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The Agent's Impatience: A Self–Other Decision Model of Intertemporal Choices

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Abstract

Intertemporal choices represent one of the most prevalent and fundamental trade-offs in consumer decision making. While prior research on intertemporal choices has focused on choices for oneself, intertemporal choices often involve one individual choosing on behalf of another. How do intertemporal choices made for another person differ from otherwise identical choices made for oneself? This research introduces a self–other decision model that distinguishes reaction utility (derived from interpersonal feedback) from vicarious utility (derived from imagining the recipient's experience). The authors tested model-derived hypotheses in 13 experiments (N = 4,799) involving decisions between peers. Consistent with the proposed role of reaction utility in the model, they find that intertemporal choices made for others are typically more "impatient" than choices for oneself. Moreover, this "agent's impatience" is attenuated when contextual and individual differences weaken the anticipation of interpersonal feedback. Together, the theoretical model and experimental results highlight the rewarding value of interpersonal feedback in self–other decision making, shedding new light on interpersonal consumer choices.

Keywords

intertemporal choice, self–other decision making, reaction utility, interpersonal affective feedback

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Every day, consumers make decisions that affect themselves and others in various ways, with immediate and long-term consequences. The trade-off between the value and time of future outcomes commonly underlies these decisions, typically in the form of an intertemporal choice between a smaller-sooner option and a larger-later option (Read, McDonald, and He 2018; Scholten and Read 2010). These choices are commonly seen in financial planning (e.g., spending now vs. saving to enable more spending later), medical decision making (e.g., receiving unpleasant vaccines now vs. being exposed to health risks later), and daily consumer purchases (e.g., purchasing the current state-of-the-art laptop vs. waiting a few months to buy the next-generation model). Given its prevalence, intertemporal choice has received extensive research over the past few decades (see reviews in Frederick, Loewenstein, and O'Donoghue [2002] and Urminsky and Zauberman [2015]).

Extant research typically examines intertemporal choice as individual decisions without interpersonal consequences. However, many decisions affect a recipient other than the decision maker, resulting in interpersonal consequences. For example, when a person makes a choice as an agent, selects a gift, or gives recommendations to a peer, the future payoffs of the decision will not only impact the peer recipient but also generate downstream consequences for the decision maker. How do consumers resolve such choices involving both interpersonal and intertemporal trade-offs? To date, time preference and self–other decision making have been studied in separate research silos. However, people live in a socially interactive world where their decisions frequently affect others, with interpersonal consequences that shape their own future decision making. It is therefore important to understand how consumers resolve intertemporal choices beyond the context of individual decision making.

The present research investigates this important question, in line with recent calls for more research on interpersonal decision making (Lerner and Tetlock 2003; Liu, Dallas, and Fitzsimons 2019). First, we extend existing single-person models of time discounting to develop a theoretical model for self–other decision making with intertemporal consequences. Integrating converging insights from psychological and consumer research, our model distinguishes the role of the

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agent's reaction utility (derived from interpersonal feedback from the recipient) from the role of the agent's vicarious utility (derived from the agent imagining the recipient's utility) in interpersonal decisions.

Based on this distinction, we derive our main hypothesis, "agent's impatience": intertemporal choices made for a similar peer will be generally more "impatient" (i.e., a stronger preference for more immediate options) than the same choices for oneself. We also derive additional hypotheses from the model regarding moderators and boundaries of the main hypothesis. We present 13 experiments (N = 4,799) that test these hypotheses. The experiments span a diverse range of interpersonal decisions, including agent decisions, gift giving, and consumer recommendations. The experimental results support the model predictions and corroborate the pivotal role of reaction utility in interpersonal decision making. We conclude with the implications and limitations of this research and discuss directions for future research on interpersonal decision making.

A Theoretical Model for Interpersonal Decisions

In classic decision models, a consumer makes a choice among available consumption options to maximize the expected utility from her future consumption. In interpersonal decision making (e.g., delegated agent decisions, gift choices, and recommendations between people), the decision maker does not expect to personally experience the chosen consumption. Rather, she considers how her choice will (positively or negatively) impact the future consumption outcomes of another person, typically a peer recipient, such as a friend, a colleague, or an acquaintance.

In these interpersonal decisions, the decision maker cares about the decision outcome to the extent that she derive some utility from the decision outcome, which motivates her to maximize those utilities. Two primary sources of utility that reward and motivate interpersonal decision making have been suggested in the psychological literature. First, it has long been posited that people experience some fraction of others' consumption utility via imagining others' experience (Craig 1968; Mobbs et al. 2009; see also "pure altruism" in Andreoni [1990] and Batson and Shaw [1991]). When choosing for another person, the decision maker may derive such utility from mentally simulating what the recipient experiences as a result of the decision outcome—an indirect, vicarious experience for the decision maker. We thus refer to this type of utility as "vicarious utility." Obtaining vicarious utility requires both comprehending and valuing another person's internal state, a high-level perspective-taking process that is effortful and frequently miscalibrated (Epley 2008; Epley et al. 2004; Eyal, Steffel, and Epley 2018).

Second, it has also been theorized that people are emotionally rewarded by directly experiencing interpersonal feedback from others, the expectation of which influences their decision making (Charlton, Fantino, and Gossett 2013; Yang and Urminsky 2018). Interpersonal feedback is affectively rewarding because it entails rich sensory (e.g., visual, auditory, tactile) information that is inherently evaluable (Bhanji and Delgado 2014; Schultz 2006). For instance, consider an appreciative facial expression, a squeal of excitement, or a warm hug —such interpersonal feedback directly gratifies people in emotionally meaningful ways. This indicates that, when choosing for another person, people also expect to derive utility from obtaining interpersonal feedback from the recipient. We refer to this utility as "reaction utility."

Research across various branches of psychology converges to suggest that interpersonal feedback is rewarding on its own and that the anticipation of interpersonal feedback can be an important factor in interpersonal decision making. Even before children develop the capacity for perspective-taking, interpersonal displays of affect have been shown to be highly effective as primary reinforcers that regulate behaviors (Grossmann 2010; Nikitin and Freund 2019; Toates 1988; Tronick 1989; Tsukiura and Cabeza 2008; Wang, Krumhuber, and Gratch 2018). In these reinforcement learning processes, the interpersonal communication of affective feedback rewards actions and thereby shapes subsequent actions through the anticipation of affective feedback.

In fact, the mechanisms specialized for processing interpersonal affect appear to be prioritized (Farah 2000; Fox 2002; Hasselmo, Rolls, and Baylis 1989). For example, emotion-conveying facial expressions attract attention faster than other stimuli and evoke automatic emotional responses from observers (Calvo and Esteves 2005; Stenberg, Wiking, and Dahl 1998; Young-Browne, Rosenfeld, and Horowitz 1977). In contrast, the vicarious understanding of others' internal psychological states emerges at later stages of development (Frick, Möhring, and Newcombe 2014; Van der Graaff et al. 2014), requires motivation and effort (Epley et al. 2004; Eyal, Steffel, and Epley 2018), and presumably involves more effortful and controlled processes.

These important characteristics of interpersonal feedback distinguish it from mere informational feedback (e.g., regarding the objective quality of a consumption outcome). To the extent that interpersonal feedback is experience-based, it is stored in episodic memory, whereas informational feedback is typically encoded more abstractly and incorporated into general semantic knowledge (Patterson, Nestor, and Rogers 2007). This suggests that the anticipation of interpersonal feedback is more likely to enter the decision-making process in the form of rich mental imagery that represents prior social experiences (Gilbert, Gill, and Wilson 2002; Killeen 2009; Moulton and Kosslyn 2009).

These characteristics also help distinguish interpersonal feedback from *intrapersonal* feedback. As an aspect of the external world that we perceive through our senses, interpersonal feedback is obtained from experiencing others' external affect display through perceptual encoding. In contrast, intrapersonal feedback is experienced internally as one's own emotions in reaction to one's own chosen outcomes. When a person experiences an emotion, her own display of emotion does not provide additional utility to her beyond the emotion she experiences (assuming that it does not provide her with new information). As such, we argue that reaction utility is a critical

component in interpersonal decisions but typically not in intrapersonal decisions.

Given the distinct rewarding value of interpersonal feedback, we posit that the anticipation of interpersonal feedback should influence interpersonal decisions beyond the effect of anticipated vicarious outcomes. Indeed, an increasing number of behavioral studies (e.g., Knapp, Hall, and Horgan 2013; Wang, Krumhuber, and Gratch 2018; Yang and Urminsky 2018) have found that the consideration of anticipated interpersonal feedback exerts a direct influence on other-regarding behaviors even when controlling for anticipated changes in the recipient's welfare. These findings are incompatible with self–other decision models that only include vicarious utility, which essentially reduce an interpersonal decision to a prediction of another person's preferences.[1] Next, we introduce a theoretical self–other decision model, in which the interpersonal decision-making process is guided by the maximization of both vicarious and reaction utility.

General Framework for Interpersonal Choice

Suppose an agent makes a choice for a recipient. Let the interpersonal indicator $s = 0$ when the agent is deciding for herself and $s = 1$ when deciding for another person. Let z denote a vector that represents all individual-specific and relationship-specific variables that may factor into the agent's decision for the recipient (e.g., relationship closeness between the agent and recipient, the agent's ability to imagine the recipient's reaction). Let $u(x; s, z)$ denote the time-independent utility the agent receives from choosing an option with monetary value x for the recipient. We thus specify

$$u(x; s, z) = \alpha^s v(x; z) + sr(x; z),$$

where $v(x; z)$ is the direct consumption utility from consuming x, $r(x; z)$ is the reaction utility the agent receives for choosing x for the recipient, and $0 < \alpha < 1$ is a constant that captures how much the agent discounts the utility experienced by the recipient, namely, social discounting (Jones and Rachlin 2006). Thus, the vicarious consumption utility that the agent receives from choosing x for the other person is defined by $\alpha v(x; z)$, which, by construction, is strictly less than the recipient's own direct consumption utility. We make standard expected utility theory assumptions: (1) $v(0; z) = r(0; z) = 0$ (no utility if the choice has zero value), and (2) $v(x; z)$ and $r(x; z)$ are each continuous twice-differentiable functions that are positive, increasing, and concave in x for $x > 0$.

