The title

The title

## Warning: package 'dplyr' was built under R version 3.6.2

## Warning: package 'tidyr' was built under R version 3.6.2

## Warning: package 'purrr' was built under R version 3.6.2

## Warning: package 'ggplot2' was built under R version 3.6.2

## Warning: package 'broom' was built under R version 3.6.2

## Warning: package 'broom.mixed' was built under R version 3.6.2

## Warning in checkMatrixPackageVersion(): Package version inconsistency detected.  
## TMB was built with Matrix version 1.2.18  
## Current Matrix version is 1.2.17  
## Please re-install 'TMB' from source using install.packages('TMB', type = 'source') or ask CRAN for a binary version of 'TMB' matching CRAN's 'Matrix' package

## Warning: package 'TMB' was built under R version 3.6.2

## Warning: package 'lme4' was built under R version 3.6.2

## Warning: package 'AICcmodavg' was built under R version 3.6.2

## Warning: package 'patchwork' was built under R version 3.6.2

# Cognition article (stress, natives and late advanced and intermediate EN y Ma Ch,

# movement anticipation through vision and visuospatial WM

## Overview

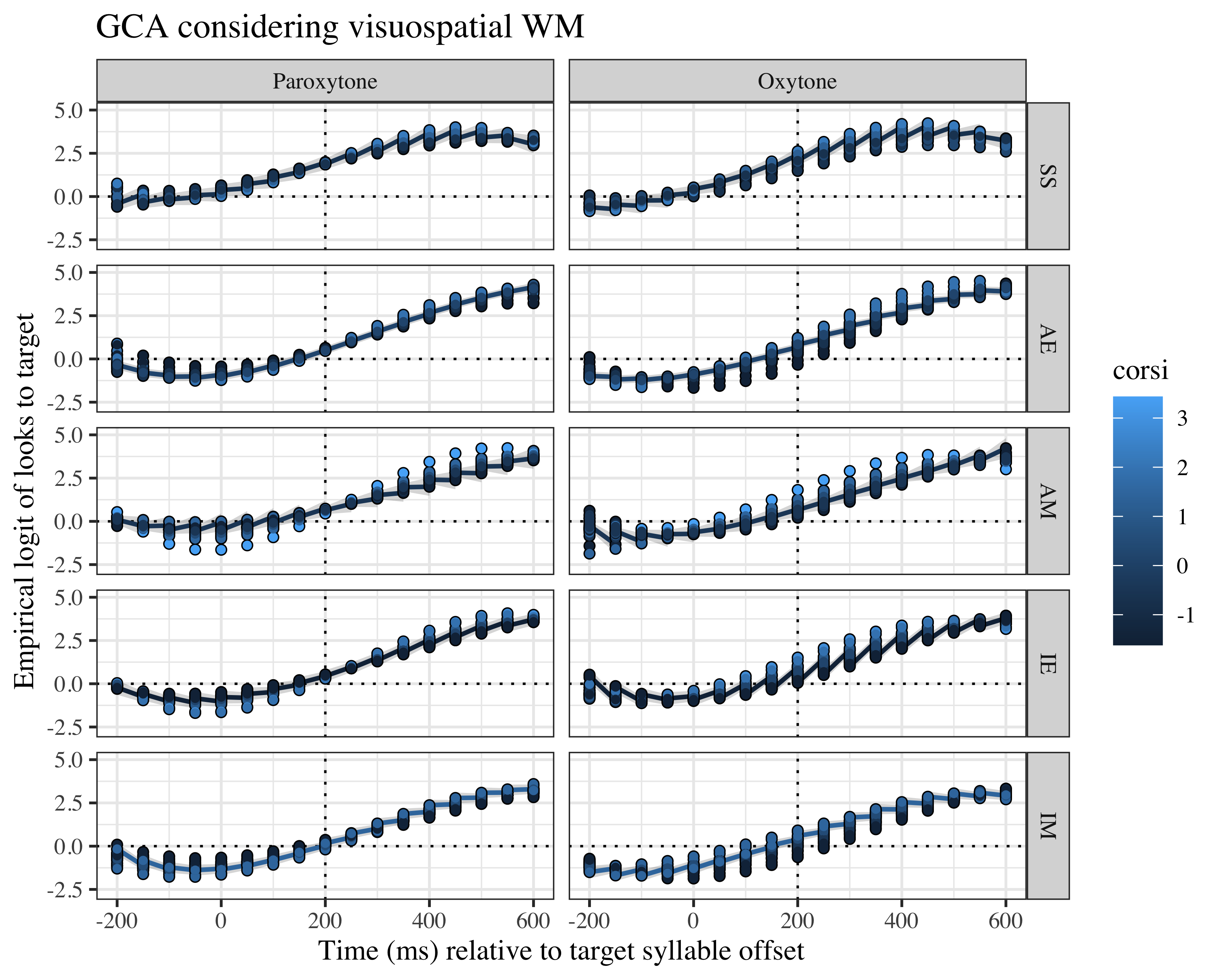
This document contains updates to the statistical analysis for vision experiment. Last updated on 2020-12-21. The results section can be copied and pasted into the corresponding google doc. The tables can also be copy and pasted where appropriate.

