplicity, that players are concerned only about the mean of their belief distributions.³ Let \( q \)

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¹I adopt the convention that player 1 is female and player 2 male and adhere to this convention throughout the remainder of the paper.
²This is not to say that the receiver does not have a strategic role to play. He does, as section 4 points out.
³The extent to which higher-order moments matter will show up in the precise functional form of the psychological component of a player’s utility function.
and \( \hat{q} \) to be the respective means of player 2’s first-order and player 1’s second-order beliefs.\(^4\) That is to say, \( q = E_2(1 \cdot \sigma_1 + 0 \cdot (1 - \sigma_1)) = E_2(pr(a_1 = 1)), \) \( q \in [0, 1] \) and \( \hat{q} = E_1(q) = E_1(E_2(pr(a_1 = 1))), \) \( \hat{q} \in [0, 1] \). The giver behaves as a subjective ex ante utility maximizer. Her utility is defined over mixed actions and second-order beliefs; while the ex ante utility of player 2, the inactive one, depends on player 1’s choice of action and his first-order beliefs.

A player’s utility function is made up of a monetary and a psychological term. The monetary term in this model is measured by the cost of the action for the giver, \( C_1(\hat{\sigma}_1) \) (where \( C_1(1) > C_1(0) \)), and its value for the receiver, \( V_2(\hat{\sigma}_1) \) (where \( V_2(1) > V_2(0) \)).

Emotions are experienced ex post. That is, emotions arise from comparing players’ ex ante beliefs with ex post actions. The receiver feels pleasantly surprised whenever, and to the extent that, the costly action is taken, \( \hat{\sigma}_1 = 1 \), while expecting something less, \( q < 1 \). Similarly, the choice of the costly action brings the giver pride whenever, and to the extent that, \( \hat{q} < 1 \). Surprise and pride add positively to utility. A tip of $10.00 (say on a restaurant bill of $50) when only $7.50 was expected brings the server surprise and the customer pride, only the degree of these emotions is less than the case where, say, no tip is expected and $10 is left. Disappointment and embarrassment bring disutility which the receiver and the giver experience as long as the costless action is taken \( \hat{\sigma}_1 = 0 \) and this outcome is less than players expected, \( \hat{\sigma}_1 < q \) and \( \hat{\sigma}_1 < \hat{q} \), respectively. A wage increase that is less than an employee expected disappoints the employee; yet the disappointment is less than if no increase is given at all.\(^5\) Finally, when players hold pure beliefs and these beliefs exactly match the giver’s action, utility does not change.

Supposing utility is additively separable across monetary and psychological payoffs,

\(^4\)Restricting beliefs to first and second orders is done for the purposes of both realism and tractability. I have trouble thinking about beliefs beyond the second, and certainly the third, order – and I believe that I am not alone in this.

\(^5\)The fact that a wage increase can evoke disappointment shows the importance of emotions. The rise in money wage can be thought of as contributing positively to the monetary component of the worker’s utility function while the disappointment shows up as disutility in his psychological evaluation of the outcome.
the most general \textit{ex ante} utility function for the receiver with these properties is\footnote{If $V_2(\sigma_1)$ and $h(\sigma_1, q)$ are linear in $\sigma_1$, then $u_2(\sigma_1, q)$ is too and is equivalent to the expectation of the \textit{ex post} utility ($E_2[V_2(\hat{\sigma}_1) + h(\hat{\sigma}_1, q)]$). Expected utility theory thus holds for the receiver under this assumption.}

\begin{equation}
 u_2(\sigma_1, q) = V_2(\sigma_1) + h(\sigma_1, q) \tag{2}
 \end{equation}

From the discussion above, the function $h(\sigma_1, q)$ has the following properties:

$$
 h(\sigma_1, q) = \begin{cases} 
 \geq 0 & \text{if } q < \sigma_1 \\
 0 & \text{if } q = \sigma_1 \\
 \leq 0 & \text{if } q > \sigma_1 
\end{cases} \tag{3}
$$

\begin{align}
 \frac{\partial h}{\partial \sigma_1} &\geq 0 & \forall \sigma_1 \in \Sigma_1 \tag{4} \\
 \frac{\partial h}{\partial q} &\leq 0 & q \in [0, 1] \tag{5}
\end{align}

The value of $h(\sigma_1, q)$ compared with $V_2(\sigma_1)$ determines the relative importance of the expected psychological and monetary outcomes.\footnote{The existence of the first partials of the function $h(\sigma_1, q)$ is guaranteed by the assumption that $h$ is continuous and differentiable everywhere.} I have made the inequalities weak to be as general as possible: $h(\sigma_1, q) = 0 \ \forall q < \sigma_1 \ (\forall q > \sigma_1)$ indicates that player 2 is insensitive to surprise (disappointment).

For the giver, an appropriate \textit{ex ante} utility function separable in the monetary and psychological terms with the above features is given by

$$
 u_1(\sigma_1, \tilde{q}) = -C_1(\sigma_1) + g(\sigma_1, \tilde{q}) \tag{6}
$$

where $g(\sigma_1, \tilde{q})$, assumed to be differentiable and continuous in $\sigma_1$ and $\tilde{q}$, is characterized by

$$
 g(\sigma_1, \tilde{q}) = \begin{cases} 
 \geq 0 & \text{if } \tilde{q} < \sigma_1 \\
 0 & \text{if } \tilde{q} = \sigma_1 \\
 \leq 0 & \text{if } \tilde{q} > \sigma_1 
\end{cases} \tag{7}
$$
\[
\frac{\partial g}{\partial \sigma_1} \geq 0 \quad \forall \sigma_1 \in \Sigma_1
\] (8)

\[
\frac{\partial g}{\partial \tilde{q}} \leq 0 \quad \tilde{q} \in [0, 1]
\] (9)

Since I assume common knowledge of rationality and players’ payoff functions, for any equilibrium concept, beliefs must correspond to \textit{ex ante} actions in equilibrium. Thus, none of the four emotions can be a part of a pure-strategy equilibrium. The corollary to this is that mixed-strategy equilibria are of special interest in this model for their ability to permit emotions in equilibrium, thereby enriching the scope of equilibria in psychological games beyond traditional game theory.