Because the agent does not receive reaction utility from herself (i.e., $s(x; z) = 0$), she expects to simply receive utility:

$$u(x; 0, z) = v(x; z).$$

We make an additional simplifying assumption, that the agent chooses for the recipient, a similar peer, as if they have the same consumption value function v. Specifically, the agent chooses for the recipient based on expected utility:

$$u(x; 1, z) = \alpha v(x; z) + r(x; z).$$

The assumption that the agent uses her own consumption value function can be understood in two ways. First, given that we focus on choice for oneself versus choice for a similar peer, the agent and the recipient presumably have similar preferences. Second, to the degree that the agent is not aware of how the recipient's preferences differ, the agent is likely to project her own preferences for consumption onto the recipient (Epley et al. 2004; Mobbs et al. 2009). We discuss extensions to the model that can accommodate the agent assuming the recipient's preferences to differ from her own in Web Appendix A, Section III.

Vicarious Utility Versus Reaction Utility

To derive useful predictions from the model, we need to specify the relationship between vicarious utility and reaction utility functions. Critical insights regarding this relationship have been offered in prior research in psychology and consumer behavior, demonstrating that affect-based evaluation is more ordinal and less sensitive to magnitude changes than less affective evaluation (Hsee and Rottenstreich 2004; Hsee, Rottenstreich, and Xiao 2005; Pham et al. 2015; cf. Schley, De Langhe, and Long 2020).

In particular, the general evaluability theory (Hsee et al. 2009; Hsee and Zhang 2010) suggests that the evaluation of more affectively evaluated outcomes is more sensitive to qualitative changes (e.g., more drastic changes around point zero) and less sensitive to quantitative changes (e.g., smaller marginal changes with further value increases). Interpersonal feedback is arguably more affectively evaluated than monetary outcomes, as alluded to previously. Therefore, we expect that the reaction utility function may be less scope-sensitive than the vicarious utility function. That is, for values greater than zero, the relative marginal increase in reaction utility should be *smaller* than that in vicarious utility. More formally, this relationship can be specified as the following monotone ratio property (MRP):

$$\frac{\partial}{\partial x}\left[\frac{r(x; z)}{v(x; z)}\right] < 0.$$

This is a fairly general property. We illustrate this in Figure 1 with three sets of commonly used utility functions that all satisfy the MRP condition. For simplicity, we treat z as a scalar in all following examples. In Figure 1, Panel A, vicarious and reaction utility are power utility functions $v(x; z) = \frac{zx^\theta}{\theta}$ and $r(x; z) = \frac{zx^\gamma}{\gamma}$, $0 < \gamma < \theta < 1$. In Panel B, the overall utility is quasi-linear with $v(x; z) = zx$ and $r(x; z) = z\ln(x + 1)$. In Panel C, $v(x; z)$ is an arbitrary increasing concave function and $r(x; z) = zc$ for $x > 0$. The

[1] To this end, our distinction between vicarious utility and reaction utility may be reminiscent of prior work (e.g., Andreoni 1989, 1990) that distinguishes "pure altruism" from "warm glow" in the context of charitable giving. We provide extended discussions on this point in the supplementary Web Appendix A, Section III.

MRP is always satisfied, although the utility functions take different forms[2] in these three sets of examples (see a full deduction for each set of examples in Web Appendix A, Section I).

To our knowledge, this property regarding potential differences in vicarious and reaction utility has not been previously tested. Therefore, we conducted a pilot study to empirically compare the vicarious and reaction utility functions. We recruited 226 participants from Prolific (preregistered at https://aspredicted.org/4pj8w.pdf) and randomly assigned them to three (vicarious utility vs. reaction utility vs. own consumption utility) between-subjects conditions. All participants were first asked to specify a friend and then to imagine referring the friend to a paid online survey, from which the survey-taker would be compensated with a food voucher with a value commensurate with the market rate.

In the vicarious-utility condition, participants were asked "How positively do you evaluate the [$x] voucher from [the listed friend]'s perspective?" In the reaction-utility condition, participants were asked "How positively do you evaluate the pleasure of seeing [the listed friend] receiving the [$x] voucher?" In the own-consumption-utility condition, participants were asked "How positively do you evaluate the [$x] voucher for yourself?" (all rated on nine-point scales; 1 = "not at all," and 9 = "extremely"). Each participant was asked to evaluate a series of six outcomes in ascending order of value (from $.10 to $5.10, in $1.00 increments). All evaluations were time-independent in this study, as no intertemporal tradeoffs were introduced.

As Figure 2 shows, the estimated vicarious and reaction utility functions vary systematically and visually resemble the examples in Figure 1. Indeed, our analyses revealed that these estimated utility functions satisfy MRP. First, the marginal increases in reaction utility were relatively smaller than those of vicarious utility, as confirmed by a significant interaction between voucher value as a within-subjects factor and evaluation as a between-subjects factor, in a repeated-measures analysis of variance ($F(5, 740) = 16.29$, $p < .001$). Estimates using the three utility functions confirm that they differ in ways consistent with MRP (Web Appendix B, Section II). Second, the ratio of average reaction utility to average vicarious utility decreases with voucher value ($r = -.80$, bootstrapped $p < .001$). We also calculated the values of $\frac{r'(x)}{r(x)}$ and $\frac{v'(x)}{v(x)}$ within each interval and found support for the MRP ($\frac{r'(x)}{r(x)} < \frac{v'(x)}{v(x)}$) (see Table W3, Web Appendix B, Section II).

Lastly, the curvature of the vicarious utility function did not significantly differ from participants' own consumption utility function in the same repeated-measures analysis of variance (interaction $F(5, 740) = .96$, $p = .440$), which also shows a main effect for the average difference between vicarious-utility and own-consumption-utility functions ($F(1, 150) = 4.04$, $p = .046$) that is consistent with the social discounting assumption ($\alpha < 1$).

The Agent's Impatience

Next, we use the proposed model to generate predictions regarding intertemporal choices for oneself versus for others. In an intertemporal choice, a person chooses between a smaller-sooner (SS) option, often immediate (i.e., in the "current period" defined by $t = 0$; Jang and Urminsky 2023), and a larger-later (LL) option. Various models of temporal discounting have been proposed and tested, in which the agent's likelihood of choosing SS over LL options is captured by an individual-level discount factor, usually deemed as reflecting the person's "impatience" for consumption outcomes (see reviews in Doyle [2012] and Urminsky and Zauberman [2015]).

When the agent considers expected vicarious utility only, the "impatience" revealed in the decision for a similar peer should be similar to her own "impatience," based on egocentric projection (Epley et al. 2004). Our theory suggests that the agent considers expected reaction utility as well—when the decision recipient is concrete and specific such that interpersonal feedback is obtainable and conceivable. As such, an intertemporal choice for another person can be thought of as guided by two related sets of questions: "How will I value the recipient's consumption outcome that results from each option?" and "How will I value the recipient's reactions to my action of choosing each option?" When this is the case, the relative attractiveness of SS versus LL options will depend not only on the expected vicarious utility, but also on the expected reaction utility of each option.

To reach a decision, the agent evaluates these future outcomes through the present lens, discounting all future utility components to the present. This includes reaction utility, which we assume is based on the recipient's consumption of goods (and not based on the positive anticipation of receiving future goods[3]), and hence is discounted from the future point of receipt to the present. We use f(t), an individual discounting factor with delay t, to represent the person's general time preference. This generic discounting factor f(t) can represent any multiplicative (and potentially time-varying) discounting model including exponential (Samuelson 1937), hyperbolic (Mazur 1987), and quasi-hyperbolic (Laibson 1997) models. For instance, it is common to assume a quasi-hyperbolic model, with $f(t) = \beta^{D}\delta^{t}$ where $\beta \in$

[2] Note that the MRP does not require the reaction utility function to be more concave than the vicarious utility function. MRP is based on the marginal increase in utility relative to the marginal increase in current utility. By contrast, concavity is about the change in the slope of the utility function. In fact, the reaction utility functions are more concave than the vicarious utility functions in Figure 1, Panels A and B, but is less concave in Panel C.

[3] Reaction utility should not be conflated with notions of contemplation emotion (Molouki, Hardisty, and Caruso 2019) or anticipatory utility (Hardisty and Weber 2020; Thakral 2023), which have been posited as the utility (or disutility) that one derives from the experience of actively *anticipating* a future event. In particular, we use "expected reaction utility" to refer to the expected enjoyment of a prospective social interaction, not the enjoyment from expecting the prospective social interaction. For an intertemporal choice model that incorporates anticipatory utility, see Thakral (2023).

[0,1] is the present-bias parameter, $\delta \in [0,1]$ is the long-run discount factor, $D = 1$ if $t > 0$, and $D = 0$ if $t = 0$.

Therefore, the utility when the agent chooses for herself is

$$U(x, t, 0) = f(t)v(x; z).$$

Furthermore, since reaction utility is derived from the interpersonal feedback at the time of receipt and not prior to it, both the vicarious and reaction utility when the agent chooses for another person are time-discounted:

$$U(x, t, 1) = f(t)\{\alpha v(x; z) + r(x; z)\}.$$

We can now derive testable hypotheses based on this decision model. Our first and main hypothesis compares the agent's choice for a similar peer recipient with her choice for herself:

> **H_1 (the agent's impatience):** Agents are more likely to choose SS for a peer than to choose SS for oneself in an intertemporal choice, all else being equal.