## Main changes

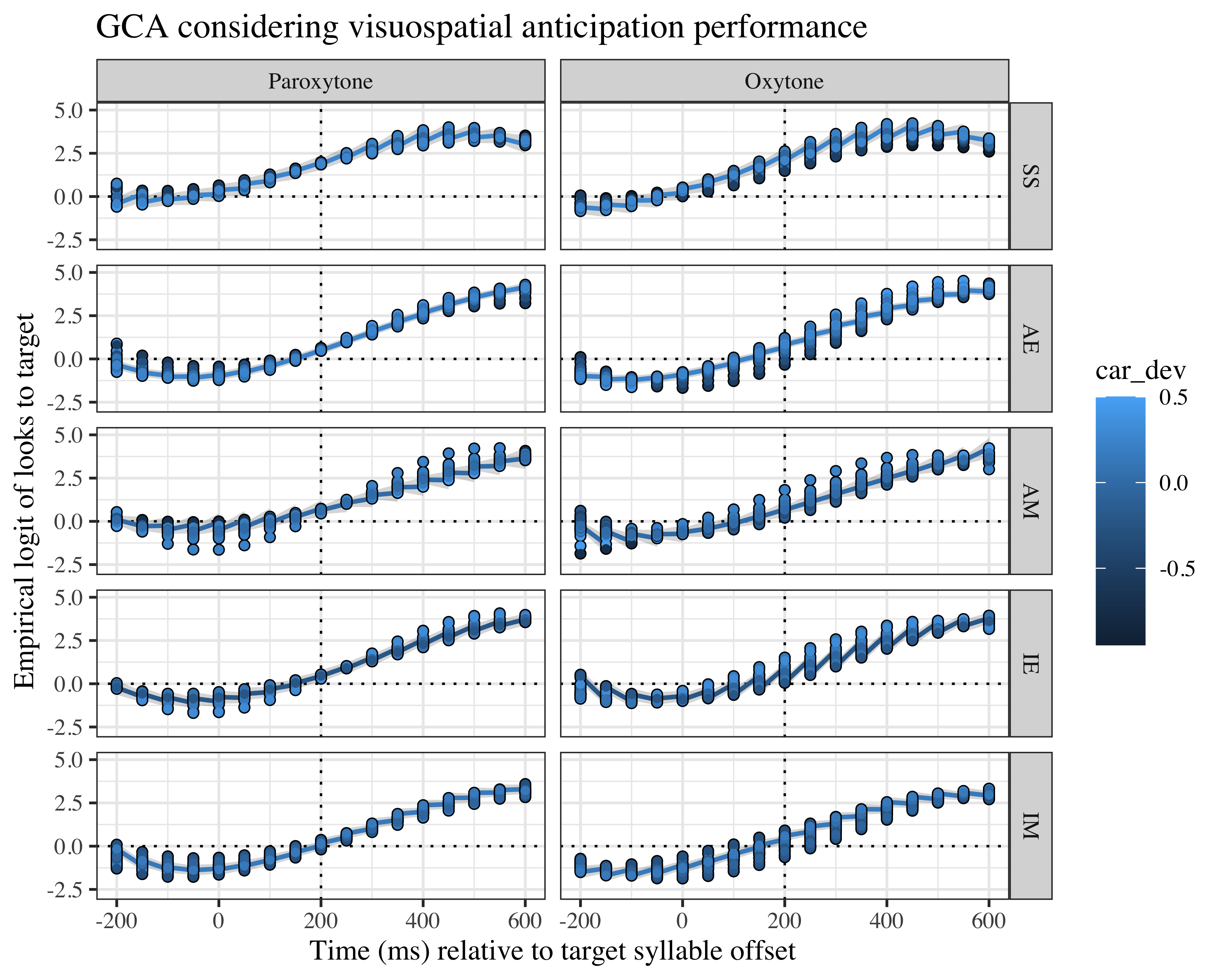
**Participants**

**Analyses**

# Plots



*Figure* *1:*. Growth curve estimates of target fixations as a function of visuospatial WM for each group and lexical stress pattern during the analysis window. Symbols and lines represent model estimates, and the transparent ribbons represents ±SE. Empirical logit values on y-axis correspond to proportions of 0.12, 0.50, 0.88, and 0.98. The horizontal dotted line represents the 50% probability of fixating on the target. The vertical dotted line indicates 200 ms after the offset of the target syllable.



*Figure* *2:*. Growth curve estimates of target fixations as a function of visuospatial anticipatory abilities for each group and lexical stress pattern during the analysis window. Symbols and lines represent model estimates, and the transparent ribbons represents ±SE. Empirical logit values on y-axis correspond to proportions of 0.12, 0.50, 0.88, and 0.98. The horizontal dotted line represents the 50% probability of fixating on the target. The vertical dotted line indicates 200 ms after the offset of the target syllable.

# Tables

## Model estimates at target syllable offset

Table 1:

