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BRIEF REPORTS

Is there a magnitude effect in tipping?

LEONARD GREEN, JOEL MYERSON, and RACHEL SCHNEIDER
Washington University, St. Louis, Missouri

The present study examined nearly 1,000 tips recorded for two taxicabs, two hair salons, and two restaurants. In each of the six cases, amount of tip increased linearly as a function of the amount of the bill. Contrary to standard microeconomic theory, there was a *magnitude effect* in that as the amount of the bill increased, the percent tip tended to decrease. The present results extend the findings of Chapman and Winquist (1998), obtained using hypothetical scenarios, to real-world tipping behavior. Chapman and Winquist argued that a magnitude effect in tipping reflects the shape of the utility function for money. We suggest, however, that the magnitude effect may be the mathematical consequence of replotting the fundamental relationship between tip and bill amounts in terms of percent tip, given that the observed linear relation between tip and bill amounts has a positive intercept. We suggest further that the positive intercept arises because a tip represents a judgment as to what constitutes a fair or equitable wage, and part of what constitutes a fair wage is independent of the amount of the bill, reflecting compensation for simply being there when needed. The present account implies that different explanations may be needed for magnitude effects observed in different domains.

Recent findings reveal that there are a number of aspects of choice behavior that represent anomalies from the perspective of standard microeconomic theory (Loewenstein, 1987; Loewenstein & Thaler, 1989). Such anomalies have contributed to the development of behavioral economic alternatives to standard theory that call attention to the psychological aspects of decision making (Thaler, 1992). The present study focuses on one such anomaly: the magnitude effect.

Standard microeconomic theory assumes that the relative value of an outcome is independent of its absolute value (Samuelson, 1937; for a discussion, see Loewenstein & Prelec, 1992). For example, standard microeconomic theory implies that the relative value of a $1,000 gain available in a year is the same as the relative value of a $100,000 gain available in a year, where relative value is the immediate subjective value divided by the nominal amount. Thus, if a $1,000 gain available in a year has an immediate subjective value of $500, then a $100,000 gain available in a year should have an immediate subjective value of $50,000 (in both cases, the relative value is equal to 0.5).

In contrast, psychological research has revealed a magnitude effect with delayed outcomes. That is, the relative value of an outcome depends on its absolute magnitude so that, for example, the relative value of a $1,000 gain available in a year is typically less than the relative value of a $100,000 gain available in a year. Green, Myerson, and McFadden (1997) showed that as the absolute magnitude of a delayed gain increases, the rate at which it is discounted decreases. Thus, with delay held constant, the relative value of a large delayed gain is greater than the relative value of a small delayed gain (see also Green, Fry, & Myerson, 1994; Kirby 1997; Raineri & Rachlin, 1993). In addition to the anomalous magnitude effect with delayed outcomes, just described, Green, Myerson, and Ostaszewski (1999) have shown that there is an anomalous magnitude effect with probabilistic outcomes. In the latter case, however, with probability held constant, the relative value of a large probabilistic gain is less than the relative value of a small probabilistic gain.

Chapman and Winquist (1998) hypothesized that there also may be a magnitude effect in tipping in that people tend to leave relatively larger tips on smaller bills and relatively smaller tips on larger bills (i.e., the percent tip is larger when the bill is smaller). Participants in the Chapman and Winquist study were asked how large a tip they would give in hypothetical scenarios involving four different bill amounts in each of three different domains: restaurant meals, taxicab rides, and haircuts. In two of the three domains (restaurant meals and haircuts), Chapman and Winquist observed a significant magnitude effect: Percent tips were larger with smaller bills.

When people were asked to recall their real-world behavior, however, there was a reliable relationship between percent tip and amount of the bill in only one domain (Chapman

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& Winquist, 1998). That is, participants were asked to recall how much they had spent on their last restaurant meal, taxicab ride, and haircut, and how large a tip they had given. Although there was a significant negative correlation between percent tip and amount of bill for restaurant meals, the correlation between percent tip and amount of bill was not significant for either taxicab rides or haircuts.

The absence of significant correlations in the latter two domains might well have been due to the unreliability of people's memory or simply to a lack of statistical power. In addition, the experimental portion of the study may have biased participants' recall of past tips and bills. Thus, the question remains whether there is a reliable magnitude effect in people's actual tipping behavior. In order to answer this question, the present study examined a relatively large body of data (close to 1,000 tips) recorded by taxicab drivers, hair stylists, and restaurant servers.