This hypothesis is derived as follows. Consider that the agent faces an intertemporal choice today between an SS option, which yields x_1 at t_1, and an LL option, which yields $x_2 > x_1$ at some time $t_2 > t_1$ in the future. When choosing for herself, the agent prefers SS to LL if and only if:

$$U(x_1, t_1, 0) = f(t_1)v(x_1; z) > f(t_2)v(x_2; z) = U(x_2, t_2, 0).$$

Thus, when the agent is indifferent between SS and LL, we have $f(t_1)v(x_1; z) = f(t_2)v(x_2; z)$. This is equivalent to

$$\frac{v(x_2; z)}{v(x_1; z)} = \frac{f(t_1)}{f(t_2)}. \quad (1)$$

Now, when choosing for a similar peer, the agent will prefer SS to LL if and only if:

$$\begin{aligned} U(x_1, t_1, 1) &= f(t_1)\{\alpha v(x_1; z) + r(x_1; z)\} \\ &> f(t_2)\{\alpha v(x_2; z) + r(x_2; z)\} \\ &= U(x_2, t_2, 1). \end{aligned}$$

Since $\alpha f(t_1)v(x_1; z) = \alpha f(t_2)v(x_2; z)$, the threshold condition under which the agent will choose SS over LL for the recipient is $f(t_1)r(x_1; z) > f(t_2)r(x_2; z)$, which is equivalent to

$$\frac{f(t_1)}{f(t_2)} > \frac{r(x_2; z)}{r(x_1; z)}. \quad (2)$$

Combining Equations 1 and 2 implies that the agent will choose SS for the recipient when

$$\frac{r(x_1; z)}{v(x_1; z)} > \frac{r(x_2; z)}{v(x_2; z)}. \quad (3)$$

This is equivalent to the MRP: the relative marginal increase in reaction utility is smaller than the relative increase in vicarious utility. In other words, as long as the MRP is satisfied, the agent will prefer the SS option for the recipient even when indifferent between the SS and LL options for herself. Intuitively, this means that the decision threshold to choose SS is lower in choices for others than that in a choice for oneself.

This prediction for "agent's impatience" may appear to be inconsistent with prior theories positing that impulsivity should be mitigated by social and psychological distance (Metcalfe and Mischel 1999; Trope, Liberman, and Wakslak 2007), such as when a person resolves an intertemporal choice in another person's shoes. However, this prior proposition only considered predictions of others' preferences and did not take into account the additional impact of interpersonal feedback. Our prediction is obtained because reaction utility from interpersonal feedback is a factor in making *decisions for others*, which is not equivalent to *predicting others' preference*, though they are frequently conflated.

A few papers have reported that people make either similar (Takahashi 2007) or "more patient" intertemporal choices for others (e.g., Albrecht et al. 2011; Pronin, Olivola, and Kennedy 2008; Ziegler and Tunney 2012) than for themselves. However, a closer examination of these studies reveals that they operationalized "decision for others" as choices for hypothetical or abstract others, from whom the agent would not anticipate (and might not even be able to simulate) interpersonal feedback. In fact, we do expect agent's impatience to be mitigated when the recipient is entirely abstract and nonidentifiable, because deciding for others indeed reduces to predicting others' preference in that case. As such, recipient specificity is a theoretical moderator of agent's impatience (see H_3) in our model.

Model-Derived Boundary Conditions

Next, we focus on the novel role of reaction utility in this model to generate additional predictions regarding the critical boundary conditions to agent's impatience. First, we consider how the reception time of interpersonal feedback (relative to the recipient's consumption) influences our main prediction. In the baseline model, feedback is expected to occur during the same period as the consumption of the SS and LL, t_1 and t_2, respectively. When a delay of interpersonal feedback occurs, our model predicts that the agent's impatience will be mitigated and potentially reversed:

> **H_2:** Delaying interpersonal affective feedback mitigates, and potentially reverses, the agent's impatience.

Let T denote when the earliest interpersonal feedback occurs. Because feedback can only occur after the earliest consumption, we have $T > t_1$. An expected delay in feedback affects reaction utility but does not affect vicarious utility. More specifically, for $t_1 < T < t_2$, the reaction utility for SS is discounted to the present from a later time T instead of t_1 so the threshold for the agent to choose SS for the recipient now becomes

$$f(t_1)\alpha v(x_1; z) + f(T)r(x_1; z) > f(t_2)\alpha v(x_2; z) + f(t_2)r(x_2; z).$$

As we show in Web Appendix A (Section II), this condition is less likely to be satisfied than the baseline condition in Equation 2. In other words, as T approaches t_2, the agent's choice for the recipient will be increasingly similar to their choice for themself, mitigating the agent's impatience. Intuitively, this means that choosing SS becomes less attractive for the agent because delaying the earlier

gratification from obtaining interpersonal feedback associated with SS reduces its rewarding value.

Further, for even longer delays of interpersonal feedback such that $T > t_2$, the equivalent condition for choosing SS is instead

$$f(t_1)\alpha v(x_1; z) + f(T)r(x_1; z) > f(t_2)\alpha v(x_2; z) + f(T)r(x_2; z).$$

As we also show in Web Appendix A (Section II), this suggests that the threshold condition no longer holds. In other words, as interpersonal feedback is delayed, occurring only after both options have been received, the relative attractiveness of the SS option diminishes, and hence the agent's choice for others becomes increasingly similar to her choice for herself and eventually favors the LL option (as its greater magnitude will result in more reaction utility).

Next, we consider the role of recipient specificity. This factor is important because when the agent considers the reaction utility from the recipient, the assessment of reaction utility largely depends on the conceivability of the recipient's reaction, an element of z. Therefore, our model also predicts that recipient specificity is a moderator to the agent's impatience:

H_3: The agent's impatience is mitigated when the recipient is unspecified.

Thus far, our theorizing has focused on cases where the recipient is a concrete and specific peer, so that the recipient's reactions are conceivable. However, when the recipient is abstract and nonspecified, his reactions are arguably less conceivable. Converging evidence shows that social cognition is sensitive to the specificity and identifiability of others. Decisions regarding specified and identifiable others qualitatively differ from those made for nonspecified, abstract others, as documented in studies across domains of risky decision making (Hsee and Weber 1997; Wagenaar, Keren, and Lichtenstein 1988), charitable giving (Kogut and Ritov 2005; Small and Loewenstein 2003), and policy making (Kogut and Ritov 2015).

In line with this insight, we assume that r(x; z) is an increasing function of recipient specificity. When the choice is for a completely nonspecified recipient, $r(x; z) \to 0$, and therefore choice for others should increasingly resemble choice for oneself. Meanwhile, recipient specificity should have little effect on vicarious utility, as it is based on projection of the agent's own preference. Therefore, when the recipient is an utterly unspecified abstract "other," our decision model simplifies the decision to a preference estimation problem, and it no longer predicts the agent's impatience.

This moderator reconciles our main "agent's impatience" hypothesis with the limited prior studies reporting findings inconsistent with H_1. In these studies, participants made choices for a hypothetical "someone else" (Takahashi 2007), "a stranger they would never meet" (Albrecht et al. 2011), or a generic unknown participant with whom the agent would not interact (Study 4, Pronin, Olivola, and Kennedy 2008). Sometimes, they were only asked to make a prediction (e.g., "How would the person choose?"; Ziegler and Tunney 2012). Put differently, the studies that reported ostensibly inconsistent results with our predictions used designs that rendered interpersonal feedback unobtainable and hard to imagine, essentially eliminating this key aspect of interpersonal decisions. Given that reaction utility was largely absent in participants' decision process, the lack of "agent's impatience" in these studies is compatible with our model, as specified in H_3.

Finally, we consider individual differences in actively anticipating interpersonal feedback, another potential element of z that is relevant to the value reaction utility. To the extent that the anticipation of interpersonal feedback draws on prior experience, its mental representation likely relies on visual imagery (Moulton and Kosslyn 2009), such as the mental simulation of others' facial expressions and body language. While such nonverbal information generally dominates the communication and interpretation of emotions in social interactions (Argyle et al. 1970; Burns and Beier 1973; Walker and Trimboli 1989), people differ in their spontaneous reliance on visual imagery in decision making (Marks 1973; Nelis et al. 2014). This means that the agent's impatience may be mitigated for people whose decision making involves little mental imagery. The formal deduction is similar to H_3, substituting reliance on mental imagery as an individual-level characteristic for context-level imaginability.

H_4: People who tend to engage little mental imagery in decision making exhibit agent's impatience to a lesser degree.

In summary, we propose a general model of self–other decision making and used it as a basis to derive a series of predictions for self–other intertemporal choices. Admittedly, this proposed model is a simplified framework that is not intended to be complete. Our hope is for this model to serve as a useful starting point for subsequent theoretical development of a more thorough understanding of interpersonal decision making.

Overview of Studies

We test predictions of the model in 13 experiments (N = 4,799), as shown in Table 1. We first test the agent's impatience effect in Study 1 with choices between SS and LL financial rewards. We then present replications of this finding in seven studies (2a–2g) across various decision contexts and stimuli, with consequential choices in three studies (2b, 2c, and 2d). Next, we examine how agent's impatience is moderated by critical situational factors implied by the model, including delays in interpersonal affective feedback (Studies 3a and 3b) and lack of recipient specificity (Study 4). Finally, we explore whether the agent's individual differences in propensity for spontaneous mental simulation (Study 5a) or trait empathy (Study 5b) moderate the effect. These 13 experiments yielded results highly congruent with our theorizing and model predictions. We report all methods and measures in all studies, provide secondary analyses and additional replications in Web Appendix B, and share all data on OSF (https://osf.io/faj3r).

Study 1: Immediate Versus Delayed Financial Rewards

In Study 1, we compared how participants made an intertemporal choice between SS and LL compensation options for another person with how participants made the same choice for themselves, between subjects. Our main hypothesis (H_1) of agent's impatience suggests that participants will be more likely to choose the SS payment (vs. LL payment) when choosing for another person than when choosing for themselves, all else being equal. We preregistered this study (https://aspredicted.org/56gu8.pdf).

Method

We planned for a sample size of at least 400 and received 467 surveys from Prolific UK respondents. Per the preregistered exclusion criteria, we obtained 440 valid responses (M_{age} = 35 years; 69% female) after excluding 15 incomplete entries, 12 participants who failed a generic instructional manipulation check (IMC), and 23 participants who failed an additional attention check about the content of the survey. We used similar screening procedures in the other online samples. Details of the screening procedures and preregistration links for all studies are reported in full detail in Web Appendix B (Table S1).