I adapt the equilibrium concept of a psychological Nash equilibrium laid out in GPS to this one-sided game.

**Definition 1** A mixed-strategy psychological equilibrium of this game is a triple \((\sigma_1^*, \tilde{q}^*, q^*)\) such that

i) \(\sigma_1^* = \tilde{q}^* = q^*\) and

ii) \(u_1(\sigma_1, \tilde{q}^*) \leq u_1(\sigma_1^*, \tilde{q}^*), \forall \sigma_1 \in \Sigma_1.\)

Statement i) of the definition indicates that beliefs must correspond to actions in equilibrium. If \(\sigma_1^* \in \Sigma_1\) is the equilibrium action of player 1, then player 2 believes (with probability one) that player 1 follows \(\sigma_1^*\). Similarly, player 1 believes that player 2 believes that 1 plays \(\sigma_1^*\). Statement ii) is a familiar one: the equilibrium action is utility-maximizing for fixed beliefs.

I first consider the two pure strategies as candidate psychological equilibria.

**Proposition 1** Depending on the parameter values, there exist two pure-strategy psychological equilibria (PSP) in this game:

first, \(q^* = \tilde{q}^* = \sigma_1^* = 1\) (PSP1) is a pure-strategy psychological equilibrium if and only if \(-g(0, 1) \geq C_1(1) - C_1(0);\)

secondly, \(q^* = \tilde{q}^* = \sigma_1^* = 0\) (PSP2) is a pure-strategy psychological equilibrium if and
only if \( g(1, 0) \leq C_1(1) - C_1(0) \);

finally, if \( -g(0, 1) < C_1(1) - C_1(0) < g(1, 0) \), there does not exist a pure-strategy psychological equilibrium.

Proof: See Appendix.

The interpretation of PSP1 is that player 1 will choose the expensive action given players’ beliefs if it is not too costly to avoid being embarrassed. That is, for the given ordering of the cost and psychological (embarrassment) functional values, player 1 incurs less disutility from pursuing the costly action than she would by being embarrassed (which would be the case if she were to take the costless action). If a charitable donation is expected of you and you know this, you will oblige as long as the cost of doing so is less than the cost of the embarrassment you would face by not donating.

On the other hand, the giver will choose the costless action, given players’ beliefs, if it is too costly to make herself feel proud (PSP2). Put differently, the psychological value (pride) she would obtain from taking the expensive action is too low to warrant its additional expense. If you know that no charitable donation is expected of you, then you will not make one unless doing so would make you sufficiently proud to offset the expense incurred.

Combining the conditions of the two pure-strategy equilibria (PSP1 and PSP2) yields the following inequality

\[
-g(0, 1) \geq C_1(1) - C_1(0) \geq g(1, 0)
\]  

(10)

Hence for this range of functional values either pure-strategy psychological equilibrium may exist depending on players’ beliefs. Figure 1 summarizes the equilibrium outcomes as a function of the psychological terms for a given cost differential.

For the range of functional values where neither PSP exists, GPS establish an existence result for \( n \)-player games with continuous utility functions. In this one-sided game, solving for mixed-strategy equilibria requires only that the giver be indifferent between her two pure strategies, namely, that equation (10) hold with equality,

\[
g(1, \bar{q}) - g(0, \bar{q}) = C_1(1) - C_1(0)
\]  

(11)
Figure 1: Summary of the pure-strategy psychological equilibria (PSP) outcomes as a function of the pride term, $g(1,0)$, and the embarrassment term, $-g(0,1)$, for a given cost differential, $C_1(1) - C_1(0)$.

**Proposition 2**  
*For the parameter values $-g(0,1) < C_1(1) - C_1(0) < g(1,0)$, a mixed-strategy psychological equilibrium exists.*

Proof: See Appendix.

The fact that the only psychological equilibria which exist for this range of parameters involve mixed strategies distinguishes psychological games from ordinary games. In traditional one-sided games, mixed-strategy equilibria exist only if the pure strategies in their support are themselves equilibria.

The playing out of a strictly mixed strategy in this game ensures the existence of emotions. In equilibrium, beliefs match the giver’s ex ante choice of action. However, in this one-shot game, the giver must select one of her pure actions. This guarantees that the outcome will differ from players’ (strictly mixed) equilibrium beliefs, thus evoking emotions.

Figure 2 lays bare the giver’s incentives. As indicated by the necessary and sufficient conditions of Proposition 1, the decision to purchase a gift depends on the ordering of the sum of the psychological weights, $g(1, \tilde{q}) - g(0, \tilde{q})$, and the cost differential, $C(1) - C(0)$. 

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Figure 2 plots $g(1, \tilde{q}) - g(0, \tilde{q})$ as a function of $\tilde{q}$. The shapes of the curves chosen are simply meant to convey the notion that they need not be linear or monotonic. The bold lines reveal second-order beliefs associated with the pure and stable mixed-strategy psychological equilibria (MSP) of this one-sided game. The MSP established in Proposition 2 are shown in Figure 2(b). When $-g(0,1) < C_1(1) - C_1(0) < g(1,0)$, the second-order beliefs $\tilde{q} \in (0, \tilde{q}_a)$ and $\tilde{q} \in (\tilde{q}_b, 1)$ form part of a MSP if $\sigma_1 = q = \tilde{q}$.

Additional MSP are uncovered in diagrams 2(a) and 2(b). Let us prove their existence. Let region 1 (2) be the area in which the cost differential, $C(1) - C(0)$, exceeds (is less than) the sum of the psychological weights, $g(1, \tilde{q}) - g(0, \tilde{q})$. Consider now the second-order beliefs $\tilde{q}^*$ in figure 2(a). To the right of $\tilde{q}^*$ in region 1, the giver is better off not buying a gift. To see this, note that her utility from buying a gift is given by $u_1(1, \tilde{q}) = -C_1(1) + g(1, \tilde{q})$. This expression must be less than her utility from not buying a gift, $u_1(0, \tilde{q}) = -C_1(0) + g(0, \tilde{q})$, by definition of the parameter orderings in region 1. Therefore, equilibrium forces must cause $\sigma_1$ and $\tilde{q}$ to fall, thus explaining the leftward-pointing arrows in this region.