Tipping provides a unique opportunity to examine how people make real-world judgments regarding the value of others' services. Tipping decisions are independent of labor market forces because they are made after services have been rendered. Absent such economic considerations, the psychological processes involved may be revealed more clearly. Moreover, if a magnitude effect were to be observed, this finding (like the magnitude effect in discounting) would represent an anomaly from the perspective of standard microeconomic theory and would invite a psychological, rather than an economic, explanation.

METHOD

Participants

Two taxicab drivers, 4 hair stylists at two salons, and 4 servers at two restaurants agreed to participate and record data on forms provided by the experimenters. The participants were not informed as to the hypothesis of the study.

Procedure

Over a period of several weeks, the taxicab drivers recorded the fare, the amount of the tip, the number of riders, and the number of bags of luggage for each ride. The restaurant servers recorded the amount of the bill, the amount of the tip, the number of people, and whether payment was in cash or by credit card for each party they served over a period of several months. The hair stylists recorded the amount of the charge and the amount of the tip for each customer served over a period of several months. The maximum amount of bill for both taxicabs, both hair salons, and one of the restaurants was less than \$100. Therefore, with respect to the other restaurant (where the maximum bill was \$274), only data from bills less than \$100 were used in order to increase the comparability of data across the three domains. In keeping with the present focus on determining what is general across tipping domains, only those variables that could be examined within all three domains—namely, amount of bill and amount of tip—were included in the analyses.

RESULTS AND DISCUSSION

Figure 1 shows that, perhaps not surprisingly, the amount of the tip tended to increase with the amount of the bill for each of the tipping domains (taxicabs, restaurants, and hair salons). Separate regression analyses were conducted for each of the two taxicabs, salons, and restaurants. For each of these six cases, absolute amount of tip was regressed on the amount of the bill (Table 1). In each case, the slope of the regression was significant (all $ps < .005$), and the intercept was significantly greater than 0.0 (all $ps < .005$).

The major issue in the present study was whether there is a magnitude effect in tipping, more specifically, whether percent tip decreases significantly with the amount of the

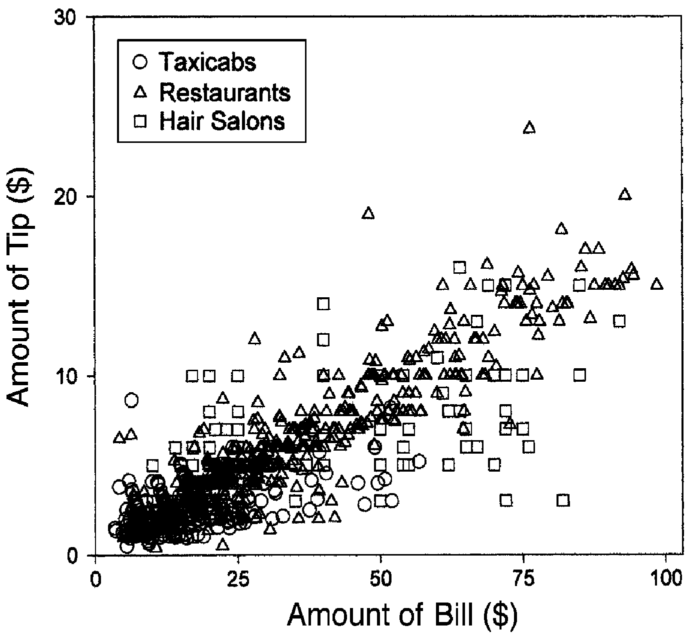

Figure 1. Amount of tip as a function of amount of bill for each of the three tipping domains.