Participants were asked for the first name of a friend with whom they often spent time. Then participants were asked to imagine that a local pizza franchise invited customers to fill out an extensive online survey about their food delivery services. In the scenario, survey-takers were compensated with digital vouchers that could be used at any outlet of the franchise, and the digital vouchers would be sent to the survey-taker via email and had no expiration date.

Participants were randomly assigned to one of two (choice for self vs. choice for other) between-subjects conditions. In the choice-for-self condition, participants were asked to imagine that they had taken part in the survey and were given a choice

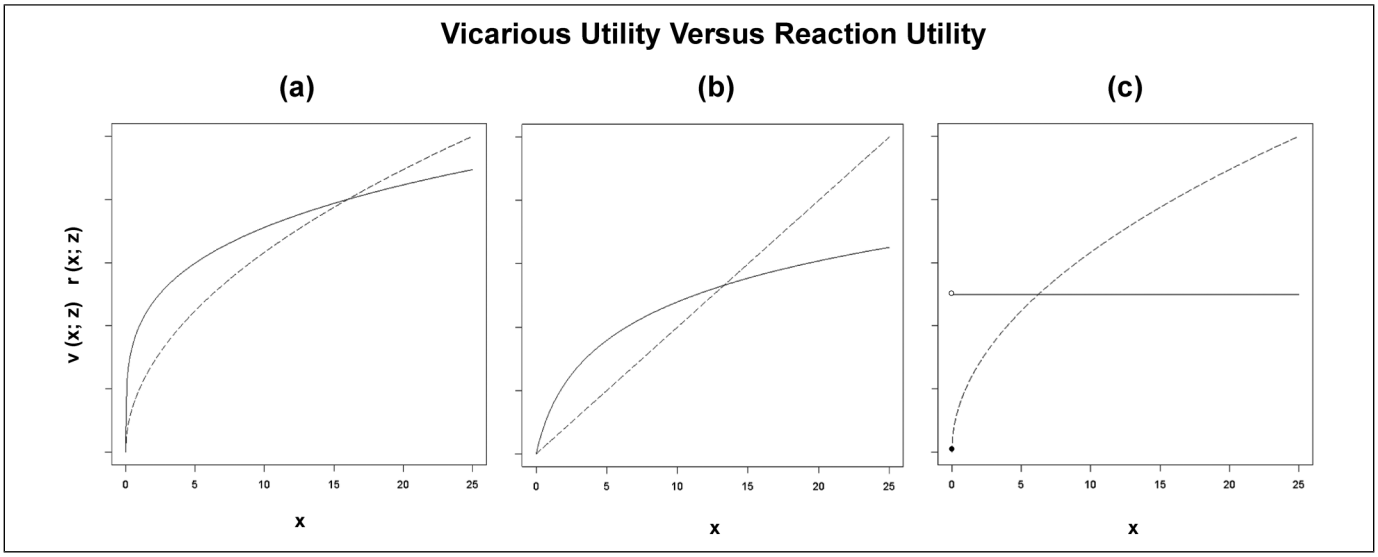

Figure 1. Three Sets of Vicarious Utility (Dashed Line) and Reaction Utility (Solid Line) Functions that Satisfy MRP.
Notes: Panel A depicts two power utility functions $v(x; z) = \frac{zx^{\theta}}{\theta}$ and $r(x; z) = \frac{zx^{\gamma}}{\gamma}$, $0 < \gamma < \theta < 1$. In Panel B, the vicarious utility is linear $v(x; z) = zx$, whereas reaction utility is a log function $r(x; z) = z\ln(x + 1)$. In Panel C, vicarious utility is concave, whereas reaction utility is a step function, $r(0; z) = 0$ and $r(x; z) = zc$.

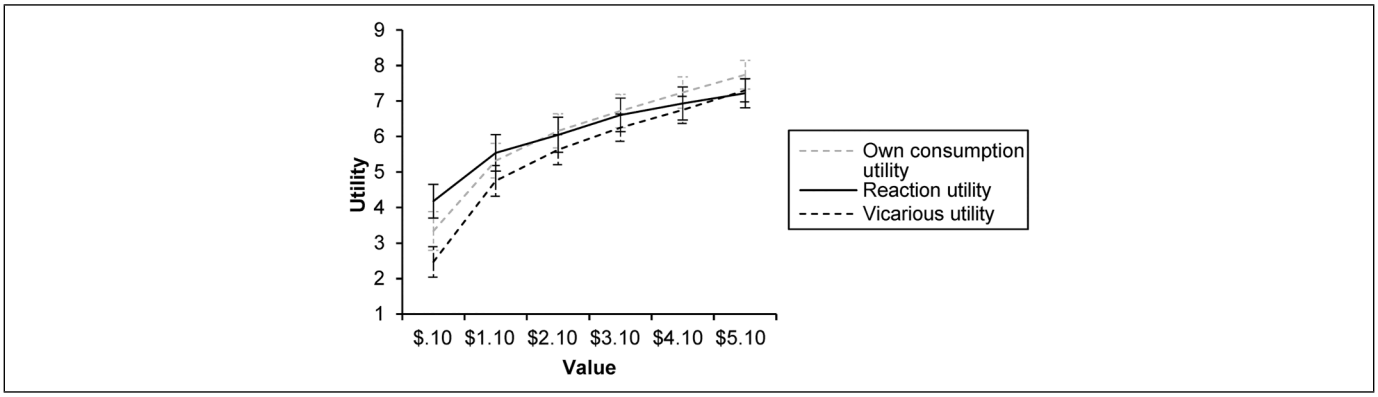

Figure 2. Estimated Utility Functions for Vicarious Utility, Reaction Utility, and Consumption Utility in the Pilot Study.

Table 1. Summary of Main Results.

Study	n	Choice of SS: For a Specified Peer	Choice of SS: For Oneself	Other Conditions/Factors	The Agent's Impatience Effect
1	440	28.1%	18.8%	—	χ^2 (1, N = 440) = 3.93, p = .015, η = .12
2a	403	49.2%	39.4%	—	χ^2 (1, N = 403) = 3.93, p = .048, η = .10
2b	88	61.4%	34.1%	—	χ^2 (1, N = 88) = 6.6, p = .018, η = .27
2c	116	41.4%	19.0%	—	χ^2 (1, N = 116) = 6.9, p = .015, η = .24
2d	155	50.6%	27.6%	—	χ^2 (1, N = 155) = 8.6, p = .003, η = .24
2e	420	51.4%	43.1%	—	GEE Wald χ^2 (1, N = 840) = 14.44, p < .001
2f	383	56.3%	49.0%	—	GEE Wald χ^2 (1, N = 1532) = 6.64, p = .010
2g	208	55.7%	41.8%	—	GEE Wald χ^2 (1, N = 1872) = 13.51, p < .001
3a	637	43.0%	33.5%	With delayed recipient feedback: 31.0%	b_{for_other} = .40, Wald = 4.01, p = .045; b_{delay} = −.52, Wald = 6.65, p = .010
3b	605	67.5%	45.3%	With delayed recipient feedback: 33.8%	b_{for_other} = .92, Wald = 19.7, p < .001; b_{delay} = −1.40, Wald = 44.88, p < .001
4	533	60.0%	35.8%;	For unspecified other: 42.1%	McNemar's χ^2 (1, N = 271) = 51.25, p < .001
5a	407	45.5%	33.4%	Tested interaction with spontaneous usage of imagery	McNemar's χ^2 (1, N = 407) = 27.76, p < .001; GEE $b_{interaction}$ = .19, Wald = 13.33, p < .001
5b	404	41.1%	31.9%	Tested interaction with trait empathy	McNemar's χ^2 (1, N = 404) = 17.28, p < .001; GEE interaction n.s.

between two options for the digital voucher: "to receive a £8 voucher today" or "to receive a £10 voucher in two weeks." Participants were asked "Which option would you choose?" In the choice-for-other condition, participants were asked to imagine that the friend took part in the survey and was given a choice between two options for the digital voucher, as in the for-self condition. Participants were then asked, "If [the friend] asked you to choose between the options on behalf of him/her, which option would you choose for [the friend]?" Participants made a binary choice between the two options, completed a generic IMC, and indicated their gender and age.

Results

Consistent with the hypothesized agent's impatience, participants in the choice-for-other condition were more likely to choose the SS payment (£8 voucher today) than were participants in the choice-for-self condition (28.1% for other vs. 18.8% for oneself; $\chi^2(1, N = 440) = 3.93$, $p = .015$, $\eta = .12$; $b_{recipient} = -.55$, Wald = 5.92, $p = .015$; Figure 3). Gender and age did not influence choices or moderate this effect.

Discussion

Study 1 supports the agent's impatience hypothesis (H_1): participants were more likely to choose the SS option when making an intertemporal choice for a specified friend than when asked to make an otherwise identical intertemporal choice for themselves. Next, in Studies 2a–2g, we test the robustness and generalizability of this effect across a variety of choice stimuli and decision contexts, including decisions with behavioral consequences.

Studies 2a–2g: Replication and Generalization Across Stimuli and Contexts

Each of the seven studies (2a–2g) followed the basic paradigm in Study 1, having participants choose between an SS and an LL option either for themselves or for another specified person. All studies randomly assigned participants to either a choice-for-self or a choice-for-other between-subjects condition, except Study 2e, in which this factor was varied within-subjects. More specifically, Study 2a tested choices between SS and LL financial rewards for online freelance work in a different population and context than Study 1. Studies 2b, 2c, and 2d each tested the effect in consequential decisions between gift cards. Studies 2e, 2f, and 2g tested the effect's generalizability to nonmonetary rewards, using choices between consumer goods.

We also varied the type of peer relationships across these studies: two strangers who had been randomly paired up and became acquainted during the study (Study 2b), a pair of friends who visited the lab together (Study 2c), or the participant and a friend specified by the participant (all other studies). We preregistered Studies 2a, 2e, and 2f. Studies 2b, 2c, 2d, and 2g predated the practice of preregistration and were the only studies that were not preregistered (see Table S1 in Web Appendix B).

