

# Supplemental Material

## Moving citizens online: Using salience & message framing to motivate behavior change

Noah Castelo, Elizabeth Hardy, Julian House, Nina Mazar, Claire Tsai, & Min Zhao

### Methods & Analysis

#### Methods

Since the color changes on the envelope as well as on the messaging on the back of the renewal form inside the envelope could not be reproduced in the print edition of the journal, we include them here.

Supplemental Figure 1. Salience messaging on envelope (treatment conditions 1, 2, and 3)



This figure is the color version of Figure 2 from the main article.

Supplemental Figure 2. Gain messaging inside the envelope, on the back of the renewal form (treatment condition 2)



This figure is the color version of Figure 4 from the main article.

Supplemental Figure 3. Loss messaging inside the envelope, on the back of the renewal form (treatment condition 3)

ServiceOntario

**Don't miss out on the convenience of renewing online!**  
**Découvrez la convenance du renouvellement en ligne!**

<p><b>Renewing in person:</b></p> <ol style="list-style-type: none"> <li>1. Travel to ServiceOntario centre (20 minutes)</li> <li>2. Wait in line (15 minutes)</li> <li>3. Talk to agent (5 minutes)</li> <li>4. Travel back to home/office (20 minutes)</li> </ol> <p><b>Total estimated time: 1 hour or more</b></p> <p><b>Renewing online:</b>  <span style="color: red;">Total estimated time: 10 minutes or less</span>                      in the convenience of your home, 24/7, instant, easy and safe.</p> <p><b>What are you waiting for? Visit us at</b>  <span style="color: red;">ServiceOntario.ca/RenewOnline</span></p>	<p><b>Renouvellement en personne:</b></p> <ol style="list-style-type: none"> <li>1. Voyage pour entretenir le bureau d'Ontario (20 minutes)</li> <li>2. Attente dans la ligne (15 minutes)</li> <li>3. Entretien à l'agent (5 minutes)</li> <li>4. Voyage de nouveau à la maison/au bureau (20 minutes)</li> </ol> <p><b>Temps total: 1 heure ou plus</b></p> <p><b>Renouvellement en ligne:</b>  <span style="color: red;">Temps total: 10 minutes ou moins</span>                      dans la commodité de votre maison, 24/7, instant, facile et sûr.</p> <p><b>Qu'attendez-vous? Visitez</b>  <span style="color: red;">ServiceOntario.ca/Renouveler-en-Ligne</span></p>
--	---

1  
4 DEC

This figure is the color version of Figure 5 from the main article.

## Data & Analysis

Here, we explain our data analysis and findings in more technical detail. We first submitted people's in-person versus online renewal behavior to a simple binary logistic regression analysis assuming independence of observations. In Model 1 (seen in the second column of Supplemental Table 1), we treated the control condition (standard letter) as a baseline comparison (therefore, it does not appear in any of the rows in the second column) and entered the three treatment conditions—salience only, salience gain, and salience loss—as dummy variables.

Supplemental Table 1. Results of binary and multilevel logistic regression analyses

Variable	Binomial logistic regression		Multilevel logistic regression	
Variable	Model 1	Model 2	Model 3	Model 4
Online renewal (0 = in person, 1= online)				
Intercept	0.12***	0.13***	0.11***	0.13***
Control condition		0.88*** [0.86, 0.90]		0.87 [0.69, 1.11]
Salience only (TC1)	1.14*** [1.12, 1.17]		1.15 [0.90, 1.46]	
Salience gain (TC2)	1.49*** [1.46, 1.52]	1.31*** [1.28, 1.33]	1.50** [1.18, 1.91]	1.31* [1.03, 1.67]

Saliency loss (TC3)	1.33*** [1.30, 1.36]	1.17*** [1.14, 1.19]	1.34* [1.05, 1.70]	1.17 [0.92, 1.48]
On-time renewal (0 = late renewal, 1 = timely renewal)				
Intercept	2.38***	2.88***	2.38***	2.90***
Control condition		0.83*** [0.81, 0.84]		0.82 [0.59, 1.15]
Saliency only (TC1)	1.21*** [1.19, 1.23]		1.22 [0.87, 1.69]	
Saliency gain (TC2)	1.30*** [1.28, 1.32]	1.08*** [1.06, 1.09]	1.31† [0.94, 1.82]	1.08 [0.77, 1.50]
Saliency loss (TC3)	1.17*** [1.15, 1.19]	0.97*** [0.95, 0.98]	1.17 [0.84, 1.63]	0.96 [0.69, 1.34]

*Note.* Reported data are odds ratios. Their 95% confidence intervals are in brackets. Odds ratios greater than 1 indicate greater likelihood of online renewal. TC1 = treatment condition 1; TC2 = treatment condition 2; TC3 = treatment condition 3.

† $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .00$ .

In Model 2 (seen in the third column of Supplemental Table 1), we treated the saliency-only treatment condition as a baseline comparison. The results reported in Supplemental Table 1 display the odds ratios of renewing online compared with the baseline.<sup>1</sup> Odds ratios larger than 1.0 mean that the odds of renewing online are larger than the odds of renewing online with the baseline-comparison letter; in the same way, odds ratios smaller than 1.0 mean that the odds of renewing online are smaller than the odds of renewing online with the baseline-comparison letter. On the basis of these analyses, we found that even our most minimalist treatment, the saliency-only treatment condition, in which we only varied the envelope to highlight the subject line in blue and changed its smaller font message from “Renew online and receive a 10-day extension” to “Instant and easy renewal online,” was superior to the standard letter (see Model 1). Additional changes to the messaging inside the envelope led to additional significant increases in the odds of online renewals over and above the increases achieved with our minimalist saliency-only treatment condition (Model 2: saliency gain and saliency loss).

