

*WEB APPENDIX A: STIMULI STUDY 1B*

Choice Display Used in this Study

Restaurant Name Here

\$ 2 off

Tomorrow

OR

Restaurant Name Here

\$ 4 off

In two weeks

Restaurant Name Here

\$ 2 off

Tomorrow

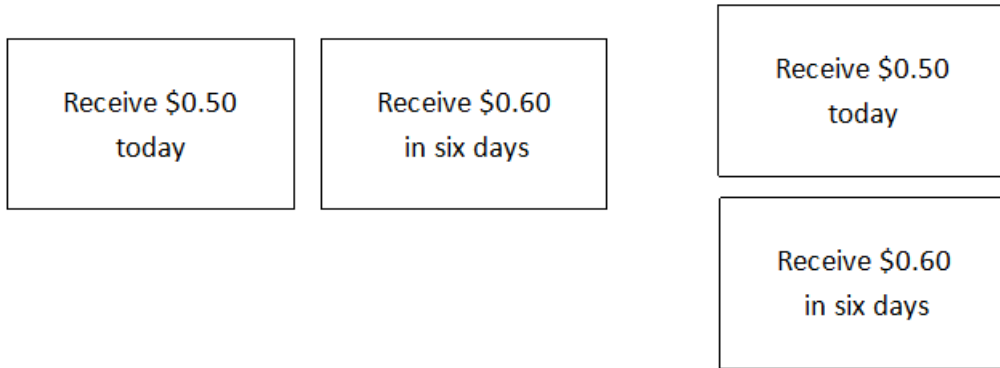
OR

Restaurant Name Here

\$ 4 off

In two weeks

*WEB APPENDIX B: STIMULI STUDY 1C*



### WEB APPENDIX C: DISPLAY ORIENTATION AND FOOD CHOICE

In this study, we present participants an option of two food rewards available at different times in a horizontal (vs. vertical) display. Furthermore, to show the application of our effects in a real-world context, the choice paradigm was consequential. That is, participants received what they selected.

#### *Method*

*Design.* Two hundred and twenty-nine students (54.1% female, average age = 20.5) participated in a single-factor design study with horizontal and vertical spatial organizations of time. We excluded 21 participants from the dataset as English was not their first language.

*Procedure.* The main study was part of an unrelated data collection session. In particular, at the end of the session, participants were directed to the spatial orientation survey. They were told that in appreciation for participating in this session, they would receive a reward of their choosing. They were given two options: receive one miniature Hershey's bar right now or receive four miniature Hershey's bars in two hours in a horizontal or vertical display. After making their selection, participants provided demographic information and indicated how involved they were with the survey they just took. A pre-test was carried out with 26 students (50% female, average age = 20.3) made a series of choices between receiving one miniature Hershey's bar now and a greater amount of Hershey's chocolate bars later. The larger, later reward increased from one to 11 in one bar increments. All of the participants saw these options in a horizontal arrangement. The results indicated that receiving one miniature chocolate right now was equally preferred as receiving four miniature chocolates in two hours ( $\chi^2 = .61, p = .433$ ).

## Results

We coded participants' selection as zero (one) if they preferred the immediate (later) reward. Twenty-seven participants who indicated they had minimal involvement with the task were excluded from the analysis (answered two or lower on the task involvement question; Townsend and Kahn 2014). The results of a chi-square analysis revealed a significant effect of spatial orientation of time ( $\chi^2(1) = 3.90, p = .048$ ). Specifically, preference to receive one chocolate now was higher when the options were presented horizontally ( $P_{\text{horizontal}} = 51.55\%$ ,  $P_{\text{vertical}} = 36.90\%$ ). Handedness was not a significant covariate ( $p = .731$ ) and our results are unchanged if it is included in the analysis.