Method

We summarize here the key details that distinguish the studies, and report additional details, including screening procedures and secondary exploratory measures, in Web Appendix B, Section II.

Study 2a. We recruited participants from Amazon Mechanical Turk (MTurk) and received 403 valid responses ($M_{age} = 38$ years; 51% female; $M_{closeness} = 8.71$). The procedure was

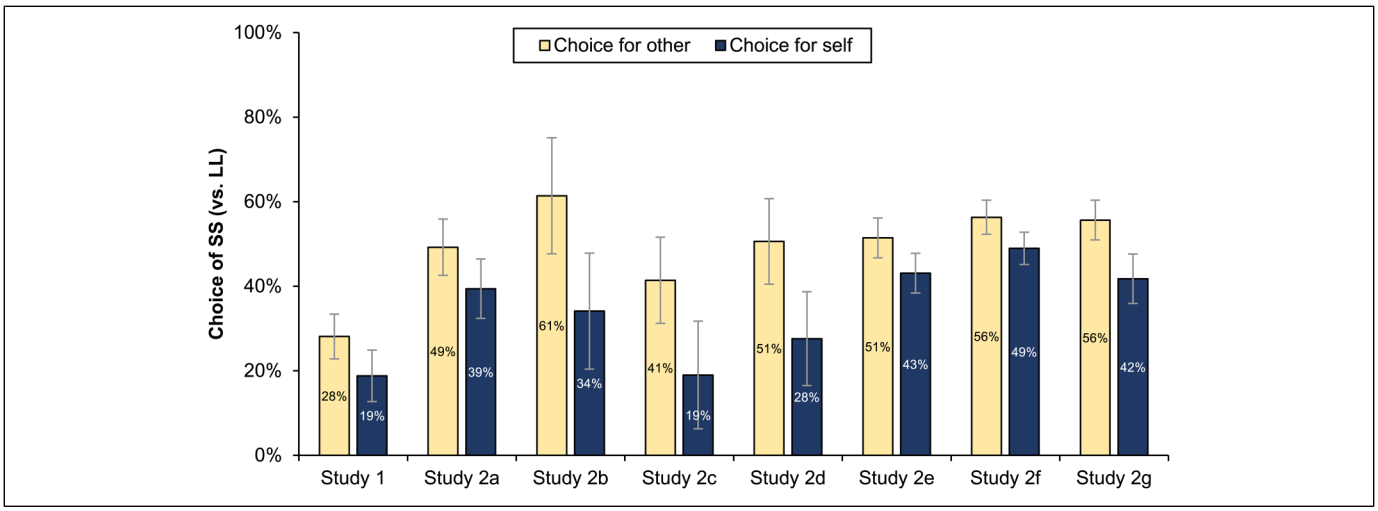

Figure 3. Agent's Impatience Is Replicated in Studies 1–2g.
Notes: Participants were more likely to choose the SS payment when deciding for a peer than when deciding for themselves. Error bars represent 95% CIs.

similar to Study 1, except that the financial rewards ("receive $8 today" vs. "receive $10 in two weeks") were from completing MTurk human intelligence tasks and were presented as either regular remuneration or a bonus payment (to test generalizability to windfall gains). Thus, the study had a 2 (recipient: self vs. for other) × 2 (description: remuneration vs. bonus payment) factorial design. In addition, participants were asked to indicate how close they felt toward the listed friend on a ten-point scale (1 = "not close at all," and 10 = "extremely close").

Study 2B. We recruited 88 participants in the behavioral lab of a large U.S. Midwestern university (M_{age} = 26 years; 52% female; $M_{closeness}$ = 4.5 out of 10). We randomly paired up the participants and asked each pair to first engage in a five-minute relationship-closeness induction task (Sedikides et al. 1999). Then, the paired participants were split up into two rooms and played and won an online game together as a team. We asked one participant (randomly assigned to be the agent) to choose between two bonus payments for the other participant (assigned to be the recipient): either a $4 Amazon e-gift card redeemable right away or a $5 Amazon e-gift card redeemable in ten days. To manipulate the redemption time, we first confirmed their receipt on the day of the experiment with the image of the e-gift card and then sent a second email containing the actual digitally accessible e-gift card on the specified redemption date. The recipients learned that they would receive the bonus payment and were asked which of the two options they preferred. Participants then rated their interpersonal closeness and mood and indicated their gender and age. The experimenter debriefed and paid them and then immediately emailed the recipient the bonus payment chosen by the agent.

Study 2c. We recruited pairs of friends to the behavioral lab of a large U.S. Midwestern university and received 116 participants (M_{age} = 19 years; 53% female; $M_{closeness}$ = 6.3). Because the participants were already friends, the relationship closeness induction task was not used. Agents chose between a $5 Starbucks gift card redeemable right away and a $6 Starbucks gift card with a sticker stating that it was redeemable in two weeks, and the agent (instead of the experimenter) handed the gift card to the recipient at the end of the experiment.

Study 2d. We recruited students from two master of business administration class sessions at a large U.S. Midwestern university for a five-minute "Thanksgiving Survey" on paper during a class break and received 155 participants (M_{age} = 29 years; 39% female, 3 gender undisclosed; $M_{closeness}$ = 7.0). We offered each student a small candy bar and a chance to receive a monetary bonus in return for participation. Participants first wrote down a specific friend to whom they would like to express gratitude and with whom they would meet up in the coming weeks (near Thanksgiving), and then composed a short thank-you message to that friend. On the second page, participants were presented with two Starbucks gift cards ($5 now or $6 in two weeks). In the choice-for-self condition, participants were asked first to choose between the two options for themselves, and then to indicate what they would have chosen if they were choosing a gift for their listed friend instead. In the choice-for-other condition, participants were asked first to make a choice for the friend they had listed, and then to indicate what they would have chosen if the choice had been for themselves instead. In both conditions, it was made clear that the first and second choices were independent of each other. Participants then answered questions about their perceived closeness with the friend; perceived similarity between themselves and the friend; and their mood, gender, and age. Upon completing the survey, the participants in the choice-for-self condition received the gift card that they had chosen for themselves, whereas the participants in the choice-for-other condition received the gift card that they had chosen for the listed friend, with the instruction to give the gift card to the friend when they met up in the coming weeks.

Study 2e. We recruited participants from MTurk and received 420 valid responses ($M_{age} = 38$ years; 48% female). This study had a mixed design with two (recipient: self vs. other) within-subjects conditions and two (consumer goods: affect-rich vs. affect-poor) between-subjects conditions, with the order between recipients counterbalanced. Motivated by debates about whether time discounting is domain-specific, such that the discount factor is steeper for affect-rich goods than affect-poor goods (e.g., Odum and Rainaud 2003, Tsukayama and Duckworth 2010; see critiques in Holt et al. [2016], Sawicki, Markiewicz, and Białek [2019], and Urminsky and Kim [2018]), we tested the generalizability of agent's impatience across consumer goods of different affective values. Participants were asked to read a scenario in which an online store rewarded its loyal customers (including the participant) with store credits as part of their customer loyalty program. Similar to Study 2d, each participant made two decisions in a counterbalanced order: choosing store credits for themselves and for a friend they had listed, based on the same scenario, yet independent of each other. The two options were "store credits of $18 value redeemable immediately on the website" and "store credits of $25 value redeemable in 4 weeks (when the website is updated to accept the code)." We also randomly assigned participants to either an affect-rich condition, in which the store credits could be redeemed for chocolate candies only, or an affect-poor condition, in which the store credits could be redeemed for vitamin supplements only. We included a manipulation check for the affective value of the products, adapted from Rottenstreich and Hsee (2001).

Study 2f. We recruited participants from MTurk and received 383 valid responses ($M_{age} = 38$ years; 47% female). Participants were randomly assigned to either choice-for-self or choice-for-other conditions and then made four types of consumer choices, which have been theorized as involving explicit or implicit intertemporal trade-offs (Khan et al. 2005; Milkman, Rogers, and Bazerman 2008). Thus, the study had a mixed design with two (recipient: self vs. other) between-subjects conditions and four (choice type) repeated choice measures. The four choices were between financial rewards ($50 cash immediately vs. $60 cash in two weeks), product purchases (standard headphones now vs. premium headphones when back in stock in a month), or less explicitly intertemporal trade-offs: entertainment (a sitcom episode vs. an educational documentary) and food (a tempting dessert vs. a healthier salad).

Study 2g. We recruited participants from MTurk and received 208 valid responses ($M_{age} = 35$ years; 50% female). The study had a mixed design with two (recipient: self vs. other) between-subjects conditions and nine (product domains) repeated measures. Each of the nine consumer choices had an explicit intertemporal trade-off with both SS and LL options from the same product category (cash, e-gift cards, dinnerware, snacks, wallets, dinner reservations, concert tickets, iTunes songs, and ice cream vouchers; Table S3 in Web Appendix B). For example, for dinnerware, participants chose between "a set of 6 pieces of sturdy dinnerware shipped and delivered this week" (the SS option) and "a set of 10 pieces of sturdy dinnerware shipped and delivered next month" (the LL option); for concert tickets, participants chose between "a back-section ticket for a big concert this weekend" (the SS option) and "a middle-section ticket for a big concert in six months" (the LL option).

Results

Participants in the choice-for-other condition were more likely to choose the SS option than participants in the choice-for-self condition across all the studies, as shown in Table 1 and Figure 3. The results were robust to numerous manipulated or measured factors. Agent's impatience generalized to a variety of financial rewards (Studies 2a, 2b, 2c, and 2d) and types of consumer choices (Studies 2e, 2f, and 2g), including consequential choices (Studies 2b, 2c, and 2d), repeated choices (Studies 2f and 2g), and within-subjects tests (Studies 2e and 2d). It was also robust to a variety of contextual factors not predicted to matter in the model: we found no evidence that the difference in choices for oneself versus choices for a peer depended on framing the financial rewards as remuneration versus bonus (Study 2a, interaction $p = .892$), on the affective-richness of rewards (Study 2e, interaction $p = .326$), or on the explicitness of the intertemporal trade-off (Study 2f, interaction $p = .575$).

