Supplementary information on Changes in Traffic Jams and Injuries Impact on Acceptability of Automated Vehicles: A Strong Curvilinear Relation with no signs of Loss Aversion

1. Survey item creation

The method is a variation of a stated preference experiment. Initially, we developed choice cards where participants could choose between two scenarios with varying absolute traffic jams and injury numbers. Here, one scenario had automated trucks. During early phases of development, we deemed this method unrealistic, as choosing between two scenarios completely ignores status quo bias (Samuelson and Zeckhauser 1988) and loss aversion (Kahneman and Tversky 1979) . Emotionally, deciding to move from A to B is different from choosing between A and B. After this, we fixated the first scenario to today's current traffic jam and injury rates. This was more realistic, as participants could then choose to "stick with todays" scenario and not accept a transition to the new numbers. Finally, we realized that it was simpler for participants to evaluate the change between these two numbers than to deduce this change themselves. In this version, we also replace the "yes/no" answers with a Likert scale from 1-7 measuring acceptance, as the question framing allowed for this, and acceptance is not a dichotomous concept. For each survey item, a program generates three random numbers between -100 and 100 on 5-point intervals. These random numbers were then input into the item. This process was repeated 5 times for each participant, resulting in 5 items per participant. Although this meant that some of the scenarios were somewhat unrealistic (for example increase in deaths and a decrease in minor injuries), this method ensured data on a wide variety of traffic jam and injury rates.

2. Limitations

The phrasing for the response option, as can be seen in Figure 2, is unfortunate. This phrasing was "How much do you agree or disagree that these are acceptable injury rates for transitioning from human drivers to self-driving trucks". If interpreted literary, it tells the participant to ignore the traffic jam items. Although we believe that few participants actually interpreted it this way, it nonetheless most likely reduces the effect size of the "traffic jams" variables in the regression. Future studies should use phrasings such as "How much do you agree or disagree that these are acceptable changes for transitioning from human drivers to self-driving trucks".

Recruiting via social media introduces certain biases, as it doesn't fully represent the views of the entire population. Our sample likely includes a higher proportion of people already interested in the topic, as they are more inclined to click on the ad and share their opinions. This may result in a more bimodal distribution compared to the general population. While these results may not be generalizable to the public at large, they likely reflect the views of those most eager to express their opinions on autonomous trucks. Additionally, we believe that the presence of loss aversion and diminishing sensitivity should not differ significantly between our sample and the general population. Thus, we argue our sample is sufficient for prospect theory testing, but readers should be hesitant about extrapolating the average acceptance to the general population.

In total, 116 of 447 responses had identical responses to all scenarios. This is a considerable number. We believe the main reason behind this number is that several participants wanted to express either resistance or support and ignored the task. As the sample was recruited through social media, our sample likely consisted of people with strong opinions on the topic, as these would have been more likely to participate in the survey. We do not believe that this should meaningfully impact the paper's main research question, the prospect theory application. Cognitive mechanisms such as loss aversion and diminishing sensitivity should apply regardless of preexisting opinions. However, removing these respondents makes the average acceptance in the main paper misleading. Therefore, we also report the average acceptance below, in a version of the data where we do not screen participants.

3. Data validation

To demonstrate data validity, we demonstrate two aspects. Firstly, in our results, both the change in traffic jams, minor injuries and major and fatal injuries have a logical impact on acceptance. All three factors have a negative impact, meaning an increase in injuries or traffic jams leads to a decrease in acceptance. Secondly, major and fatal injuries have a larger impact than minor injuries, which again have a larger impact than traffic jams. These findings, which are in line with common sense, support the validity of the data.

It could be argued that the above findings are there simply because of the data cleaning. Therefore, we also present the same data without this data cleaning. In Table 1a, we see that the above data validation arguments still hold. All coefficients are negative, and the size of the coefficients are logically ordered with deaths being more important than injuries, which are again more important than traffic jams.

4. Mean acceptance

The paper investigates if aspects of prospect theory apply to the acceptance of automated vehicles as an effect on their impact on traffic jams and injury rates. As a function of this, it also collects data on the mean acceptance rate in our sample. As this can itself be useful we report this here. For all the below numbers, we do not remove participants with no variation in their responses, or incongruent accept or disproval.

The mean acceptance across all scenarios was very low, at -1.23 (SD = 1.97, Min = -3, Max = 3). Table 1a models the relationship between demographic variables, traffic jams and injuries, and acceptance. Surprisingly, neither age, gender, nor education was statistically significantly associated with acceptance in our sample. This suggests that demographic variables could have a low impact on the acceptance of automatic vehicles when their impact on traffic jams and injuries is explicitly stated. Finally, we see that major and fatal injuries are considerably more important than minor injuries, which are again somewhat more important than traffic jams.

Table 1a.
Multilevel regression on the acceptance of automated trucks. Incidence level R^2 = .23. Person level R^2 = .02. Numbers in parentheses represent standard errors.

		Range	Coef.	*P*
Lvl 2 variables	Male	0 – 1	0.111(.164)	.498
	Age	18 – 81	- 0.002(.004)	.581
	Education	0 – 7	0.022(.035)	.532
Lvl 1 variables	Traffic jams	-100 – 100	- 0.002(.001)	.000
	Minor injuries	-100 – 100	- 0.003(.001)	.000
	Major and fatal injuries	-100 – 100	- 0.013(.001)	.000
	Constant		- 1.378(.391)	.000

References

Kahneman, Daniel, and Amos Tversky. 1979. “Prospect Theory: An Analysis of Decision under Risk.” *Econometrica: Journal of the Econometric Society* 47 (2): 263.

Samuelson, William, and Richard Zeckhauser. 1988. “Status Quo Bias in Decision Making.” *Journal of Risk and Uncertainty* 1 (1): 7–59.