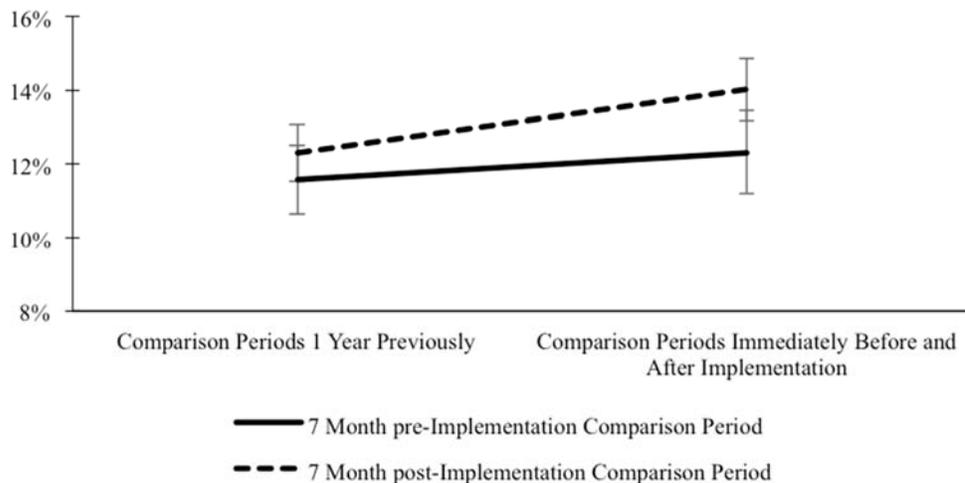
<sup>1</sup>Although vehicle owners could also renew their license plate stickers by mail, less than 0.07% elected to do so during our experiment. To keep our report succinct, this small group was excluded from the subsequently reported analyses. Our results remain the same without excluding that group.

To account for the fact that different versions of the letter were clustered by the week in which the letters were sent, as opposed to assigned to vehicle owners completely randomly, we conducted a second type of analysis: a two-level binary logistic regression analysis (using the GENLINUX procedure in SPSS) in which vehicle owners were nested within the week they were mailed their letter. Using a random-intercepts model in this way accounts for statistical dependencies within clusters, such as the possibility that vehicle owners who received renewal letters in the same week may have experienced other coincident factors (such as weather or general mail volume) that made their probability of renewing online more similar to that of their weekly cohort than that of vehicle owners involved in the experiment during other weeks (Hofman, 1997). The results of this analysis can be seen in the fourth and fifth columns (labeled *Model 3* and *Model 4*, respectively) of Supplemental Table 1. Odds ratios from the multilevel logistic regression indicate that most of the key results from the simple logistic regression continue to hold. Specifically, the odds of renewing online in our minimalist salience-only treatment condition are no longer significantly larger than the odds of renewing online with the standard letter. However, the other two treatment conditions, salience gain and salience loss, remain significantly more effective. In addition, the salience-gain condition (but not the salience-loss condition) continues to lead to significantly higher odds of online renewals in comparison to our minimalist salience-only treatment condition. Specifically, for vehicle owners in the salience-gain treatment condition, the odds of renewing online are 1.5 times larger than the odds for vehicle owners with the standard letter and 1.3 times larger than the odds for vehicle owners in the salience-only treatment condition. At minimum, we can thus conclude that our gain-frame messaging intervention inside the envelope had a significant, positive impact on online renewal rates.

At the end of February 2015, ServiceOntario implemented our salience-gain test condition province-wide. By aggregating online renewal rates every month after this implementation, we were able to compare year-over-year increases in online renewals for the seven months immediately before and after the implementation of the salience-gain letter (see the dashed black line of Figure 8 in the main manuscript). To assess whether this increase is statistically significant, we conducted a mixed-method analysis of variance to control for any seasonal effects during the months in which the salience-gain letter was first implemented, with the monthly renewal rate as a year-over-year factor that was repeated at 12-month intervals and notice type as a factor that indicated whether the salience-gain notice represented the majority of notices in circulation during the more

recent of the repeated months (for this analysis, the months of March and April were excluded because vehicle owners have 90 days to renew their license plate stickers and thus, during those months, it was expected that a mixture of standard and salience-gain letters would be coexistent in the population—our analyses are substantively unchanged when we include March and April, however). This analysis revealed a significant main effect for year-over-year comparisons,  $F(1, 12) = 54.27, p < .001$ , indicating that there was a general increase in online renewals year-over-year. A marginally significant main effect of the seven-month comparison period immediately before and after implementation,  $F(1, 12) = 3.48, p = .087$ , is probably driven by increased renewal rates after implementation of the salience-gain letter, as can be seen on the left in Supplemental Figure 4 in the largely overlapping error bars for these comparison periods 12 months before the implementation. It is important to note that these main effects were qualified by a significant interaction,  $F(1, 12) = 8.48, p = .013$ , which, as can be seen in Supplemental Figure 4, indicates that in the months after the salience-gain letter was implemented, the year-over-year increases in the use of online services accelerated significantly. Note that Supplemental Figure 4 was created from the two gray-shaded boxes in Figure 8 in the main article.

Supplemental Figure 4. Online renewal rates of year-over-year comparison periods seven months immediately before and after implementation of the salience-benefit letter



Error bars are included to indicate 95% confidence intervals. The bars display how much variation exists among data from each group. If two error bars overlap by less than a quarter of their total length (or do not overlap), the probability that the differences were observed by chance is less than 5% (that is, the statistical significance is  $p < .05$ ).

### Additional Reference

Hofmann, D. A. (1997). An overview of the logic and rationale of hierarchical linear models. *Journal of Management*, 23, 723–744.