Moreover, in Studies 2d and 2e, in which participants made choices both for themselves and for the other person, we regressed choice for other on choice for self (choices coded as SS = −1, LL = 1) and found that the intercept was significant and negative (Study 2d: $b = -1.28$, $Wald = 25.2$, $p < .001$; Study 2e: $b = -.50$, $Wald = 14.7$, $p < .001$), verifying the agent's impatience effect while controlling for own preferences. In these regressions, choice for self positively predicted choice for others (Study 2d: $b = 1.22$, $Wald = 22.7$, $p < .001$; Study 2e: $b = 1.43$, $Wald = 121.9$, $p < .001$), consistent with our model assumption that vicarious utility involves egocentric projection of one's own intertemporal preferences onto the recipient.

Lastly, closeness of relationship to the recipient, mood, gender, and age did not consistently moderate the effect of decision recipient (self vs. other) on choice, and the effect persisted when we controlled for mood or other covariates.

Discussion

These seven replication studies revealed strong support for our hypothesis (H_1) that people are more likely to make an "impatient" choice when choosing for a peer than when making an otherwise identical choice for themselves. Finally, because choice of SS for a specified peer was not only higher than choice for oneself in all studies but also significantly higher than 50% in Study 2b (as well as Studies 3b and 4; see Table 1), the agent's impatience effect cannot be explained by indifference between the options when making choices for others (which predicts choice shares to be generally closer to 50%–50% in choice-for-other conditions than in choice-for-self conditions).

Study 3a and 3b: When Interpersonal Feedback Is Delayed

Our model also predicts circumstances under which agent's impatience should be reduced or even eliminated. A key boundary condition is the timing of the interpersonal feedback, which we test in two parallel studies. Both Studies 3a and 3b had three between-subjects conditions (choice for self vs. choice for other with an immediate reaction vs. choice for other with the reaction delayed). Our model predicts that agents' choices for another person will be more "patient" when the recipient's reaction is delayed (H_2). We preregistered both Study 3a (https://aspredicted.org/2ic53.pdf) and Study 3b (https://aspredicted.org/pf9wz.pdf).

Method

In Study 3a, we recruited 700 participants from MTurk and obtained 637 valid responses ($M_{age} = 39$ years; 48% female). Participants were asked to imagine that they have two friends, Alex and Blair, who also work on MTurk from time to time. In the scenario, both Alex and Blair are similar to the participant in many ways. The participant's friendships with Alex and Blair are equally close, and the participant meets up with both Alex and Blair equally often. Participants then read that, due to upcoming events that they had committed to, "You are going to meet up with Alex and hang out this evening. You won't be able to see Blair until after about a month." Therefore, the two recipients differ in the timing of the interpersonal feedback: feedback from Alex is presumably not delayed for either option (since Alex will still be around), whereas feedback from Blair for both the SS (received today) and LL (received in two weeks) will be delayed to the same future point of time (in at least a month).

Participants were randomly assigned into one of the three conditions. In the choice-for-self condition, participants were asked to imagine that they would be receiving a payment from one of their recent human intelligence tasks and needed to choose between two options: $5 today or $6.50 in two weeks. In both choice-for-other conditions, participants read that their friend [Alex/Blair] had asked the participant to take care of their MTurk account for one day since they did not have access to internet that day. Participants logged into [Alex/Blair]'s account and found that they had to make a choice between two payment options, identical to that in the choice-for-self condition. Thus, in the immediate reaction version, participants were asked to make a choice for Alex, whom they would see later in the day, and in the delayed reaction version, participants were asked to make a choice for Blair, whom they would see after a month. After participants indicated their choice, they completed a generic IMC and indicated their gender and age.

In Study 3b, we recruited 650 MTurkers and obtained 605 valid completed responses ($M_{age} = 37$ years; 48% female). The procedure was similar to that of Study 3a, except that the scenario and intertemporal choice involved choosing between Starbucks reward points instead of work payment. We asked participants to imagine that they often visited Starbucks and used a Starbucks rewards phone application, which awards stars as reward points for purchases. Participants read that they had just received a message via their Starbucks app and were asked to make a choice (for themselves, Alex, or Blair) between "receive 100 stars (US$10) today" and "receive 125 stars (US$12.50) in three weeks." Every ten stars are worth US$1, and customers can apply these stars to any in-store purchases with no expiration date.

Results

In Study 3a, participants' choices differed significantly across the three conditions ($\chi^2(2, N = 637) = 7.56$, $p = .023$). Participants who were asked to choose for Alex (whose affective feedback would occur sooner) were more likely to choose the SS option (43.0%) than participants who were asked to choose either for Blair (whose affective feedback would be delayed; 31.0%) or for themselves (33.5%; Figure 4).

We dummy-coded recipient (choosing for self = 0, for other = 1) and reaction delay (immediate: choosing for self or for Alex = 0, delayed: for Blair = 1). Using these predictor variables, a binary logistic regression predicting choice of SS (SS = 1, LL = 0) revealed that participants who chose for another person with immediate interpersonal feedback were more likely to choose SS than participants who chose for themselves (b = .40, Wald = 4.01, $p = .045$), and participants who chose for another person with delayed feedback scenario were less likely to choose SS than those choosing for another person with immediate feedback (b = −.52, Wald = 6.65, $p = .010$).

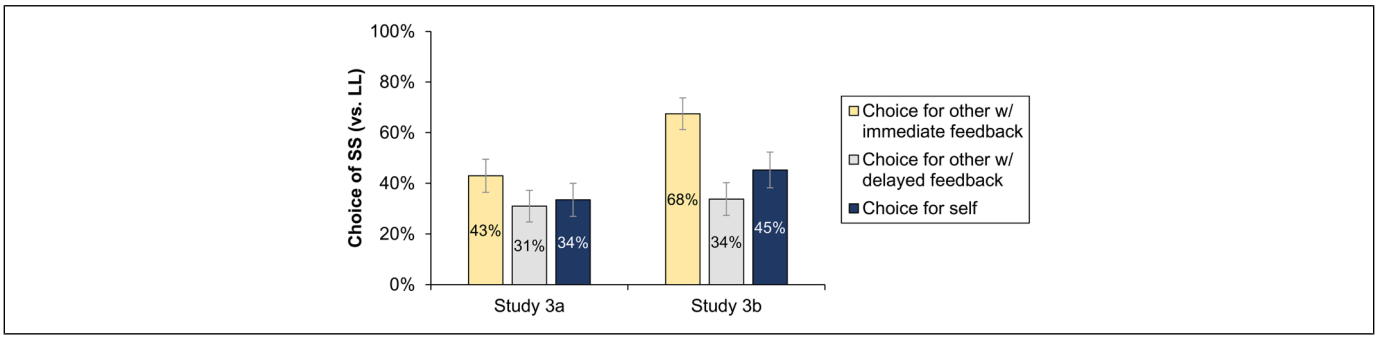

Figure 4. Agent's Impatience Is Mitigated When Interpersonal Feedback Is Delayed (Studies 3a and 3b).
Notes: Error bars represent 95% CIs.

In Study 3b, participants' choices likewise differed significantly across the three conditions ($\chi^2(2, N = 605) = 48.35$, $p < .001$). Participants who were asked to choose for Alex (whose affective feedback would occur immediately) were more likely to choose the SS option (67.5%) than participants who were asked to choose for Blair (whose affective feedback would be delayed; 33.8%), or participants who were asked to choose for themselves (45.3%; Figure 4; see additional discussion in Web Appendix A, Section III). Using the same dummy coding as Study 3a, a binary logistic regression revealed that participants who chose for another person with immediate feedback were more likely to choose SS than participants who chose for themselves ($b = .92$, Wald = 19.7, $p < .001$), and participants who chose for another person with delayed feedback were less likely to choose SS than those choosing for another person with immediate feedback ($b_{delay} = -1.40$, Wald = 44.88, $p < .001$).

Discussion

Study 3a supported our prediction, per H_2, that agent's impatience occurs only when the agent anticipates immediate interpersonal feedback, and not when the agent anticipates delayed interpersonal feedback. These findings were fully replicated in Study 3b.

Study 4: The Role of Recipient Specificity

Another critical proposed moderator of the agent's impatience effect is recipient specificity (H_3)—whether the agent was choosing for a specified or generic other person. We tested this moderator in Study 4 using a mixed design, with two (recipient: self vs. other) within-subjects repeated measures and two (recipient specificity: specified vs. unspecified) between-subjects conditions. When the decision recipient is specified, the model predicts that participants who chose for another will be more impatient than participants who chose for themselves, because the specificity of the decision recipient facilitates the vivid mental simulation of interpersonal reactions, which increases the relative impact of reaction utility. When the recipient is unspecified, we expect that participants who chose for another will be less likely to visualize the reactions, which renders their decision for the other person more similar to their choice for themselves because the choice for other would be based relatively more on vicarious utility.

Another purpose of this study was to directly examine the relative impact of expected vicarious utility and expected reaction utility in the decision process of choosing for specified versus unspecified others. We asked participants to predict their recipient's evaluation of each option and to predict their recipient's reaction to each option. We then tested whether these differences mediated the difference between choices for the specified versus unspecified other person. We preregistered this study (https://aspredicted.org/8kg76.pdf).

Method

We received 533 valid responses ($M_{age} = 37$ years; 49% female) from MTurk after applying the preregistered screening procedure (Table S1, Web Appendix B).

Participants were first instructed, "Think of a person that you do not know very well but frequently interact with (e.g., a barista at a local coffee shop) [and] briefly describe the person you are thinking about." We referred to the listed person as Person A in the subsequent scenario. Participants then read that many consumers, including Person A, filled out a large-scale online survey from Starbucks and were compensated with store credit. These consumers were given a choice between two options: receive $28 in store credit today or receive $35 in store credit in three weeks. We randomly assigned participants to two conditions. In the specified-recipient condition, participants read, "Imagine that Person A took part in the survey and was given these two options. If you were asked to choose on behalf of Person A, which option would you choose for Person A?" In the unspecified-recipient condition, participants read, "Imagine the average customer who took part in the survey and was given these two options. If you were asked to choose on behalf of the average customer, which option would you choose?"