| Group | Lexical stress | Visual pred. | Visuospatial WM | Probability | LB | UB |
| --- | --- | --- | --- | --- | --- | --- |
| AM | paroxytone | 0.4674001817 | -1.4705882 | 0.6752285 | 0.5639941 | 0.7696738 |
|  | paroxytone | -0.1167591509 | -1.4705882 | 0.6577553 | 0.5908377 | 0.7189348 |
|  | paroxytone | -0.2227241915 | -1.4705882 | 0.6545375 | 0.5770562 | 0.7245989 |
|  | paroxytone | -0.0192732711 | -1.4705882 | 0.6607028 | 0.5982931 | 0.7179867 |
|  | paroxytone | 0.1765968254 | -1.4705882 | 0.6665872 | 0.5957667 | 0.7306106 |
|  | paroxytone | 0.4528233836 | -0.4901961 | 0.6587846 | 0.5836356 | 0.7267209 |
|  | paroxytone | 0.1877253148 | -0.4901961 | 0.6569493 | 0.5988013 | 0.7107407 |
|  | paroxytone | -0.4360777680 | -0.4901961 | 0.6526122 | 0.5814809 | 0.7175270 |
|  | paroxytone | 0.1827808662 | -0.4901961 | 0.6569150 | 0.5989844 | 0.7105215 |
|  | paroxytone | -0.1912532275 | -0.4901961 | 0.6543175 | 0.5975543 | 0.7070001 |
|  | paroxytone | -0.1337108184 | -0.4901961 | 0.6547177 | 0.5998142 | 0.7057834 |
|  | paroxytone | -0.1032471901 | -0.4901961 | 0.6549295 | 0.6007234 | 0.7053857 |
|  | paroxytone | -0.2849874686 | -0.4901961 | 0.6536651 | 0.5924994 | 0.7101412 |
|  | paroxytone | -0.0118563050 | -0.4901961 | 0.6555645 | 0.6021823 | 0.7052892 |
|  | paroxytone | -0.2935026084 | -0.4901961 | 0.6536058 | 0.5919647 | 0.7104890 |
|  | paroxytone | 0.0808364445 | -0.4901961 | 0.6562080 | 0.6016853 | 0.7069030 |
|  | paroxytone | 0.0110344909 | -0.4901961 | 0.6557235 | 0.6022433 | 0.7055289 |
|  | paroxytone | -0.2441089246 | 0.4901961 | 0.6540129 | 0.5947616 | 0.7088418 |
|  | paroxytone | -0.1756308540 | 0.4901961 | 0.6528797 | 0.5963773 | 0.7053800 |
|  | paroxytone | -0.2297884155 | 0.4901961 | 0.6537760 | 0.5951622 | 0.7080662 |
|  | paroxytone | 0.4115493727 | 0.4901961 | 0.6430930 | 0.5740291 | 0.7066811 |
|  | paroxytone | 0.0529779496 | 0.4901961 | 0.6490842 | 0.5954068 | 0.6992375 |
|  | paroxytone | -0.2300487884 | 0.4901961 | 0.6537803 | 0.5951552 | 0.7080801 |
|  | paroxytone | 0.0574028842 | 0.4901961 | 0.6490105 | 0.5952827 | 0.6992098 |
|  | paroxytone | 0.0261867775 | 1.4705882 | 0.6431788 | 0.5809701 | 0.7009066 |
|  | paroxytone | -0.7330763466 | 1.4705882 | 0.6733786 | 0.5155954 | 0.7997304 |
|  | paroxytone | 0.1208119741 | 1.4705882 | 0.6393279 | 0.5744908 | 0.6994538 |
|  | paroxytone | -0.0410180689 | 1.4705882 | 0.6459026 | 0.5824170 | 0.7046312 |
|  | paroxytone | 0.1632693508 | 1.4705882 | 0.6375941 | 0.5699905 | 0.7001604 |
|  | paroxytone | 0.2329733848 | 3.4313725 | 0.6116116 | 0.4826803 | 0.7266099 |