Next consider a deviation from $\tilde{q}^*$ to region 2 (to the left). Because the sum of the psychological weights exceeds the cost differential, the giver is always more likely to purchase a gift (and benefit from the relatively high pride term) than indicated by her beliefs. Equilibrium forces thus bring her second-order beliefs back to $\tilde{q}^*$, making $\tilde{q}^*$ part of a MSP in which $\sigma_1 = q = \tilde{q}^*$. In short, stable MSP exist where countervailing equilibrium forces act upon the giver’s beliefs in a neighborhood of the second-order beliefs.

Points on the positively-sloped portions of $g(1, \tilde{q}) - g(0, \tilde{q})$ reveal beliefs associated with unstable mixed-strategy equilibria. For any second-order beliefs on these portions of the function, the utility from purchasing a gift equals that from no gift purchase. However, this equality is delicate. Once beliefs are perturbed slightly in either direction of the equality, equilibrium forces continue to push them away from the equality and towards stable equilibrium beliefs.

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8This particular range of equilibrium second-order beliefs covered by Proposition 2 is a function of the shape of $g(1, \tilde{q}) - g(0, \tilde{q})$. If this function was decreasing monotonically from $\tilde{q} = 0$ to $\tilde{q} = 1$, then all $\tilde{q} \in (0, 1)$ would be a part of such MSP.
Figure 2: Phase diagrams for the cases where (a) $-g(0,1) > g(1,0)$ and (b) $g(1,0) > -g(0,1)$. The bold lines indicate the stable, second-order equilibrium beliefs. The arrows reveal the directional forces exerted upon the giver’s second-order beliefs given the ordering of the cost differential, $C(1)-C(0)$, and the sum of the pride and embarrassment terms, $g(1,q) - g(0,q)$. 
Figure 2 also helps us to understand the comparative statics of the model. Suppose, for instance, the giver is playing a mixed-strategy equilibrium with beliefs at $\tilde{q}^*$. Now allow an increase in the pride term; $g(1, \tilde{q}) - g(0, \tilde{q})$ shifts upward. The diagram reveals that given the parameter orderings, the giver finds herself strictly within region 2. With the costly action dominating the costless one, the optimal mixing probability increases, as does the optimal $\tilde{q}$. More generally, for any MSP, a uniform increase in the pride term increases the optimal mixture, $\sigma^*_2$. The identical analysis holds for the embarrassment term, $-g(0, \tilde{q})$: for any MSP an increase in the weight of embarrassment, $-g(0, \tilde{q})$ decreases, thus diminishing the frequency of gift giving.

Finally, this one-sided model illustrates a central feature of psychological games and incorporating belief-dependent emotions into game theory more generally: simply modifying the payoffs of a traditional game to reflect players’ emotional reactions to physical outcomes cannot generate both gift-giving and non-gift-giving equilibria. Any single modification of payoffs in a traditional one-sided game would produce either a unique equilibrium or a continuum of equilibria, in the case where two or more strategies offer the same payoff. By contrast, the above game supports more than one pure-strategy psychological equilibrium (each with differing payoffs).

### 3.2 Two-sided simultaneous game

The action space for the two-sided game is $A = (A_1, A_2)$ where $A_2$ is defined as $A_1$ above. Let $\Sigma_2 = \Delta(A_2)$ be player 2’s set of mixed actions. Both players now have first and second-order beliefs. Let $r = E_1(pr(\sigma_2 = 1))$ be the probability player 1 assigns to player 2 taking the costly action. Similarly, let $\tilde{r} = E_2(E_1(pr(\sigma_2 = 1)))$ be the probability player 2 attaches to player 1’s first-order beliefs. With both players acting as both giver and receiver, their additive utility functions can be written as follows:

$$u_1 = -C_1(\sigma_1) + g_1(\sigma_1, \tilde{q}) + V_1(\sigma_2) + h_1(\sigma_2, r) , \tilde{q}, r \in [0, 1]$$

$$u_2 = -C_2(\sigma_2) + g_2(\sigma_2, \tilde{r}) + V_2(\sigma_1) + h_2(\sigma_1, q) , q, \tilde{r} \in [0, 1]$$
between players’ actions in this basic model, the two-sided simultaneous version is strategically equivalent to two one-sided games as described above. Expressed differently, the receiver’s utility \((V_1(\sigma_2) + h_1(\sigma_2, r))\), for player 1) is treated as a constant when the giver chooses between strategies. Depending on players’ psychological parameters, any one of four pure-strategy psychological equilibria may arise:

\[
\begin{align*}
\text{PSP a : } & q = \tilde{q} = \sigma_1^* = 1, \quad r = \tilde{r} = \sigma_2^* = 1 \\
\text{PSP b : } & q = \tilde{q} = \sigma_1^* = 1, \quad r = \tilde{r} = \sigma_2^* = 0 \\
\text{PSP c : } & q = \tilde{q} = \sigma_1^* = 0, \quad r = \tilde{r} = \sigma_2^* = 1 \\
\text{PSP d : } & q = \tilde{q} = \sigma_1^* = 0, \quad r = \tilde{r} = \sigma_2^* = 0
\end{align*}
\]

The next section compares this set of psychological equilibria to those obtained when the strategic interaction of players’ choices of actions is allowed.

4 Reciprocity and Gift Giving

“Give as much as you receive and all is for the best.” Maori proverb (Mauss, p.69)

“[A]s there is always a keen competition to be the most generous giver, a man who has received less than he gave will not keep his grievance to himself, but will brag about his own generosity and compare it to his partner’s meanness; the other resents it, and the quarrel is ready to break out.” (Malinowski, pp.97-98)

In the basic model presented above, only second-order beliefs directly affect a player’s choice of action. In a wide variety of gift exchanges, a player’s decision to give depends on her first-order beliefs. The economic anthropology literature on gift giving emphasizes its reciprocal nature in archaic societies. (See, for instance, Malinowski, pp.95-98, 166-167, and Polanyi (1977), pp.38-39, 93-94.) Mauss sums up the ostentatious displays of wealth associated with the potlaches of the native American tribes of the northern Pacific in which clans destroyed or gave away their most valued possessions as follows: “Outside pure destruction the obligation to repay is the essence of potlach,” (p.40). More recently, the obligation to reciprocate, in some form, a gift given has been documented
between prison inmates (Korn and McCorkle, 1954), couples dating (Belk and Coon, 1993), doctors and patients (Drew et al., 1983), parents and children (Homans, 1974; Schwartz, p.8) and employers and employees (Akerlof, p.550).