Receive 1 miniature  
Hershey's chocolate  
bar now

Receive 4 miniature  
Hershey's chocolate  
bars in 2 hours

Receive 1 miniature  
Hershey's chocolate  
bar now

Receive 4 miniature  
Hershey's chocolate  
bars in 2 hours

WEB APPENDIX D: STIMULI STUDY 2

*Where will your retirement take you?*

*Start planning.*




*Where will your retirement take you?*

*Time moves on. Start planning.*



## WEB APPENDIX E: STIMULI STUDY 3



Choose your shipping options:

Shipping details


Please choose the shipping speed you would prefer:

Receive \$1.00 credit  
and delivery tomorrow

Receive \$2.00 credit  
and delivery in six days

Place your order

By placing your order, you agree to Amazon.com's [privacy notice](#) and [conditions of use](#).



Choose your shipping options:

Shipping details

Please choose the shipping speed you would prefer:

Receive \$1.00 credit  
and delivery tomorrow

Receive \$2.00 credit  
and delivery in six days

Place your order

By placing your order, you agree to Amazon.com's [privacy notice](#) and [conditions of use](#).

*WEB APPENDIX F: STIMULI STUDY 4*



## WEB APPENDIX G

An intertemporal decision requires a trade-off between time and money considerations. The objective of our next study is to demonstrate that attention to time, and not attention to money, is responsible for the influence of spatial orientation of time on intertemporal choice.

### *Method*

*Design.* Four hundred and fifty-eight Mturk workers (56.1% female, average age = 35.32) participated in a 2 (display: horizontal vs. vertical) x 2 (order of attention measure: time first, money first) between-subjects design. Seventeen participants were eliminated because English was not their native language. One participant was eliminated from the analysis because of low involvement with the task (two or lower on the involvement scale).

*Procedure.* Similar to Study 3, participants imagined that they were ordering a product from Amazon.com. They were then told that amazon could provide a \$1 credit tomorrow or a larger credit in six days. They had to indicate the amount of money they would need in order to delay the receipt of the credit. Subsequently, they answered how short or long the five-day waiting period would feel to them on a three-item scale: “How long did the additional five days wait period feel to you?” (1= Very small/ 9 = Very large; 1 = Very short, 9 = Very long; 1= Very near/ 9 = Very far;  $\alpha = .94$ ). Finally, they responded to two attention questions on a seven-point scale (How much did you focus on how much time you had to wait while making your decision?; 1= not at all, 7= very much) and attention to money (How much did you focus on the extra money you would receive if you waited as you were making your decision? 1= not at all, 7 = very much). The order of presentation of the attention measures was counterbalanced, however, we did not find a significant interaction between orientation and presentation order in the



analyses ( $p$ 's > .15). As a control, we also measured how frequently they purchased products on amazon.com (1 = not at all frequently, 7 = very frequently).

## *Results*

*Money required to delay reward.* Twelve participants were excluded from the analysis because they provided estimates that were 3 SD above the mean per condition. Consistent with our previous results, participants asked for more money when they saw the amazon display in a horizontal (vs. vertical) format ( $M_{\text{horizontal}} = \$9.95$  vs.  $M_{\text{vertical}} = \$6.06$ ;  $F(1,426) = 4.63$ ,  $p = .032$ ).

*Attention Mechanism.* We first ran a 2 (display orientation) x 2 (order of attention measure) ANOVA on attention to time. We found a significant main effect of order ( $F(1,424) = 22.09$ ,  $p < .001$ ) and a significant main effect of display orientation ( $F(1,424) = 4.84$ ,  $p = .028$ ). As mentioned above, no interaction effect emerged. Replicating our previous findings, we found that attention to time was affected by the display orientation ( $M_{\text{hor}} = 4.99$  vs.  $M_{\text{ver}} = 4.72$ ). Similarly, we ran a 2 x 2 ANOVA on attention to money. We only found a significant main effect of order of attention measure ( $F(1,424) = 7.55$ ,  $p = .006$ ). Hence, attention to money was not affected by the display orientation ( $F(1,424) = 1.45$ ,  $p = .228$ ).