|  | oxytone | 0.4674001817 | -1.4705882 | 0.6662704 | 0.5603847 | 0.7576806 |
|  | oxytone | -0.1167591509 | -1.4705882 | 0.5708472 | 0.5026393 | 0.6364664 |
|  | oxytone | -0.2227241915 | -1.4705882 | 0.5527161 | 0.4743178 | 0.6285781 |
|  | oxytone | -0.0192732711 | -1.4705882 | 0.5873624 | 0.5237842 | 0.6481542 |
|  | oxytone | 0.1765968254 | -1.4705882 | 0.6199235 | 0.5493698 | 0.6857496 |
|  | oxytone | 0.4528233836 | -0.4901961 | 0.7126212 | 0.6463717 | 0.7708592 |
|  | oxytone | 0.1877253148 | -0.4901961 | 0.6814265 | 0.6269914 | 0.7313218 |
|  | oxytone | -0.4360777680 | -0.4901961 | 0.6016907 | 0.5307140 | 0.6686350 |
|  | oxytone | 0.1827808662 | -0.4901961 | 0.6808277 | 0.6265370 | 0.7306194 |
|  | oxytone | -0.1912532275 | -0.4901961 | 0.6339091 | 0.5776491 | 0.6867391 |
|  | oxytone | -0.1337108184 | -0.4901961 | 0.6413224 | 0.5871431 | 0.6921201 |
|  | oxytone | -0.1032471901 | -0.4901961 | 0.6452202 | 0.5918853 | 0.6951747 |
|  | oxytone | -0.2849874686 | -0.4901961 | 0.6216975 | 0.5608043 | 0.6789809 |
|  | oxytone | -0.0118563050 | -0.4901961 | 0.6567969 | 0.6048781 | 0.7052183 |
|  | oxytone | -0.2935026084 | -0.4901961 | 0.6205802 | 0.5591972 | 0.6783325 |
|  | oxytone | 0.0808364445 | -0.4901961 | 0.6683509 | 0.6161620 | 0.7167064 |
|  | oxytone | 0.0110344909 | -0.4901961 | 0.6596682 | 0.6078395 | 0.7079383 |
|  | oxytone | -0.2441089246 | 0.4901961 | 0.6989534 | 0.6451142 | 0.7478177 |
|  | oxytone | -0.1756308540 | 0.4901961 | 0.7049711 | 0.6540391 | 0.7512565 |
|  | oxytone | -0.2297884155 | 0.4901961 | 0.7002176 | 0.6470436 | 0.7484946 |
|  | oxytone | 0.4115493727 | 0.4901961 | 0.7535671 | 0.6980665 | 0.8017629 |
|  | oxytone | 0.0529779496 | 0.4901961 | 0.7245432 | 0.6778354 | 0.7668089 |
|  | oxytone | -0.2300487884 | 0.4901961 | 0.7001947 | 0.6470088 | 0.7484821 |
|  | oxytone | 0.0574028842 | 0.4901961 | 0.7249140 | 0.6782019 | 0.7671731 |
|  | oxytone | 0.0261867775 | 1.4705882 | 0.7758162 | 0.7286616 | 0.8168359 |
|  | oxytone | -0.7330763466 | 1.4705882 | 0.7363227 | 0.5992959 | 0.8390737 |
|  | oxytone | 0.1208119741 | 1.4705882 | 0.7804315 | 0.7320282 | 0.8222152 |
|  | oxytone | -0.0410180689 | 1.4705882 | 0.7724966 | 0.7238806 | 0.8147435 |
|  | oxytone | 0.1632693508 | 1.4705882 | 0.7824800 | 0.7323648 | 0.8254477 |
|  | oxytone | 0.2329733848 | 3.4313725 | 0.8598659 | 0.7886037 | 0.9098516 |
| SS | paroxytone | 0.1581907386 | -1.6153846 | 0.8683663 | 0.8229682 | 0.9034878 |
|  | paroxytone | -0.0508796412 | -1.6153846 | 0.8763143 | 0.8388418 | 0.9060496 |