Table 1
Means and Standard Deviations of Amount of Bill and Number of Data Points for Each Sample in Each Tipping Domain, as Well as the Slopes, Intercepts, and Correlations for the Amount of Tip and Percent Tip as Functions of the Amount of the Bill

		Amount of Bill ($)		Amount of Tip			Percent Tip		
	N	*M*	*SD*	Slope	Int	*r*	Slope	Int	*r*
Cabs									
V	139	12.94	6.68	0.039	1.59	.264	−0.946	31.71	−.464
X	99	19.18	12.71	0.071	1.36	.608	−0.439	26.33	−.433
Restaurants									
C	157	25.31	11.88	0.123	1.30	.685	−0.429	30.66	−.339
F	276	44.26	21.54	0.169	0.67	.907	−0.041	20.66	−.210
Salons									
M	192	39.52	20.31	0.083	2.35	.581	−0.214	24.89	−.480
J	86	28.88	14.04	0.109	2.65	.582	−0.227	28.22	−.385

Note—All slopes and intercepts were significantly different from 0.0 at $p < .005$.

bill. In order to address this issue, percent tip (i.e., 100 × tip/bill) was regressed on the amount of the bill. The regression slopes were negative in each of the six cases analyzed (i.e., both taxicabs, hair salons, and restaurants; all ps $< .005$; Table 1). This finding represents a magnitude effect in real-world tipping behavior, and is similar to that observed with hypothetical tipping scenarios by Chapman and Winquist (1998). As Chapman and Winquist pointed out, this magnitude effect represents an anomaly from the perspective of standard microeconomic theory.

Chapman and Winquist (1998) interpreted the magnitude effect in terms of the shape of the utility function for money (i.e., the function describing the relationship between subjective value and amount). Their interpretation assumes that when people decide how much of a tip to leave, the decision is not based on the ratio of the amount of tip to the amount of bill. Rather, Chapman and Winquist's interpretation assumes that people decide how much tip to leave on the basis of the ratio of the subjective value of the tip to the subjective value of the bill.

Chapman and Winquist (1998) based their interpretation on Loewenstein and Prelec's proposal regarding the shape of the utility function (Loewenstein & Prelec, 1992; Prelec & Loewenstein, 1991). Loewenstein and Prelec proposed that the shape of the utility function is such that if the ratio of actual amounts of money is held constant (e.g., 1 to 5), the ratio of a smaller pair of amounts seems to be less than the ratio of a larger pair of amounts. Loewenstein and Prelec termed this phenomenon "increasing proportional sensitivity" (IPS). Thus, for example, the ratio of $2 to $10 seems smaller than the ratio of $10 to $50. Consequently, Chapman and Winquist suggested, one would have to leave more than a $2 tip on a bill of $10 for it to seem equivalent to a $10 tip on a bill of $50. It should be noted, however, that the IPS property does not greatly constrain the shape of the utility function or (as a result) the form of the relationship between the amount of the bill and the amount of the tip.[1]

Moreover, there is evidence that argues against a general account of magnitude effects in terms of the shape of the utility function. Green et al. (1999) have shown that there are magnitude effects in decisions involving both delayed and probabilistic gains. In the former case (i.e., with delayed gains), the relative subjective value of a large delayed gain is greater than the relative subjective value of a small delayed gain. In the latter case, however (i.e., with probabilistic gains), the relative subjective value of a large probabilistic gain is less than the relative subjective value of a small probabilistic gain. Given that, in principle, the utility function for money should be the same regardless of whether gains are delayed or probabilistic, one would not expect amount to have opposite effects in the two cases.

There is a simple, alternative account of the decrease in percent tip as a function of the amount of the bill that does not rely on the shape of the utility function. As noted previously, the regression of amount of tip (T) on amount of bill (B) had a positive slope and a positive intercept (Table 1):

$$T = m{*}B + c. \quad (1)$$

It follows, then, that the percent tip, $\%T$ (where $\%T = 100 * T/B$, and $B > 0$), is given by

$$\%T = 100 * (m + c/B). \quad (2)$$

Note that as B increases, the percent tip decreases, asymptoting at m. Thus, the observed magnitude effect is consistent with the positive slope and intercept of the regression of amount of tip on amount of bill. Indeed, the observed nonlinear relation between percent tip and amount of the bill follows the form predicted by Equation 2 (see Figure 2; the solid curve represents the fit of Equation 2 to the data; $R^2 = .198$).[2]

One would expect, on the basis of Equation 2, that if one were to use linear regression to examine the relation between percent tip and amount of the bill over different ranges of amounts, the slope of the regression line would depend on the amounts examined. For example, the slope of the linear regression for amounts under $10 would be steeper (i.e., more negative) than the slope for amounts between $10 and $25. As the amounts get even larger, the