To capture the importance of reciprocity in gift giving, I add a fairness term to players’ utility functions: for player 1, \( \eta_1(\sigma_1, r) \) is a function of her choice of strategy and her beliefs about that of her opponent. \( \eta_1(\bar{\sigma}_1, \bar{\sigma}_2) \) then measures her actual fairness outcome.\(^9\) With the assumption that a player’s utility is additively separable across the monetary, psychological and fairness outcomes, player 1’s ex ante utility function can be written as\(^10\)

\[
u_1(\sigma_1, \bar{r}, r) = -C_1(\sigma_1) + g_1(\sigma_1, \bar{q}) + \eta_1(\sigma_1, r)
\] (18)

While the precise value of the fairness outcome depends on the particular situation (the individual, her relationship with her opponent, and the type of interaction), we might expect a minimum ordering among the values of possible pure-strategy outcomes to hold quite broadly. Reciprocating an opponent’s costly action with a similarly costly one might bring the giver a feeling of integrity or honor. By the same token, if you expect your opponent to take an inexpensive action you may feel justified in doing the same. These equal exchanges are assumed to contribute positively to players’ utility. Unequal exchanges are assumed to contribute negatively to utility: a player may feel cheated if she bears the expense of the costly action while her opponent takes the cheap one and guilty if the situation is reversed.\(^11\) Or, to use Mauss’ words, “the gift not

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\(^9\)Observe that the fairness term is not psychological in the sense of GPS. The actual payoff derived from the equality of the exchange depends on a comparison of the actions of the two players, and not on beliefs.

\(^10\)Player 2’s utility function, \( u_2(\sigma_2, \bar{r}, q) \), is similarly defined and the properties of the fairness term, \( \eta_1(\sigma_1, r) \), apply equally to \( \eta_2(\sigma_2, q) \).

\(^11\)It may strike some that player 1 might feel better off or “ahead of the game” if \( (\bar{\sigma}_1, \bar{\sigma}_2) = (0, 1) \). For instance, if a waiter provides you with excellent service (a costly action), you may feel like you “got away with something” in leaving no tip. This would of course imply that the monetary outcome outweighs the psychological and fairness considerations. Restricting attention to fairness, the outcome \((0, 1)\) makes player 1 feel guilty. To say that she does not is equivalent to saying that she places no importance on the equality of the exchange \((\eta_1(0, 1) = 0)\).
yet repaid debases the man who accepted it,” (p.63). The above leads to the following ordering among pure-strategy outcomes:

\[
\min \{ \eta_i(1,1), \eta_i(0,0) \} \geq 0 \geq \max \{ \eta_i(0,1), \eta_i(1,0) \}, \quad i = 1, 2.
\] (19)

**Definition 2** A mixed-strategy psychological fairness equilibrium of this game is a pair of triples \((\sigma_1^*, \tilde{q}^*, q^*)\) and \((\sigma_2^*, \tilde{r}^*, r^*)\) such that

i) \(\sigma_1^* = \tilde{q}^* = q^*\), \(\sigma_2^* = \tilde{r}^* = r^*\) and

ii) \(u_1(\sigma_1, \tilde{q}^*, r^*) \leq u_1(\sigma_1^*, \tilde{q}^*, r^*)\), \(\forall \sigma_1 \in \Sigma_1\), \(u_2(\sigma_2, \tilde{r}^*, q^*) \leq u_2(\sigma_2^*, \tilde{r}^*, q^*)\), \(\forall \sigma_2 \in \Sigma_2\).

Adding fairness to players’ utility functions affects the equilibrium strategies of the previous section in a way that is intuitive.\(^{13}\) Since equal (or fair) exchanges add positively to utility, psychological equilibria characterized by such exchanges will continue to be equilibrium outcomes when fairness is added. On the other hand, unequal exchanges that survive as psychological fairness equilibria must be psychological equilibria when fairness considerations are removed. The following results formalize this intuition for pure strategies.

**Proposition 3** The set of pure-strategy psychological equilibria (PSP) characterized by equal exchanges are also pure-strategy psychological fairness equilibria (PSPF). That is, PSPa and PSPd (from subsection 2.2) are also PSPF.

\(^{12}\)One reasonable assumption not made is that for exchanges of equal value, players may feel better about being generous than being stingy, \(\eta_i(1,1) > \eta_i(0,0)\).

\(^{13}\)Note that this simple and intuitive definition differs from Rabin’s psychological game-theoretic model of reciprocal fairness. His determination of whether or not someone is treating you fairly depends on what you believe that person’s motives to be. Motives, as Rabin illustrates, undoubtedly play an important part of fairness in many settings; yet they are never in question in this setting in which a player may choose an action costly to herself which benefits her opponent. Secondly, Rabin’s choice of utility function implies that people are not willing to sacrifice their own material payoff except to reciprocate their opponents’ actions. Material sacrifices are made only to help (hurt) someone who you believe is sacrificing to help (hurt) you. In my model, it is possible that your opponent takes the costly action while you take the costless one, or vice-versa. The desire to reciprocate may thus be offset by monetary or psychological considerations. Many gift-giving situations, particularly between parents and children, are characterized by unequal exchanges. These situations, typically explained by altruism, are absent from Rabin’s model.
Proposition 4  The set of pure-strategy psychological fairness equilibria (PSPF) characterized by unequal exchanges are also pure-strategy psychological equilibria (PSP).

Proof: See Appendix.

