Pilot study

We predicted that presenting efficiency upgrade options in SE mode would result in calibrated judgments of the larger upgrades and, in turn, in calibrated WTP. Importantly, presenting both upgrades in a JE mode would result in biased evaluations for the larger upgrade's savings and, in turn, a willingness to overpay.

We examined our hypothesis by presenting participants with four vignettes describing smaller and larger upgrades relating to speed or fuel efficiency in either SE or JE modes and afterwards, participants indicated their WTP for each upgrade. We predicted that the relative difference in WTP between the smaller vs. larger upgrades would be increased in JE vs. SE. This prediction was based on the assertion that, when judged jointly, the larger upgrade would appear more attractive in terms of its time/fuel savings.

Method

Participants. We recruited 298 participants from Prolific Academic (M_{age}= 34.4; SD_{age} = 12.9; 50% were female). Participants were pre-screened to include only U.S. residents, aged 18 or above, who speak English as their first language. In order to maximize participants' attention, and to screen out participants who did not read the instructions carefully, we included an attention-check question asking participants about the topic of the study. In the text preceding the question, participants were instructed to choose the "other" option and write the word "attention" in the box next to it. Thirty-three (11%) participants failed the attention-check and were omitted from further analyses.

Design and procedure. The study was presented as a study on consumer preferences. Participants read four scenarios, containing offers of upgrades for two services (Internet service and a fast lane for driving) and two products (a printer and a car). In each scenario, participants

were presented with initial values and were asked to indicate how much they would be willing to pay for an upgrade to a higher value. Participants were randomly allocated to one of three experimental groups: two groups were presented with a SE task and one group was presented with a JE task. For example, the Internet speed scenario in the JE condition read:

> Alex and Taylor are both customers of two large Internet Service Providers in the U.S. Both pay a similar monthly fee for home Internet service at a speed of 25 Mbps. Alex's provider offers an option to upgrade Alex's Internet service from 25 Mbps to 50 Mbps. Taylor's provider offers an option to upgrade Taylor's Internet service from 25 Mbps to 100Mbps. How much, in your opinion, should each of them be willing to pay more for their monthly service after the upgrade? What should be the increase - in USD - in Alex's and Taylor's monthly payment compared to the current plan's rate?

The other scenarios asked about WTP to drive in a fast lane which allows people to drive faster (speed increases from 40 to 60 or 80 mph), to purchase a printer that prints more pages per minute (50 to 100 or 150 pages-per-minute), or to lease a car that has a higher fuel efficiency (increases from 10 to 20 or 30 MPG). In the separate evaluation conditions, participants were presented with either the small or the large upgrade for each scenario. Participants indicated their WTP for each scenario using a slider that ranged from 0 to $50 for the fast lane, and from 0 to $100, $200, or $5000 for Internet service, the printer and the car, respectively. The order of the four scenarios was randomized within each experimental group. At the end of the study, participants reported their age, gender and any comments they may have had.

Results and Discussion

Among participants in the JE condition, we omitted five responses from the analyses because the participants reported a higher estimate for the smaller upgrade relative to the larger upgrade in a certain scenario. Additionally, we omitted five responses in the SE condition and eight responses in the JE condition that were over three standard deviations above the mean.

To examine our hypothesis that people would be willing to pay more for the larger upgrade, compared to the smaller one, in joint vs. separate evaluations mode, we computed the difference

(in percentages) of WTP between the large and small upgrades for each evaluation condition in each scenario. We compared these ratios of WTP to the normative ratio that is to be expected from the savings gained (in time or fuel) between the upgrades. Figure 1 shows that the difference in the WTP ratio was consistently high when the evaluations of both upgrades were made jointly, and considerably smaller when the upgrades were evaluated separately. For example, when asked for their WTP to upgrade their home Internet speed from 25 to either 50 or 100 Mbps, participants in the JE mode were willing to pay about twice as much (99% more) for the larger upgrade (M=$32.49 vs. $16.34, SD=20.29, 12.00). In contrast, participants in the SE mode were willing to only add 28% to the cost of the larger upgrade (M=$21.73 vs. $16.94, SD=12.37, 9.85). In other words, the JE mode increased the relative WTP for the large upgrade by 3.5 times. As shown in Figure 1, an even larger relative increase – 6 times more – was seen for upgrading printers, whereas smaller, but still considerable increases – 2.2 and 1.5 times – were found for upgrading cars and increasing driving speed, respectively. Table 2 provides the means of WTP for each condition.