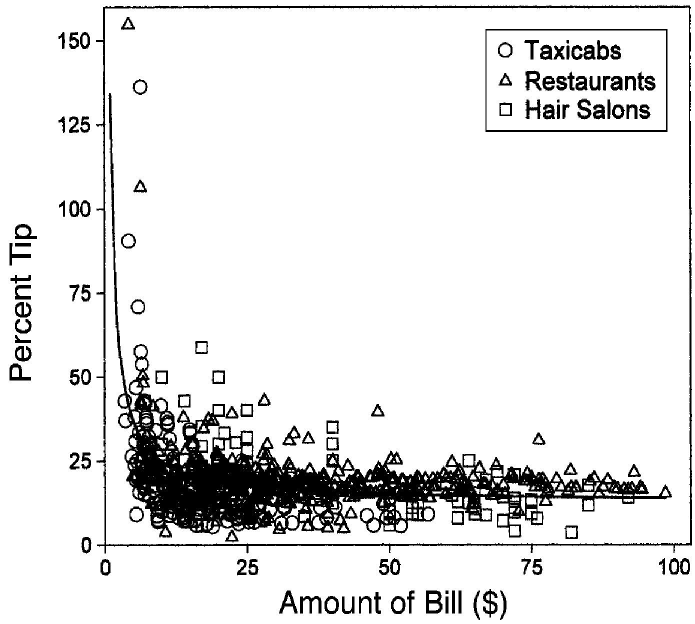

Figure 2. Percent tip as a function of amount of bill for the data from each of the three tipping domains. The curved line is Equation 2 fit to the data.

slope of the regression line would become progressively less negative, ultimately approaching zero.[3]

The linear regression results for each of the two taxicabs, salons, and restaurants are consistent with this expectation. Indeed, much of the variation in the regression slopes for percent tip presented in Table 1 may be accounted for by differences in the mean amounts of the bills. This may be seen in Figure 3, which plots these slopes as a function of mean amount of bill. As the mean bill increases, the regression slopes become progressively less negative, gradually approaching zero. Indeed, when the data from bills greater than $100 (38 bills ranging from $102 to $274 that previously had been excluded) were analyzed, the slope (−0.005) of the regression of percent tip on amount of bill did not differ significantly from 0.0.

If one assumes that the linear relationship between amount of tip and amount of bill (i.e., Equation 1) is fundamental, then the magnitude effect observed with percent tip follows as a simple mathematical consequence. Of course, what one considers to be fundamental, the relationship between amount of tip and amount of bill or the magnitude effect itself, depends on one's hypothesis as to the psychological processes involved in tipping. Several psychological accounts of tipping have been offered. Most notably, tipping has been explained in terms of compliance with social norms, seeking social approval (or avoiding disapproval), maintaining equitable relationships, and buying future services (e.g., Lynn & Grassman, 1990). Although these accounts could potentially explain the positive relationship between amount of bill and amount of tip, none of these accounts explains the positive intercept of this relationship, and none specifically predicts a magnitude effect (decrease in percent tip).

We offer a simple hypothesis that accounts for both the positive relationship and the intercept, and thus for the magnitude effect. It has been suggested that a tip represents a judgment as to what constitutes a fair or equitable wage (Bodvarsson & Gibson, 1994; Lynn & Grassman, 1990). Part of what a customer takes into account when determining what constitutes a fair wage is the effort expended specifically on his/her behalf. Bodvarsson and Gibson have shown that the amount of tip left by restaurant customers increased with server effort, as objectively defined, even after controlling for amount of bill. Indeed, they suggested that the positive relationship with amount of bill is due simply to the high correlation between effort and amount of bill.

We would suggest that another part of what constitutes a fair wage may reflect compensation for being there when needed. According to Woody Allen, much of success in life is due to just showing up (Peters & Waterman, 1982), and similarly, a tip, in part, may serve as payment to the service provider for just showing up. The compensation we provide taxicab drivers who are there when needed, hair stylists who keep appointments, and servers who are available to wait restaurant tables is partially independent of the amount of effort expended specifically on our behalf. It is this amount-independent compensation that is reflected in the positive intercept and that accounts for the decrease in percent tip as amount of bill increases (i.e., the magnitude effect). Indeed, the present account of the positive in-