An implication of the above analysis is that if fairness is sufficiently important, its addition may rule out psychological equilibria characterized by unequal exchanges. Two people attempting to establish relations who pay close attention to the equity of their exchange will arrive at a different equilibrium outcome than a gift exchange between a mother and daughter. Unequal exchanges that do survive as psychological fairness equilibria reflect monetary or emotional considerations which dominate fairness, as in the case of a donor to a charity. Finally, equal exchanges that are psychological fairness equilibria may not be psychological equilibria if fairness is an important feature of the interaction while emotions are not, as might be expected in contractual relationships between, say, workers and absentee employers, or in other relationships of mutual dependency in their initial stages.

5 Efficiency, Welfare, and Holiday Gift Giving

Bringing emotions into the purview of game theory and utility maximization has important ramifications for efficiency and welfare. This section offers an expanded notion of welfare which takes emotions into account and examines it in the context of holiday gift giving.

Two previous surveys measure the welfare impact of holiday gift giving. Waldfogel, and Solnick and Hemenway (hereafter S&H) measure the inefficiency of gift giving by comparing recipients’ willingness to pay for the gifts they received or their willingness to accept (an amount in cash) not to have the gifts with their cost estimates of the gifts. The difference between the willingness to pay (accept) and the cost estimates equals the inefficiency or deadweight loss. Waldfogel finds that the deadweight loss of holiday gift giving is between 10 percent and a third of the value of the gifts. S&H
replicate Waldfogel’s study and find a 214% welfare gain associated with holiday gift giving. Yet in both studies, asking recipients their willingness to pay or accept and, further, explicitly instructing them to exclude any sentimental value from these value estimates remove them from the emotional context in which the gift may have been given. For an institution like gift giving in which emotions and reciprocity considerations may form a component of participants’ welfare assessments, this measure of inefficiency seems inappropriate. Instead, it compares the monetary cost of the gift to the receiver’s monetary valuation.

Waldfogel’s and S&H’s measure of the efficiency of an institution (gift giving) is really one of monetary welfare-improvingness. It can be defined as follows:

**Definition 3** An institution or policy is monetarily welfare-improving if and only if the system of transactions associated with it, \( \{\hat{\sigma}_{ij}\}_{i=1}^{n}, \{\hat{\sigma}_{ij}\}_{j=1}^{m} \), satisfy

\[
\sum_{i=1}^{n} \sum_{j=1}^{m} C_i(\hat{\sigma}_{ij}) \leq \sum_{i=1}^{n} \sum_{j=1}^{m} V_j(\hat{\sigma}_{ij}),
\]

where \( C_i(\hat{\sigma}_{ij}) = V_j(\hat{\sigma}_{ij}) = 0 \) if there is no transaction from \( i \) to \( j \). \( \hat{\sigma}_{ij} \) refers to the action taken by player \( i \) whose consequence is felt by player \( j \). \( n \) and \( m \) indicate the numbers of givers and receivers respectively (\( n \) need not equal \( m \)).

This traditional notion of welfare-improvingness requires the monetary cost of an institution or policy be less than or equal to its monetary valuation. In psychological games, emotions belong in any definition of welfare.

**Definition 4** An institution or policy is welfare-improving if and only if the system of transactions associated with it, \( \{\hat{\sigma}_{ij}\}_{i=1}^{n}, \{\hat{\sigma}_{ij}\}_{j=1}^{m} \), satisfy

\[
\sum_{i=1}^{n} \sum_{j=1}^{m} [C_i(\hat{\sigma}_{ij}) - g_i(\hat{\sigma}_{ij}, q_{ij}) - \eta_i(\hat{\sigma}_{ij}, \hat{\sigma}_{ji})] \leq \sum_{i=1}^{n} \sum_{j=1}^{m} [V_j(\hat{\sigma}_{ij}) + h_j(\hat{\sigma}_{ij}, q_{ji}) + \eta_j(\hat{\sigma}_{ji}, \hat{\sigma}_{ij})],
\]

\(^{14}\)Ruffe and Tykocinski (1998) design a series of controlled experiments and show that the opposite findings of the two studies are the result of different willingness-to-accept questions, and not subject pool differences as S&H claim.
where all functions in the above expression = 0 if there is no transaction from $i$ to $j$. $q_{ji}$ refers to player $j$’s first-order beliefs about $i$’s choice of action. Player $i$’s second-order beliefs, $\tilde{q}_{ij}$, refer to $i$’s beliefs about $j$’s beliefs about $i$’s choice of action.

In words, an institution is said to be welfare-improving if the total costs of the givers’ actions (monetary, psychological, and fairness) are less than the recipients’ total valuations of these actions (monetary, psychological, and fairness). Or, a welfare-improving institution is one whose existence makes people better off (by adding non-negatively to the total utility of the players’ involved).

For the PSP of section two, the notions of monetary welfare and (total) welfare are equivalent. With the absence of emotions in PSP, the change in welfare of institutions characterized by such equilibrium outcomes depends solely on a comparison of monetary costs and valuations. However, casual empiricism gives us reason to believe that MSP are equally as relevant to gift giving. All four of the basic model’s emotions – surprise, pride, embarrassment, and disappointment – are a part of gift giving. Beliefs which differ from the gifts given elicit these emotions. Beliefs differing from outcomes may arise from incomplete information or the giver’s preference to mix in order to surprise the recipient. The social norms that it is inappropriate to ask the receiver what he wants as a gift and considered rude for him to tell the giver facilitate inaccurate beliefs. The result is that the gifts expected often differ from those given, particularly in those relationships where the parties do not know each other well. In the case where the parties are well acquainted, mixing may be intentional in order to benefit from the positive emotions associated with surprising the receiver.

Are the strictly MSP of this model welfare-improving? For the giver they are not.

**Proposition 5** Any MSP generates negative utility for the giver.

Proof: All PSP (degenerate MSP) contribute negatively to the utility of the giver. The monetary term $-C(\sigma_1)$ of the giver is negative by definition and there are no psychological effects in PSP.