|  | paroxytone | 0.1042261914 | -1.6153846 | 0.8704584 | 0.8296119 | 0.9026618 |
|  | paroxytone | -0.0036157821 | -0.6538462 | 0.8717552 | 0.8394862 | 0.8983227 |
|  | paroxytone | 0.4079965825 | -0.6538462 | 0.8646539 | 0.8157655 | 0.9021257 |
|  | paroxytone | -0.5057592969 | -0.6538462 | 0.8799856 | 0.8311815 | 0.9161049 |
|  | paroxytone | 0.2614363127 | -0.6538462 | 0.8672196 | 0.8271802 | 0.8991140 |
|  | paroxytone | -0.1136001837 | 0.3076923 | 0.8684028 | 0.8359721 | 0.8952251 |
|  | paroxytone | -0.9476364783 | 0.3076923 | 0.8645575 | 0.7984470 | 0.9113899 |
|  | paroxytone | 0.1212674786 | 0.3076923 | 0.8694688 | 0.8370708 | 0.8962232 |
|  | paroxytone | 0.1543839024 | 0.3076923 | 0.8696185 | 0.8368012 | 0.8966517 |
|  | paroxytone | -0.3542466578 | 0.3076923 | 0.8673029 | 0.8295389 | 0.8977321 |
|  | paroxytone | 0.0553230911 | 0.3076923 | 0.8691702 | 0.8373036 | 0.8955738 |
|  | paroxytone | -0.4818293748 | 0.3076923 | 0.8667166 | 0.8243548 | 0.9000999 |
|  | paroxytone | -0.2438211497 | 0.3076923 | 0.8678086 | 0.8330957 | 0.8962014 |
|  | paroxytone | 0.0917721059 | 0.3076923 | 0.8693353 | 0.8372258 | 0.8958984 |
|  | paroxytone | 0.3675517358 | 1.2692308 | 0.8756186 | 0.8225934 | 0.9144435 |
|  | paroxytone | 0.1663709040 | 1.2692308 | 0.8704793 | 0.8318673 | 0.9012763 |
|  | paroxytone | -0.0477877641 | 1.2692308 | 0.8648109 | 0.8277400 | 0.8949169 |
|  | paroxytone | 0.2199009453 | 2.2307692 | 0.8737890 | 0.8168077 | 0.9148932 |
|  | oxytone | 0.1581907386 | -1.6153846 | 0.8560112 | 0.8092034 | 0.8928562 |
|  | oxytone | -0.0508796412 | -1.6153846 | 0.8220412 | 0.7742545 | 0.8615215 |
|  | oxytone | 0.1042261914 | -1.6153846 | 0.8477966 | 0.8032287 | 0.8837312 |
|  | oxytone | -0.0036157821 | -0.6538462 | 0.8667421 | 0.8342791 | 0.8936566 |
|  | oxytone | 0.4079965825 | -0.6538462 | 0.8996444 | 0.8629162 | 0.9273606 |
|  | oxytone | -0.5057592969 | -0.6538462 | 0.8147337 | 0.7496620 | 0.8659163 |
|  | oxytone | 0.2614363127 | -0.6538462 | 0.8888498 | 0.8554171 | 0.9153170 |
|  | oxytone | -0.1136001837 | 0.3076923 | 0.8927278 | 0.8659758 | 0.9146662 |
|  | oxytone | -0.9476364783 | 0.3076923 | 0.8611993 | 0.7977090 | 0.9070838 |
|  | oxytone | 0.1212674786 | 0.3076923 | 0.9003930 | 0.8751525 | 0.9209913 |
|  | oxytone | 0.1543839024 | 0.3076923 | 0.9014337 | 0.8760993 | 0.9220488 |
|  | oxytone | -0.3542466578 | 0.3076923 | 0.8843406 | 0.8517139 | 0.9105425 |
|  | oxytone | 0.0553230911 | 0.3076923 | 0.8982914 | 0.8730265 | 0.9189956 |
|  | oxytone | -0.4818293748 | 0.3076923 | 0.8796665 | 0.8422251 | 0.9091809 |
|  | oxytone | -0.2438211497 | 0.3076923 | 0.8882578 | 0.8588694 | 0.9121525 |