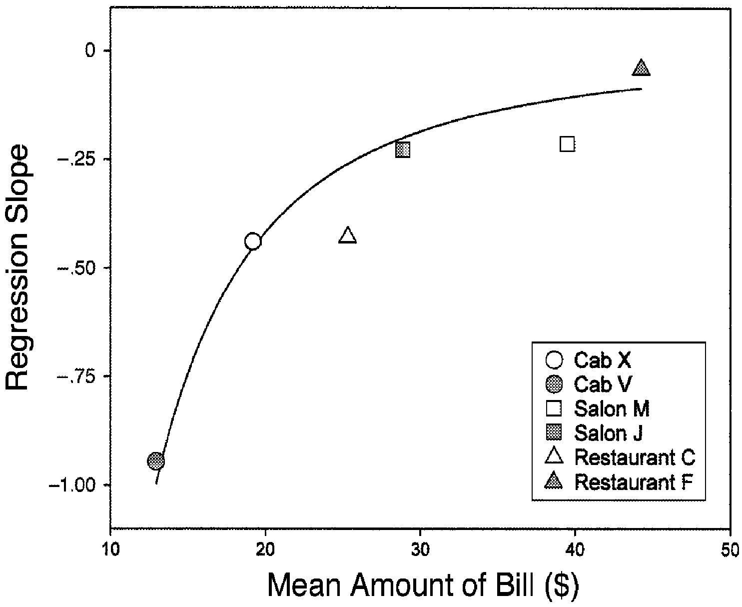

Figure 3. Regression slope as a function of mean amount of bill (see Table 1). The curved line is Equation A1.

tercept is supported by the observation that people frequently tip for services for which there is no charge (e.g., when a bellhop brings bags to a hotel room).

It is obvious that many factors in addition to the amount of the bill determine how big a tip one leaves (e.g., quantity and quality of service, patronage frequency, and perhaps, in some cases, the patrons' judgments as to the overall quality of the establishment; Bodvarsson & Gibson, 1994; Harris, 1995; Lynn & Grassman, 1990). Some of these factors may interact with the amount of the bill, whereas others (e.g., those that reflect compensation for just showing up) may exert effects on tipping that are independent of amount. The present findings suggest that, given the multitude of factors that may affect tipping, it may be important to distinguish those that affect the slope of the regression of amount of tip on amount of bill from those that affect its intercept.

In summary, the present results reveal that tipping shows a magnitude effect in a variety of real-world situations. That is, there is a decrease in percent tip as the amount of the bill increases. From the perspective of standard microeconomic theory, this magnitude effect represents an apparent anomaly in decision making, although one that may be understood as a mathematical consequence of the linear relation between amount of tip and amount of bill (and the fact that the intercept of the regression of amount of tip on amount of bill is positive). If our interpretation is correct, then there would be no need to appeal to the shape of the utility function for money in order to explain the magnitude effect in tipping. Of course, neither the present account nor any other extant account of the magnitude effect in tipping can explain the magnitude effects observed with either delayed or probabilistic gains. Although it remains to be determined whether a unified account of the magnitude effects observed in tipping and with delayed and probabilistic gains is possible or even necessary, the present account implies that separate, domain-specific explanations of these phenomena may be required.

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NOTES

1. For example, utility functions of the form $v(x) = a(x/(x + b))$ and $v(x) = a(1 - e^{-bx})$, but not power functions with fractional exponents, are both consistent with increasing proportional sensitivity.

2. This may be contrasted with the fit of a simple regression line to the data ($R^2 = .070$). Moreover, inspection of the residuals about Equation 2 revealed a lack of systematic deviation, whereas inspection of the residuals about the simple regression line revealed a pattern consistent with the hypothesis that the relation was actually nonlinear (i.e., residuals tended to be positive for small and large bills, but negative for medium-sized bills).

3. The mathematical basis for this prediction is as follows. The derivative of Equation 2 is given by

$$d\%T/dB = -c/B^2. \tag{A1}$$

This means that the slope of a tangent to the curve described by Equation 2 is steepest (i.e., most negative) when the amount of the bill (B) is small and approaches zero as the amount of the bill increases. Thus, the slope of a linear regression line for percent tip will also be steepest when the bill is small, and the regression line will flatten out as amount increases. Equation A1 was fit to the data from Table 1 (i.e., the linear regression slope for percent tip as a function of the mean amount of bill for each taxicab, restaurant, and hair salon). As predicted, Equation A1 (the curved line in Figure 2) adequately accounts for the observed variation in regression slopes.

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