For any strictly MSP, $u_1(1, \tilde{q}) = u_1(0, \tilde{q})$
\[-C_1(1) + g(1, \tilde{q}) = -C_1(0) + g(0, \tilde{q})\]

and 
\[-C_1(0) + g(0, \tilde{q}) \leq 0 \quad \text{(since } -C_1(0) \leq 0 \text{ and } g(0, \tilde{q}) \leq 0)\]

thus, 
\[-C_1(1) + g(1, \tilde{q}) \leq 0\]  \hfill \Box

The proof of Proposition 5 reveals that the giver’s pride term can never exceed the monetary cost of the gift \(g(1, \tilde{q}) \leq C_1(1)\) in any MSP. But ultimately, whether MSP are welfare-improving requires the receiver’s gain to outweigh giver’s welfare loss. That is, MSP are welfare-improving in this model if and only if:

\[V_2(\hat{\sigma}_1) + h(\hat{\sigma}_1, q) \geq C_1(1) - g(1, \tilde{q}) = C_1(0) - g(0, \tilde{q})\]

For many kinds of gifts, this is quite probable. Consider the common practice of bringing home small trinkets from a vacation for friends and family. A small, plastic replica of the Taj Mahal probably has little monetary value to the recipient, while the giver may well have paid an exorbitant price in an Indian tourist shop. \((C_1(\hat{\sigma}_1) > V_2(\hat{\sigma}_1)).\) Yet we give such gifts with pride and joy and the receivers surely appreciate them, for they indicate that we took the time to think of them while on vacation halfway around the world. Therefore, although these souvenirs may be monetarily welfare-reducing they are welfare-improving.

At the same time, goods that are monetarily welfare-improving may be welfare-reducing if they disappoint the recipient sufficiently. This may occur if, for instance,

\(^{15}\)Flowers are another example of a gift ill-suited for Waldfogel’s notion of efficiency. Anyone who has ever brought home flowers for a mother or spouse as a surprise understands the importance of the psychological component of own’s evaluation.

\(^{16}\)Nowhere is the monetary welfare-reducing but overall welfare-improving property of gift giving more beautifully illustrated than in O. Henry’s classic short story “The Gift of the Magi”. The story tells of a poor young couple who sacrifice their most precious possessions in order to buy each other Christmas gifts. So that she can buy her husband, Jim, a platinum fob chain for his watch that has been passed down from his grandfather and father, Della sells her gorgeous knee-length hair. Ironically, to buy Della combs for her hair that she has long admired, Jim sells his watch. The outcome represents a two-sided coordination failure. Having sold the goods that are the essential complements of the gifts they received from one another, are the two traumatized with their gifts which have zero monetary value? Not at all. They are delighted with them!
you were expecting more (than you received). You may value a bicycle at an amount
greater than your parents paid for it, however, it may still disappoint you if you were
expecting a more sophisticated means of transportation for your birthday present, like
a car!

The normative implication of this analysis is that gift givers with high psychological
terms or givers who believe the receiver is sensitive to emotions should spend more
time attempting to maximize their psychological payoff. Find out secretly what the
recipient wants (through better informed sources or subtle, unsuspecting questions to
the recipient, so that she does not anticipate the gift). Surprise and pride come from
the type or value of the gift or from the gift’s timing. A pair of roller blades on your
birthday when a shirt and socks were expected, a check from your aunt and uncle for your
birthday for $50 when last year you received $20, or flowers received unexpectedly all
bring pleasant surprise to the receiver while making the giver feel proud. Those people
who spontaneously buy gifts obtain joy in surprising others. These are the people with
high $g(1, 0)$ values.

At the other extreme is the shopper who sets out with a list in hand from the receiver
indicating precisely what he wants and therefore expects. There is little or no utility to
be gained from the psychological component in fulfilling his expectations – no room for
surprise. Rather, the best the giver can do is to purchase a monetarily welfare-improving
gift, a bargain. Pursuing such a strategy may indicate that either the giver has low
psychological weights or her belief that the receiver does. Alternatively, her bargain
hunting may stem from not knowing well the recipient’s preferences in conjunction with
an aversity to negative emotions. This explains the customary gifts exchanged in
the early stages of courtship. Chocolates, flowers, dinners out and stuffed animals are
routine gifts between couples in the preliminary stages of dating. This relatively narrow
set of gifts reflects the couple’s coordination on a pure-strategy, gift-giving equilibrium
and thus their wish to avoid the embarrassment associated with the “wrong” type of
gift, or no gift at all. More personal gifts, like clothing or perfume and cologne, appear
only after the couple become better acquainted with one another’s preferences, thereby

$^{17}$The recipient who gave the list to the giver in the first place either has low expectations from the
giver or is also averse to negative emotions.
reducing the risk of negative emotions.

Finally, enter the role of the recipient. Strategic receivers will want to act surprised. By doing so, they lower givers’ second-order beliefs bringing into play givers’ high pride \((g(1, 0))\) terms. Practically, this may mean more gifts in the future for the seemingly appreciative receiver. Faking surprise is welfare-improving and helps to explain why asking for what you want is considered rude: it spoils the credibility of acting surprised.

6 Applications

The tipping of a server by a client is a convention not well explained by traditional economic theory. To offer the server a tip in a restaurant often frequented by the customer can be understood as an attempt to assure good service in the future. Leaving a tip is thus strategic behavior. Yet in the absence of an enforcement mechanism – a one-time visit to a restaurant by a tourist in a foreign land, for example – why would a utility-maximizing agent leave any tip at all?

In fact, Kahneman, Knetsch and Thaler (KKT) (1986) offer evidence that people tip just as much in situations void of strategic incentives. That is to say, the strategic incentive to tip appears to be insignificant.