|  | oxytone | 0.0917721059 | 0.3076923 | 0.8994578 | 0.8742423 | 0.9200796 |
|  | oxytone | 0.3675517358 | 1.2692308 | 0.9179529 | 0.8818080 | 0.9437492 |
|  | oxytone | 0.1663709040 | 1.2692308 | 0.9190870 | 0.8939726 | 0.9386608 |
|  | oxytone | -0.0477877641 | 1.2692308 | 0.9202786 | 0.8973380 | 0.9384446 |
|  | oxytone | 0.2199009453 | 2.2307692 | 0.9318604 | 0.8993285 | 0.9544126 |
| IM | paroxytone | 0.1241045092 | -1.4705882 | 0.5058270 | 0.4311753 | 0.5802197 |
|  | paroxytone | 0.1057320762 | -1.4705882 | 0.5097425 | 0.4373223 | 0.5817561 |
|  | paroxytone | -0.2753536716 | -1.4705882 | 0.5899896 | 0.4927391 | 0.6806783 |
|  | paroxytone | -0.1935965835 | -1.4705882 | 0.5730263 | 0.4907115 | 0.6514858 |
|  | paroxytone | -0.0711839350 | -1.4705882 | 0.5473153 | 0.4797897 | 0.6131432 |
|  | paroxytone | 0.1059271362 | -0.4901961 | 0.5181078 | 0.4593961 | 0.5763237 |
|  | paroxytone | 0.0014227125 | -0.4901961 | 0.5258869 | 0.4695771 | 0.5815458 |
|  | paroxytone | -0.1583553285 | -0.4901961 | 0.5377549 | 0.4788217 | 0.5956515 |
|  | paroxytone | -0.1097565124 | -0.4901961 | 0.5341489 | 0.4768067 | 0.5906027 |
|  | paroxytone | -0.1285121719 | -0.4901961 | 0.5355410 | 0.4776628 | 0.5924774 |
|  | paroxytone | -0.3972081849 | -0.4901961 | 0.5554128 | 0.4808388 | 0.6275717 |
|  | paroxytone | 0.3397413472 | -0.4901961 | 0.5006770 | 0.4272797 | 0.5740451 |
|  | paroxytone | 0.2289886200 | -0.4901961 | 0.5089364 | 0.4437798 | 0.5737908 |
|  | paroxytone | 0.0829194276 | -0.4901961 | 0.5198213 | 0.4619052 | 0.5772095 |
|  | paroxytone | -0.2240602119 | -0.4901961 | 0.5426237 | 0.4805555 | 0.6033962 |
|  | paroxytone | -0.1901149178 | 0.4901961 | 0.5075805 | 0.4462634 | 0.5686704 |
|  | paroxytone | -0.2654595017 | 0.4901961 | 0.5027586 | 0.4372534 | 0.5681693 |
|  | paroxytone | 0.2370601796 | 0.4901961 | 0.5348657 | 0.4711539 | 0.5974597 |
|  | paroxytone | -0.1050330650 | 0.4901961 | 0.5130238 | 0.4549989 | 0.5706997 |
|  | paroxytone | 0.0161333691 | 0.4901961 | 0.5207700 | 0.4642597 | 0.5767537 |
|  | paroxytone | -0.3154510969 | 0.4901961 | 0.4995590 | 0.4307382 | 0.5683964 |
|  | paroxytone | 0.1225627930 | 0.4901961 | 0.5275660 | 0.4690904 | 0.5852949 |
|  | paroxytone | 0.0738063764 | 0.4901961 | 0.5244538 | 0.4672541 | 0.5810190 |
|  | paroxytone | -0.0278332879 | 0.4901961 | 0.5179602 | 0.4613604 | 0.5741028 |
|  | paroxytone | 0.3572608748 | 0.4901961 | 0.5425129 | 0.4705915 | 0.6127048 |
|  | paroxytone | 0.2566755353 | 0.4901961 | 0.5361148 | 0.4712301 | 0.5997995 |