Figure 1. Percentage difference (ratio) in WTP between large vs. small upgrades in separate and joint evaluations for each scenario in Study 1 (error bars indicate 90% confidence intervals).
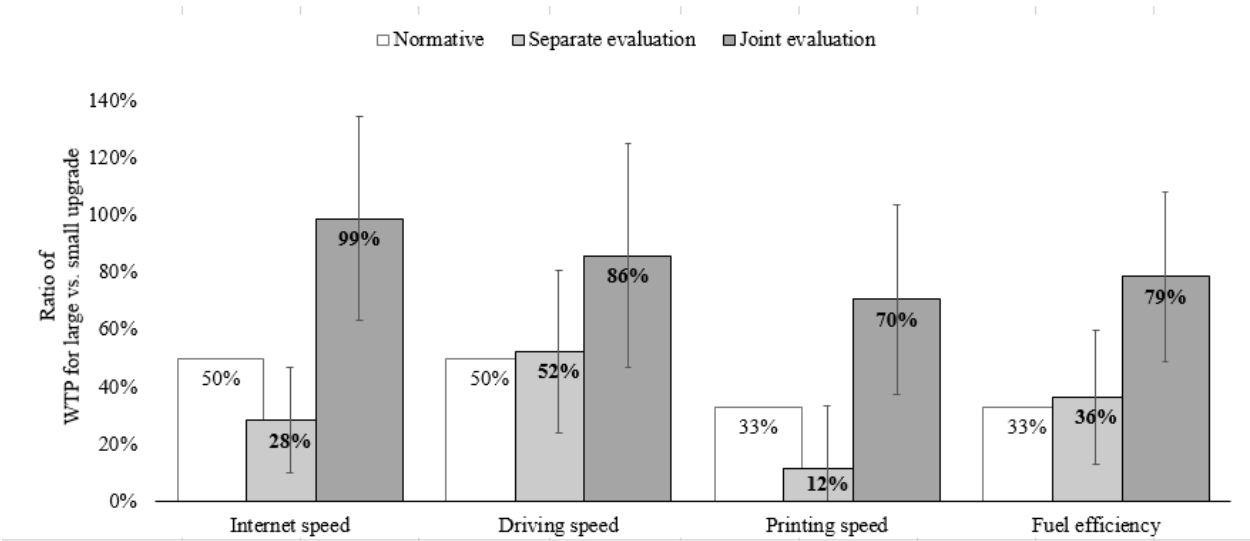
Table 2. Means of WTP (and SDs) for the smaller and larger upgrades in joint vs. separate evaluations for the scenarios.

Scenario	Separate evaluation		Joint evaluation	
	Small upgrade	Large upgrade	Small upgrade	Large upgrade
Internet	16.94 (9.85)	21.73 (12.37)	16.34 (12.00)	32.49 (20.29)
Driving	5.63 (3.92)	8.57 (6.92)	6.81 (5.70)	12.29 (9.00)
Printer	32.99 (24.74)	36.83 (27.97)	33.58 (26.55)	57.20 (40.28)
Car	1521 (1023)	2073 (1447)	1186 (791)	2118 (1255)

Figure 1 additionally shows that these differences are due to participants in the JE modes providing exaggerated prices compared to the normative standard, which is based on the actual savings that could be gained by the upgrades. For example, in the Internet speed scenario, JE participants' WTP ratio was twice what it should have been, had they correctly calculated the actual savings. In all scenarios, we found that JE participants' WTP ratios were significantly greater than the normative ratio, suggesting that they overestimated the savings that could be gained by the large upgrade in all cases. Table 2 further demonstrates that the difference in WTP between conditions was primarily driven by the WTP for the large, and not the small, upgrades further corroborating this conclusion. In contrast, the WTP ratios among participants in the SE conditions were much more calibrated and in close resemblance to the normative ratios. There was only a significant difference in the printing speed case, and even in that case, participant responses in the SE condition produced a lower, and not higher, ratio of WTP between the upgrades, meaning that participants did not overestimate the savings of the large upgrade in any of the cases.

To summarize, we found that the JE mode caused participants to overestimate what they would gain from a larger upgrade, which led them to provide an upward biased WTP for large upgrades and, in essence, be willing to pay much more in order to save much less.