Emotions such as pride, embarrassment and guilt need to be brought into economic analysis if we hope to understand this behavior. The level of service provided by the employee depends on the tip she expects to receive from the client. Her beliefs as to the amount of tip she can expect may depend on observables like the client’s age, nationality, or wealth. A server in a restaurant in a developing country may expect a larger tip from, and thus offer a higher level of service to, an American tourist than from a poorer native

\[18\] In an extensive survey on fairness, KKT pose the following two questions:

**Question 1:** If the service is satisfactory, how much of a tip do you think most people would leave after ordering a meal costing $10 in a restaurant that they visit frequently?
**Answer 1:** Mean response: $1.28  (N=122)

**Question 2:** If the service is satisfactory, how much . . . in a restaurant on a trip to another city that they do not expect to visit again?
**Answer 2:** Mean response: $1.27  (N=124).
of the country. One very counterintuitive, normative implication of this analysis is that a client who believes he is incorrectly perceived by the server as a cheap tipper (his $\hat{q}$ is low) should offer the tip up front (before the service is provided) to ensure good service, as long as he believes that the server’s psychological and fairness weights are not too low.\textsuperscript{19}

There are some situations where a client may not know if or how much of a tip is expected. If in a foreign country he may inquire as to the customary tipping practice. His question is an attempt to acquire appropriate beliefs about what the worker expects to receive (the client’s $\hat{q}$). An economist’s reflex response might be to ask why anyone would obtain costly information if one only cared about his own material payoff. Feelings clearly do matter.

Another domain where this model may be applied is industrial relations. My model suggests that bonuses, lunches or afternoons off when given as a surprise may be very effective forms of compensation for the employer. The positive feelings of surprise and gratitude that result from such compensation policy may tangibly lead to higher effort levels chosen by workers, positive publicity for the firm, better relations between workers and management and a greater sense of worker commitment to the firm – all elements that one would want to incorporate in any comprehensive welfare assessment of a firm’s wage-setting policy. Furthermore, if these forms of compensation are to be used repeatedly, there is the danger that they lose their effectiveness as a surprise and that they disappoint the employee in their absence. This provides employers with the challenge of randomizing the regularity, timing, type, and amount of such bonuses in order that employees continue to differentiate them from regular wages and salaries.

Additionally, when such rewards are given as surprise gifts, they help to preserve employees’ intrinsic job motivation. Research in motivational psychology establishes that monetary incentives tied tightly to performance can sometimes crowd out one’s inherent motivation to perform a task, particularly if the task is interesting or the relationship between employee and employer personal.\textsuperscript{20} Thus, piece rate or highly

\textsuperscript{19}Students are such clients.

\textsuperscript{20}Frey (1997) offers a thorough coverage of this crowding-out effect and its relevance to a variety of economic, political and social settings.
performance-contingent forms of monetary compensation displace intrinsic effort (and should be reserved for repetitive tasks in which work morale is inherently low). On the other hand, rewards that are more subtly or loosely linked to individual performance, like unanticipated gifts, can serve to support intrinsic motivation.

By the same token, if an employer must cut wages or implement some policy which will adversely affect workers, the employer should try first to lower workers’ expectations. This can be done by taking some action which signals to workers that an upcoming decreased wage is unavoidable. Announcing the firm’s (shrinking) profits or a supplier’s price increase or cutting the board of director’s salaries may achieve this. By lowering workers’ expectations and thus preparing them for the blow to come, disappointment (which may translate into low worker morale or shirking) can be minimized. In good times, workers can similarly attempt to affect the second-order beliefs of firms. By letting management (and the general public) know that they expect to share in the company’s successes, management may concede to avoid (public) embarrassment.

7 Concluding Remarks

Formal banking and insurance systems and markets have replaced gift giving as a means of insurance, borrowing, lending and trade in most parts of the world. Yet (over)spending on Christmas gifts, wedding and birthday presents, charitable donations, and bequests all testify to the central role gifts continue to play in modern society. Gift giving on such occasions seems to be driven, in part, by sentiments for, and the desire to surprise, the receiving party. Social customs like the wrapping of gifts and the impertinence of requesting the gift you want all heighten the receiver’s surprise. In addition, by meeting or exceeding expectations, gift giving in commercial relations serves to preserve or enhance participants’ motivation and commitment to the relationship.

This paper presents a two-player, psychological game-theoretic model of gift giving which incorporates a class of surprise-related emotions. The equilibrium requirement that beliefs correspond to actions precludes the existence of emotions in all pure-strategy equilibria of the model: givers give the gift that is expected of them whenever the psycho-
logical cost of embarrassment exceeds the monetary cost of the gift itself (eg. a customer choosing to tip in accordance with the social norm). No gift is given if the psychological benefit derived from surprising the receiver does not merit the monetary cost of the gift. Mixed-strategy equilibria are therefore of special interest for their ability to permit emotions in equilibrium. Employers engaged in long-term relationships with their employees may want to develop positive worker sentiments by offering unanticipated rewards and bonuses. Even allowing for emotions, all equilibria of the model yield negative utility for the giver. Still, an attempt to minimize her loss or a desire to maximize the gift recipient’s gain may motivate her to surprise the receiver either through the timing or the choice of gift. On gift-giving occasions when a giver does not know a recipient’s preferences, she may be well-advised to stick to an appropriate conventional gift like chocolates, flowers, wine or money to minimize the welfare loss.

References


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Appendix: Proofs

Proof of Proposition 1: Solving for the PSP in the one-sided game is simply a utility maximization problem given extreme beliefs.

\[ \sigma_1 = 1 \geq \sigma_1 = 0 \iff u_1(1, \tilde{q}) \geq u_1(0, \tilde{q}) \]
\[ \iff -C_1(1) + g(1, \tilde{q}) \geq -C_1(0) + g(0, \tilde{q}) \]
\[ \iff g(1, \tilde{q}) - g(0, \tilde{q}) \geq C_1(1) - C_1(0) \tag{20} \]

Substituting beliefs consistent with the expensive action in (20) gives rise to the first pure-strategy psychological equilibrium.

\textbf{PSP1}: \( q^* = \tilde{q}^* = \sigma_1^* = 1 \).

This equilibrium exists if and only if \( -g(0, 1) \geq C_1(1) - C_1(0) \).

The condition under which the cheap action is preferred is similarly computed,

\[ \sigma_1 = 0 \geq \sigma_1 = 1 \iff u_1(0, \tilde{q}) \geq u_1(1, \tilde{q}) \tag{21} \]

with the solution to this inequality yielding the second pure-strategy equilibrium.

\textbf{PSP2}: \( q^* = \tilde{q}^* = \sigma_1^* = 0 \).

This equilibrium exists if and only if \( g(1, 0) \leq C_1(1) - C_1(0) \).