|  | paroxytone | -0.2053133637 | 0.4901961 | 0.5066079 | 0.4445338 | 0.5684790 |
|  | paroxytone | 0.0335927092 | 0.4901961 | 0.5218855 | 0.4652626 | 0.5779515 |
|  | paroxytone | -0.1855250239 | 1.4705882 | 0.4759151 | 0.3936100 | 0.5595497 |
|  | paroxytone | -0.2995683505 | 1.4705882 | 0.4529318 | 0.3519121 | 0.5579833 |
|  | paroxytone | 0.1418897194 | 1.4705882 | 0.5421284 | 0.4673543 | 0.6150516 |
|  | oxytone | 0.1241045092 | -1.4705882 | 0.5088419 | 0.4367642 | 0.5805539 |
|  | oxytone | 0.1057320762 | -1.4705882 | 0.5011155 | 0.4313936 | 0.5707940 |
|  | oxytone | -0.2753536716 | -1.4705882 | 0.3459990 | 0.2658174 | 0.4360033 |
|  | oxytone | -0.1935965835 | -1.4705882 | 0.3777461 | 0.3060109 | 0.4552659 |
|  | oxytone | -0.0711839350 | -1.4705882 | 0.4272255 | 0.3648896 | 0.4919617 |
|  | oxytone | 0.1059271362 | -0.4901961 | 0.5522327 | 0.4950344 | 0.6080815 |
|  | oxytone | 0.0014227125 | -0.4901961 | 0.5292253 | 0.4740937 | 0.5836529 |
|  | oxytone | -0.1583553285 | -0.4901961 | 0.4938412 | 0.4365168 | 0.5513280 |
|  | oxytone | -0.1097565124 | -0.4901961 | 0.5046136 | 0.4486156 | 0.5604961 |
|  | oxytone | -0.1285121719 | -0.4901961 | 0.5004562 | 0.4440098 | 0.5568910 |
|  | oxytone | -0.3972081849 | -0.4901961 | 0.4411685 | 0.3715227 | 0.5132089 |
|  | oxytone | 0.3397413472 | -0.4901961 | 0.6027683 | 0.5329147 | 0.6686701 |
|  | oxytone | 0.2289886200 | -0.4901961 | 0.5790346 | 0.5162747 | 0.6393401 |
|  | oxytone | 0.0829194276 | -0.4901961 | 0.5471831 | 0.4906702 | 0.6025052 |
|  | oxytone | -0.2240602119 | -0.4901961 | 0.4792881 | 0.4193891 | 0.5397885 |
|  | oxytone | -0.1901149178 | 0.4901961 | 0.5957228 | 0.5368226 | 0.6519887 |
|  | oxytone | -0.2654595017 | 0.4901961 | 0.5940713 | 0.5311682 | 0.6540317 |
|  | oxytone | 0.2370601796 | 0.4901961 | 0.6050446 | 0.5442464 | 0.6627580 |
|  | oxytone | -0.1050330650 | 0.4901961 | 0.5975852 | 0.5418110 | 0.6509441 |
|  | oxytone | 0.0161333691 | 0.4901961 | 0.6002326 | 0.5459317 | 0.6521771 |
|  | oxytone | -0.3154510969 | 0.4901961 | 0.5929742 | 0.5268750 | 0.6558705 |
|  | oxytone | 0.1225627930 | 0.4901961 | 0.6025532 | 0.5465082 | 0.6560313 |
|  | oxytone | 0.0738063764 | 0.4901961 | 0.6014907 | 0.5465897 | 0.6539528 |
|  | oxytone | -0.0278332879 | 0.4901961 | 0.5992727 | 0.5448635 | 0.6513397 |
|  | oxytone | 0.3572608748 | 0.4901961 | 0.6076542 | 0.5393291 | 0.6720084 |
|  | oxytone | 0.2566755353 | 0.4901961 | 0.6054709 | 0.5436017 | 0.6641350 |
|  | oxytone | -0.2053133637 | 0.4901961 | 0.5953898 | 0.5357687 | 0.6523228 |
|  | oxytone | 0.0335927092 | 0.4901961 | 0.6006136 | 0.5462193 | 0.6526343 |