After participants made a choice, they were asked to predict how the recipient would react to each option ("How do you think [the recipient] would react to receiving [option] [i.e., with facial and bodily expressions of emotion]?") and how the recipient would evaluate each option ("How do you think [the recipient] would evaluate [i.e., objectively assess] the receipt of [option]?") on two nine-point scales (−4 = "very negatively," and 4 = "very positively"). Next, in the choice for self, participants were asked, "Imagine instead that you took part in the survey and were given the two options of compensation. Which option would you choose for yourself?" Lastly, participants indicated the perceived closeness between themselves and the recipient on a ten-point scale (1 = "not close at all," and 10 = "extremely close"), completed a generic IMC, completed an additional attention check about the content of the study, and indicated their gender and age.

Results

Comparing the first choice made by each participant across conditions, those who chose for a specified other were more likely to choose SS (60.0% for person A) than participants who chose for an unspecified other (42.1% for the average customer; $\chi^2(1, N = 533) = 13.50$, $p < .001$, $\eta = .16$; $b_{recipient\_specificity} = .64$, Wald = 13.38, $p < .001$). Participants' choices for themselves did not differ significantly between specificity conditions (35.8% vs. 37.4%; $\chi^2(1, N = 533) = .15$, $p = .699$).

Next, comparing the within-subjects choices, participants were much more likely to choose SS for a specified other (60.0%) than to choose SS for themselves (35.8%; McNemar's $\chi^2(1, N = 271) = 51.25$, $p < .001$). Participants also were somewhat more likely to choose SS for an unspecified other (42.1%) than to choose SS for themselves (37.4%; McNemar's $\chi^2(1, N = 262) = 5.03$, $p = .025$), but the difference between self and other was smaller when the other recipient was specified versus unspecified ($\Delta = 24.2\%$ vs. 4.8%). Generalized estimation equations confirmed that the nonspecific recipient significantly reduced the agent's impatience effect (interaction between self vs. other and recipient specificity condition; Wald χ^2 $(1, N = 1066) = 20.71$, $p < .001$).

Next, we examined agents' anticipation of recipient reactions and recipient evaluations. First, recipient specificity influenced participants' anticipation of both recipient reactions and recipient evaluations: participants expected larger differences in recipient reactions to the two options when the decision recipient was a specified person than when the decision recipient was unspecified ($\Delta_{reaction}$ = 1.05 vs. $\Delta_{reaction}$ = .47; F(1, 531) = 12.64, $p < .001$; Table S5, Web Appendix B), with more positive reactions for the SS option. Participants also expected larger differences between recipient evaluations of the two options when the decision recipient was a specified person than when the decision recipient was unspecified ($\Delta_{evaluation}$ = .82 vs. $\Delta_{evaluation}$ = .29; F(1, 531) = 8.78, $p = .003$). More importantly, the difference in anticipated recipient reactions to the options mediated the effect of recipient specificity on agent choices (indirect effect = .24, SE = .09, $CI_{95\%}$ = [.09, .44]), even when controlling for the difference in anticipated evaluations (indirect effect = .18, SE = .08, $CI_{95\%}$ = [.05, .36]).

We also conducted separate multivariate binary logistic regressions to examine the predicted impact of anticipated recipient reactions and recipient evaluation on choices, controlling for egocentric projection. Among participants who chose for a specified other person, the difference in anticipated reactions significantly predicted choice ($b_{\Delta reaction}$ = −.54, Wald = 15.13, $p < .001$), whereas the difference in anticipated recipient evaluations only had a directional effect ($b_{\Delta evaluation}$ = −.17, Wald = 1.94, $p = .164$). Among participants who chose for an unspecified other, however, the difference score of anticipated reactions was only borderline significant ($b_{\Delta reaction}$ = −.31, Wald = 3.89, $p = .049$) while the difference score of anticipated recipient evaluations was significant ($b_{\Delta evaluation}$ = −.37, Wald = 6.34, $p < .012$). In both regressions, choices for oneself also strongly predicted choices for others (for the specified other: b = 3.19, Wald = 45.18, $p < .001$; for the unspecified other: b = 3.48, Wald = 68.49, $p < .001$), consistent with the assumption that own impatience is projected. In summary, anticipated reactions significantly explained the other-oriented decision process, separately from the role of anticipated evaluations, particularly when the recipient was specified.

Lastly, as intended, interpersonal closeness with the decision recipient did not differ between the specified and unspecified other (for the specified other: $M_{closeness}$ = 4.07, SD = 2.29 vs. for the unspecified other: $M_{closeness}$ = 3.91, SD = 2.66; t(514.3) = −.73, $p = .463$). Closeness, gender, and age did not moderate the effect.

Discussion

We observed a large agent's impatience effect when the decision recipient was specified, and this effect was nearly eliminated when the recipient was unspecified. In other words, agents are more likely to make an "impatient" intertemporal decision for another person if they can imagine the decision recipient's reactions, compared with when choosing for a person for whom the interpersonal consequences are hard to imagine. These results support model predictions that recipient specificity is a critical moderator of the effect (H_3).

This moderator also helps reconcile our findings with prior research, which had concluded that choices for another (unspecified) person were not as "impatient" as choices for oneself (Albrecht et al. 2011; Pronin, Olivola, and Kennedy 2008; Takahashi 2007; Ziegler and Tunney 2012). Our results in Study 4 suggest that recipient specificity largely reconciles the differences between our findings and prior results through modulating the extent to which the agent considers interpersonal consequences in their decision process. When the decision recipient is a specified, identifiable individual—as in our studies, and as is typically the case in real-world choices for others—choices for another person are more "impatient" than choices for oneself. By contrast, the agent's impatience no longer holds when the recipient is an arbitrary, unspecified other person—as was the case in prior studies (see also the "General Discussion" section).

Study 4 also provided additional process evidence that support the distinction between vicarious utility and reaction utility in our model. The mediation analysis suggests that reaction utility was the primary factor explaining agent's impatience. Further complementing these results, we found that choice for oneself correlated more strongly with choice for unspecified other (r = .70, $p < .001$) than with choice for specified other (r = .53, $p < .001$), suggesting that egocentric projection played a larger role in choice for the unspecified other than in choice for the specified other, consistent with our model assumptions.

It is notable that the predicted moderation occurred despite the use of a hypothetical scenario in this study. Obviously, in this setting, agents are not expecting an actual postdecision interaction with the recipient. Yet, because specifying the recipient facilitates participants' simulation of a hypothetical anticipated affective reaction, the model nonetheless predicts a stronger agent's impatience effect for the specified recipient. This feature of our model is consistent with findings in the charitable giving literature that donations increase when the funds would go to an identifiable victim even though no subsequent social interactions would ensue (Small and Loewenstein 2003). In summary, our model predicts similar results for real and hypothetical decisions as long as the recipient is a specified person whose affective reactions are vividly imaginable.

Studies 5a and 5b: Individual Differences

Next, we examine the degree to which agent's impatience is moderated by individual differences. In addition to testing our proposed moderator (H_4), reliance on mental imagery, in Study 5a, we also test the effects of individual differences in empathy in Study 5b. While our model yields a straightforward prediction regarding imagery reliance because of its direct connection to reaction utility, the model does not make a clear prediction about whether empathy would moderate agent's impatience. This is because empathy is a multifaceted construct (Davis 1983; Reniers et al. 2011) that can arguably influence both vicarious utility and reaction utility. For instance, if the agent has greater empathy for the recipient, then both their expected vicarious utility and expected reaction utility should increase, and how her choice for the recipient

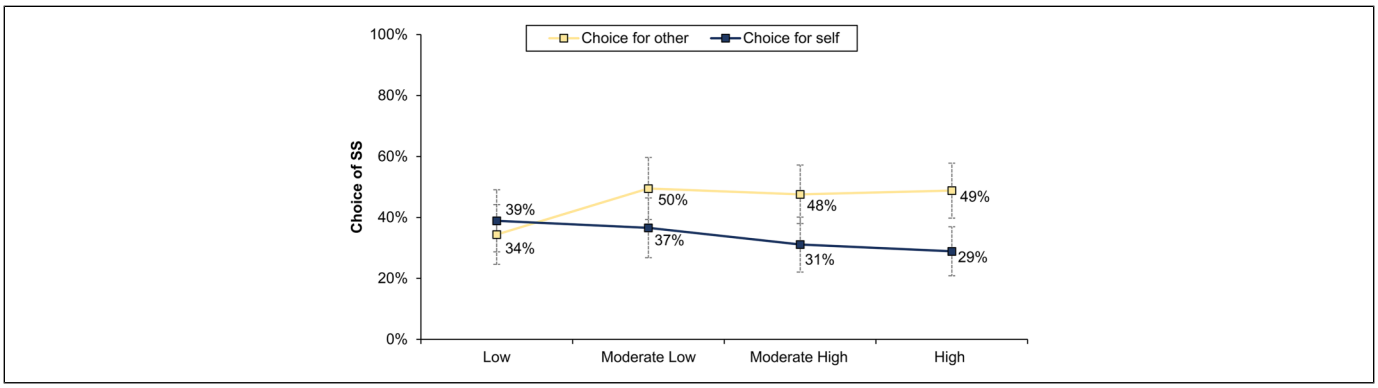

Figure 5. Agent's Impatience Is Attenuated Among People Who Spontaneously Engage in Less Use of Imagery.
Notes: The x-axis represents four levels of spontaneous imagery use (SUIS); low = first quartile (<37), moderate low = between first and second quartiles (37–42), moderate high = between second and third quartiles (42–46), high = fourth quartile (>46).

compares with her choice for herself will depend on the relative increase between the two utility components.