To see why there does not exist a PSP for \( -g(0, 1) < C_1(1) - C_1(0) < g(1, 0) \), first consider the case where \( q = \tilde{q} = 1 \). Here, player 2 is expecting player 1 to take the costly action \( (q = 1) \)
and player 1 knows this \((\tilde{q} = 1)\). From the ordering of functional values we see that the cost differential of the two actions exceeds the cost of embarrassment. It follows that player 1 would prefer to take the cheap action and suffer embarrassment rather than incur the expense of the costly action. Player 1’s action does not therefore correspond to players’ beliefs; thus, there does not exist a pure-strategy psychological equilibrium where \(q = \tilde{q} = 1\) for the above range of values.

For the case where player 2 expects player 1 to choose the costless action known by player 1 \((q = \tilde{q} = 0)\), player 1 actually prefers to take the costly action. Since the utility from the pride exceeds the cost differential of the two actions, she prefers to take the expensive action, contrary to players’ beliefs.

Proof of Proposition 2: I refer the interested reader to GPS for the original existence theorem for MSP in psychological games. I prove the existence of mixed-strategy psychological equilibria directly and for the region 

\[-g(0,1) < C_1(1) - C_1(0) < g(1,0)\] 

(where there does not exist a PSP).

The proof follows from the continuity of \(g(\tilde{\sigma}_1, \tilde{q})\) with respect to \(\tilde{q}\). The cost differential between actions in the right-hand side of (11) is a (positive) constant. The left-hand side is the sum of two functions, \(g(1, \tilde{q})\) and \(-g(0, \tilde{q})\), both of which are continuous; thus, their sum is also continuous. For \(\tilde{q} = 0\), \(g(1, 0) - g(0, 0) = g(1, 0) > C_1(1) - C_1(0)\). For \(\tilde{q} = 1\), \(g(1, 1) - g(0, 1) = -g(0, 1) < C_1(1) - C_1(0)\). Because \(g(1, \tilde{q}) - g(0, \tilde{q})\) is continuous in \(\tilde{q}\), there must exist some \(\tilde{q} \in (0, 1)\) such that (11) holds by the Intermediate Value Theorem. Although the functions \(g(1, \tilde{q})\) and \(-g(0, \tilde{q})\) are monotonically decreasing and increasing, respectively, their sum may be non-monotonic in \(\tilde{q}\); therefore, the MSP is not necessarily unique. Rather, the functional forms of \(g(1, \tilde{q})\) and \(-g(0, \tilde{q})\) determine the number of MSP.

Proof of Proposition 3: i) recall PSPa: \(\sigma_1 = \tilde{q} = q = 1, \sigma_2 = \tilde{r} = r = 1\).

In order for this to be a psychological fairness equilibrium (PSPFa), the following must be true

\[u_i(1, 1, 1) \geq u_i(0, 1, 1) \text{ for } i = 1, 2\] 

\(\Leftrightarrow\) \(-C_i(1) + g_i(1, 1) + \eta_i(1, 1) \geq -C_i(0) + g_i(0, 1) + \eta_i(0, 1)\) 

\(\Leftrightarrow\) \(-g_i(0, 1) + \eta_i(1, 1) - \eta_i(0, 1) \geq C_i(1) - C_i(0)\)
Equation (24) must necessarily hold. Recall the necessary condition for PSPa: \(-g_i(0, 1) \geq C_i(1) - C_i(0)\). Adding \(\eta_i(1, 1) - \eta_i(0, 1) \geq 0\) (by (19)) to this condition maintains the desired inequality.

ii) recall PSPd: \(\sigma_1 = \tilde{q} = q = 0, \sigma_2 = \tilde{r} = r = 0\).

If PSPd obtains, then it is also a psychological fairness equilibrium (PSPFd) only if

\[
\begin{align*}
\eta_i(0, 0) &\leq 0 \\
\eta_i(1, 0) - \eta_i(0, 0) &\leq C_i(1) - C_i(0)
\end{align*}
\]

We know \(\eta_i(0, 0) = 0\) by (19). Therefore, adding this term to the necessary condition of PSPd, \(g_i(1, 0) \leq C_i(1) - C_i(0)\), preserves the desired inequality.

**Proof of Proposition 4**: Consider the two-sided, pure-strategy psychological fairness equilibrium (PSPFb):

\(\sigma_1 = \tilde{q} = q = 1, \sigma_2 = \tilde{r} = r = 0\). For this to be an equilibrium it must be the case that

\[
\begin{align*}
u_i(1, 1, 0) &\geq u_i(0, 1, 0) \quad \text{for } i = 1, 2 \\
\iff -C_i(0) + g_i(0, 0) + \eta_i(0, 0) &\geq -C_i(1) + g_i(1, 0) + \eta_i(1, 0) \\
\iff g_i(1, 0) + \eta_i(1, 0) - \eta_i(0, 0) &\leq C_i(1) - C_i(0)
\end{align*}
\]

If equation (30) holds, then the one-sided equilibrium PSP1 also obtains; for \(\eta_i(1, 0) - \eta_i(0, 0) \leq 0\) by (19) and \(-g_i(1, 0) \geq C_i(1) - C_i(0)\) is the necessary condition for PSP1.

For player 2, PSPFb requires that

\[
\begin{align*}
u_2(0, 0, 1) &\geq u_2(1, 0, 1) \\
\iff -C_2(0) + g_2(0, 0) + \eta_2(0, 1) &\geq -C_2(1) + g_2(1, 0) + \eta_2(1, 1) \\
\iff g_2(1, 0) &\leq C_2(1) - C_2(0) + \eta_2(1, 0) - \eta_2(0, 0)
\end{align*}
\]

Equation (33) implies \(g_2(1, 0) \leq C_2(1) - C_2(0)\), the necessary condition for PSP2. This follows directly from the observation that \(\eta_2(0, 1) - \eta_2(1, 1) \leq 0\) (by (19)).

The same proof can be used to show that if player 1 chooses the costless action and player 2 the costly one, and, with the appropriate beliefs, these choices form a psychological fairness equilibrium (PSPFc), then this must also be a psychological equilibrium (PSPc). \(\Box\)