Using PROCESS macro (model 6), we also found support for an attention to time → anticipated time perception mediation pathway. The dependent variable in the model was the amount of money required to delay the receipt of the reward. The independent variable was display orientation (0 = horizontal, 1 = vertical). We included frequency of shopping on amazon, as a covariate in the mediation analysis. Including this covariate in any of the previous analyses does not change our results. Controlling for frequency of purchasing on amazon, we found a marginally significant display orientation on attention to time ( $M_{\text{horizontal}} = 4.99$  vs.  $M_{\text{vertical}} = 4.72$ ;  $B = -.28$ ,  $t(425) = -1.78$ ,  $p = .076$ ). Second, the results revealed a significant main

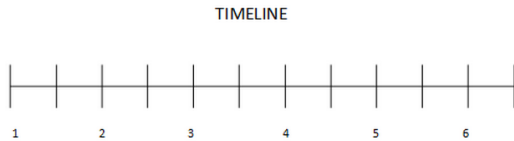
effect of frequency of purchasing on amazon ( $B = .27$ ,  $t(424) = 4.34$ ,  $p < .001$ ), a significant effect of attention on anticipated time duration ( $B = .41$ ,  $t(424) = 7.13$ ,  $p < .001$ ), while accounting for the effect of orientation on anticipated time duration ( $M_{\text{horizontal}} = 5.41$ ,  $M_{\text{vertical}} = 5.15$ ;  $B = -.19$ ,  $t(424) = -1.05$ ,  $p = .30$ ). This suggests that higher attention to time leads to expanded anticipated duration estimates. Finally, we found a significant effect of frequency of purchase on amazon on amount required to delay the reward ( $B = -1.39$ ,  $t(423) = -2.26$ ,  $p = .024$ ) and more importantly, anticipated time duration had a significant effect on amount of money required to delay the receipt of the reward ( $B = .90$ ,  $t(423) = 1.93$ ,  $p = .054$ ). A 90% CI for the indirect effect was obtained with 5,000 bootstrap resamples and supported a marginally significant indirect effect of spatial organization of time through the attention  $\rightarrow$  duration pathway (90% CI,  $-.438$ ,  $-.008$ ). Reversing the order of the mediators led to nonsignificant indirect effects (90% CI =  $-.019$ ,  $.428$ ).

### *Discussion*

An intertemporal decision inherently requires a tradeoff between time and money. We have argued that a horizontal (vs. vertical) display increases attention to time, leading to higher preference for an immediate reward. However, an alternative explanation is that a horizontal display decreases attention to money, leading to a higher preference for the smaller reward. The findings support the premise that attention to time, and not attention to money, is the underlying mechanism of the orientation effect.

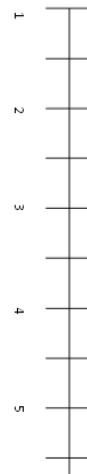
## WEB APPENDIX H: TIMELINE TASK STUDY 5

Instructions: In this first part of the research project, we would like you to imagine that you were building a short timeline for a school project. The professor would like you to build a timeline of the history of telephones. There are six events that you must arrange on the timeline, which are provided below. The professor provides you with a picture of the timeline (depicted below) so that you can complete it. In the second trial, participants were presented with a timeline of hats (horizontal or vertical) and asked to evaluate the appeal of the hats and to indicate which era was the most appealing and most unappealing.



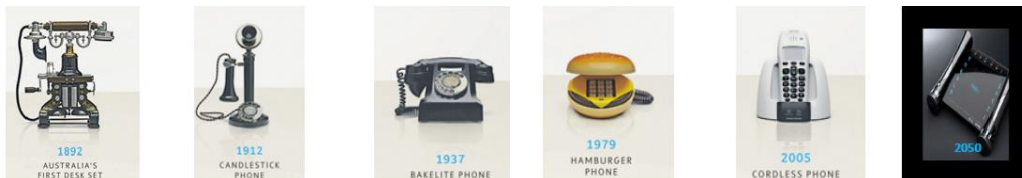
Horizontal Timeline

TIMELINE



Vertical Timeline

Trial 1



Trial 2