We test these two individual difference measures in otherwise identical but separate studies so that measurement of one factor that does not affect measurement of the other. Both studies had a within-subjects design of two (recipient: self vs. other) decisions, with individual differences in imagery usage (Study 5a) and in empathy (Study 5b) measured at the end of the studies. We preregistered both studies (https://aspredicted.org/dj6rv.pdf and https://aspredicted.org/7bh5f.pdf).

Method

In Studies 5a and 5b, we received 407 and 404 valid responses, respectively (Study 5a: $M_{age} = 39.6$ years; 66% female, 8 nonbinary; $M_{age} = 36.3$ years; 69% female, 8 nonbinary), after applying the preregistered screening procedure. The procedure in both studies was identical to the specific other condition in Study 4: participants were asked to imagine an acquaintance, indicated a decision they would make for the acquaintance, and then indicated a decision they would make for themselves under the same circumstances.

Afterward, participants completed additional measures. In Study 5a, we included three measures. First, participants were asked to indicate how vivid the mental imagery of the recipient was in their mind on a five-point scale adapted from the Vividness of Visual Imagery Questionnaire (Marks 1973), where a lower number indicates greater vividness (1= "Perfectly clear and as vivid as normal vision," and 5 = "No image at all, you only 'know' that you are thinking of the object"). Second, participants completed a spontaneous usage of imagery scale (SUIS; Nelis et al. 2014), which measures spontaneous engagement in visual processing during decision making, where a higher score indicates greater reliance on visual processing. Finally, participants completed the style of processing questionnaire (Childers, Houston, and Heckler 1985), which measures a general tendency to engage in visual versus verbal processing of information. In Study 5b, participants were asked to complete the full empathy scale from Reniers et al. (2011), which included five subscales capturing different aspects of empathy, including perspective taking and emotion contagion.

Results

In Study 5a, participants were again more likely to choose SS when choosing for another person (45.5%) than when choosing for themselves (33.4%; McNemar's $\chi^2(1, N = 407) = 27.76$, $p < .001$). As expected, participants with a higher tendency to engage in spontaneous use of imagery (measured by the SUIS score) were more impatient in their choice for the specified other person but not for themselves (interaction $F(1, 405) = 14.73$, $p < .001$; generalized estimating equations [GEE] $b_{interaction} = .19$, Wald = 13.33, $p < .001$; Figure 5). Indeed, the SUIS score negatively correlated with low mental imagery vividness ($r = -.240$, $p < .001$), validating the relevance of the general trait for engaging in visual processing specifically in the decision process. Meanwhile, the more general visual versus verbal style of processing scale did not moderate the effect ($p = .74$) and was not correlated with self-reported imagery vividness ($r = .035$, $p = .48$).

Moreover, participants chose more impatiently for others (but not for themselves) the more they reported vividly imagining the recipient. Participants who chose SS for the specified other person also reported more vivid mental imagery (on the adapted Vividness of Visual Imagery Questionnaire measure) than participants who chose LL for that person ($M_{SS} = 2.37$, $SD = 1.01$ vs. $M_{LL} = 2.61$, $SD = 1.01$; $t(405) = 2.34$, $p = .020$). In contrast, participants who chose SS versus LL for themselves reported similarly vivid mental imagery ($t > -1$, $p = .594$). A significant interaction between decision recipient (other vs. self) and imagery vividness confirmed these differences ($F(1, 405) = 4.36$, $p = .037$).

Overall, our results based on two of the three included measures suggest that spontaneously engaging in more spontaneous use of vivid imagery during the decision process predicts greater impatience in choosing for others. This is consistent with the model prediction, under the assumption that greater spontaneous use of vivid imagery increases expected reaction utility.

In Study 5b, as in Study 5a, participants were again more likely to choose SS when choosing for another person (41.1%) than when choosing for themselves (31.9%; McNemar's $\chi^2(1, N = 404) = 17.28$, $p < .001$). However, neither the overall Questionnaire of Cognitive and Affective Empathy scale nor any of its subscales moderated the within-subjects agent's impatience effect ($ps > .34$).

Discussion

Study 5a found that the agent's impatience effect was stronger among participants who tend to spontaneously engage in visual imagery. In contrast, participants' trait empathy did not moderate the effect either in Study 5b or in another three studies (using different empathy measures, see Web Appendix B). These results support H_4 and point to the involvement of mental imagery as underlying the impact of reaction utility in interpersonal decision making.

General Discussion

We develop a general model of self–other decision making in intertemporal choice. We then present the first set of experiments that systematically test differences between self-oriented and other-oriented intertemporal choices. Consistent with our model, these experiments found that intertemporal choices for a specified peer recipient are typically more "impatient" than otherwise identical choices for oneself, a finding that contrasts with what has been previously theorized or reported. Additional experiments identify boundary conditions that are consistent with the model predictions based on incorporating interpersonal feedback into the intertemporal trade-off.

This research joins a growing body of research on self–other decision making and highlights the pivotal yet previously overlooked role of interpersonal feedback in shaping decisions for others. While the extant literature has examined various psychological mechanisms that contribute to "impatience" in individual decision making (Hardisty and Pfeffer 2017; Read, Olivola, and Hardisty 2017; Soman et al. 2005), the present research shows that "impatience" in interpersonal decision making can come from a distinct source—the rewarding value of interpersonal feedback. Our findings suggest that the role of this source of utility should also be considered in other types of self–other decision making.

Limitations, Model Extensions, and Future Directions

Domain-specific discounting. In our model, the critical assumption for our hypotheses is the MRP between vicarious and reaction utility functions. This basic assumption is theoretically parsimonious and congruent with the common view that future outcomes are first construed atemporally (e.g., as mental imagery) before adjusting subjective value for the delay (Friedman 1993; Gilbert, Gill, and Wilson 2002). It should be noted that an alternative assumption about domain-specific discounting could also generate similar hypotheses. That is, if the individual discount rate varies across different utility sources and is steeper for reaction utility than for vicarious utility, then we can also derive (with additional secondary assumptions) that choice for others will be more "impatient" than otherwise identical choice for oneself. Given that MRP is a sufficient condition for our hypotheses, we do not need to adopt this assumption about domain-specific discounting, which has been a topic of disagreement in the literature (see Killeen 2009; Sawicki, Markiewicz, and Białek 2019).

Explicit preference differences and prediction errors. In this research, we focused on intertemporal choices between peers whose preferences are presumably similar. Accordingly, the calibration of beliefs about others' preference is based primarily on the accuracy of egocentric projection for a given decision in our baseline model. This is admittedly a simplification of the real world. Sometimes, agents could know a specific recipient well enough to have accurate direct knowledge about how the recipient's specific preferences differ from their own. Alternatively, as proposed by Pronin, Olivola, and Kennedy (2008), agents may perceive others' affective experiences in general to be less intense than their own, and therefore believe that others will have more "patience" in intertemporal trade-offs. When such prediction errors exist, the value of expected vicarious utility should be shifted in favor of the LL option even without influencing the reaction utility component. To this end, our model can be extended to cases in which preference calibration is also influenced by the agent's beliefs about how the recipient's preferences differ from their own. We briefly discuss these model extensions in Web Appendix A (Section III). Future research could test the predictions of this extended model in contexts where such beliefs are likely to occur.

Learning in repeated interactions. In our model, we focused our discussion of interpersonal feedback on its affectively rewarding component. However, interpersonal feedback can also provide informational feedback about the success of the agent's preference calibration or the fit between the recipient's true preference and the agent's selection. Another interesting extension of the model would then involve repeated choices, in which such feedback regarding fit in turn influences not only the value of reaction utility but also the value of expected vicarious utility in subsequent decisions. Further, interpersonal feedback can be more dynamic than assumed here, involving one or more potential interactions at different times (i.e., potentially including notification prior to receipt, at the time of receipt, multiple consumption occasions, and even postconsumption recollection). Future research might consider exploring the implications of such dynamic interactions on an agents' choices.

Theoretical and Practical Implications

It has been often presumed or implied that the interpersonal delegation of intertemporal choices leads to more "far-sighted" decision outcomes. The present research shows that interpersonal decision making may yield decisions that are more *short*-sighted when interpersonal feedback is actively anticipated. These findings have implications for both consumers and

marketers. Consumers should take this finding into account when delegating decisions to their peers, particularly when aiming to better align the choice outcomes with their long-term welfare. Marketers can use this insight to better promote products and services that involve interpersonal consequences, such as in gift marketing and referral programs, by highlighting options that are likely to evoke immediate and easily imagined interpersonal reactions.

Beyond decisions between peers, many other types of interpersonal decisions involve goals that introduce additional and potentially competing considerations in the decision process. For example, parents making decisions for their children not only anticipate their children's immediate feedback but also expect their decisions to shape character and deliver benefits in other important aspects. When doctors give medical advice to their patients, these decisions bear a host of physical, emotional, and legal consequences. When people donate to needy others, the donor typically will not receive concrete interpersonal feedback. As a result, reaction utility often plays a smaller role in these decisions (unless interventions are used to facilitate mental simulation of interpersonal reactions), whereas vicarious utility and other factors (e.g., image motives, moral obligations) have a larger impact. In these decisions, we conjecture that the influence of interpersonal feedback can be overridden by other considerations, many of which tilt the overall intertemporal trade-off when choosing for others toward LL options with greater long-term consequences.

In daily life, we are constantly interacting with others, making decisions that affect them, and experiencing how they react to our decisions, immediately and in the future. There is a growing consensus that decisions for others involve potentially gratifying social outcomes that give rise to complex intertemporal trade-offs (Charlton, Fantino, and Gossett 2013; Galak, Givi, and Williams 2016; Yang and Urminsky 2018), and the attainment of the social outcomes further shapes subsequent choices (Liu, Dallas, and Fitzsimons 2019; Wang, Krumhuber, and Gratch 2018; Yang and Urminsky 2018). To truly understand self–other decision making, a comprehensive framework must incorporate not only intrapersonal processes of projection, estimation, and vicarious experience but also the role of interpersonal feedback. By taking both aspects into consideration, our research reveals that intertemporal choice for others goes beyond merely guessing what others want and encompasses a fundamental inclination for immediate gratification derived from our social connections.

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