|  | oxytone | -0.1855250239 | 1.4705882 | 0.6952779 | 0.6226706 | 0.7593144 |
|  | oxytone | -0.2995683505 | 1.4705882 | 0.7120343 | 0.6220763 | 0.7878809 |
|  | oxytone | 0.1418897194 | 1.4705882 | 0.6443197 | 0.5749940 | 0.7080784 |
| IE | paroxytone | -0.0275172015 | -1.5258621 | 0.6227825 | 0.5601608 | 0.6815569 |
|  | paroxytone | -0.2448900432 | -1.5258621 | 0.6080284 | 0.5205453 | 0.6890832 |
|  | paroxytone | -0.1948984480 | -1.5258621 | 0.6114402 | 0.5325894 | 0.6848600 |
|  | paroxytone | -0.0835271545 | -1.5258621 | 0.6190013 | 0.5536838 | 0.6802796 |
|  | paroxytone | 0.0904120051 | -1.5258621 | 0.6306946 | 0.5632636 | 0.6933819 |
|  | paroxytone | 0.0911294018 | -1.5258621 | 0.6307426 | 0.5632422 | 0.6934879 |
|  | paroxytone | -0.2230187203 | -1.5258621 | 0.6095224 | 0.5259643 | 0.6871135 |
|  | paroxytone | -0.0566404424 | -0.6637931 | 0.6179453 | 0.5634984 | 0.6695830 |
|  | paroxytone | -0.1519369208 | -0.6637931 | 0.6154039 | 0.5582533 | 0.6695375 |
|  | paroxytone | -0.2383338005 | -0.6637931 | 0.6130944 | 0.5509258 | 0.6717839 |
|  | paroxytone | 0.2096627054 | -0.6637931 | 0.6250124 | 0.5611384 | 0.6848117 |
|  | paroxytone | 0.0368334257 | -0.6637931 | 0.6204317 | 0.5653968 | 0.6725339 |
|  | paroxytone | -0.2339543818 | -0.6637931 | 0.6132116 | 0.5513483 | 0.6716252 |
|  | paroxytone | -0.0524133979 | -0.6637931 | 0.6180578 | 0.5636547 | 0.6696534 |
|  | paroxytone | 0.4948453619 | 0.1982759 | 0.6070459 | 0.5358210 | 0.6739915 |
|  | paroxytone | 0.0022038311 | 0.1982759 | 0.6142113 | 0.5608278 | 0.6649821 |
|  | paroxytone | -0.1457035285 | 0.1982759 | 0.6163531 | 0.5605644 | 0.6692383 |
|  | paroxytone | 0.5002961553 | 0.1982759 | 0.6069664 | 0.5353786 | 0.6742357 |
|  | paroxytone | 0.0757003774 | 0.1982759 | 0.6131454 | 0.5595048 | 0.6641746 |
|  | paroxytone | -0.0531184080 | 0.1982759 | 0.6150129 | 0.5611766 | 0.6661734 |
|  | paroxytone | -0.2829044854 | 0.1982759 | 0.6183359 | 0.5572181 | 0.6759239 |
|  | paroxytone | 0.1735291939 | 0.1982759 | 0.6117249 | 0.5562485 | 0.6644495 |
|  | paroxytone | -0.0261421578 | 0.1982759 | 0.6146221 | 0.5610754 | 0.6655305 |
|  | paroxytone | -0.3283722035 | 0.1982759 | 0.6189921 | 0.5555679 | 0.6786012 |
|  | paroxytone | -0.1042130213 | 0.1982759 | 0.6157528 | 0.5610178 | 0.6677054 |
|  | paroxytone | -0.0511726117 | 0.1982759 | 0.6149848 | 0.5611737 | 0.6661232 |
|  | paroxytone | 0.2097585350 | 1.0603448 | 0.5972006 | 0.5304775 | 0.6605100 |
|  | paroxytone | 0.1795177705 | 1.0603448 | 0.5989102 | 0.5345904 | 0.6599944 |
|  | paroxytone | -0.0509122388 | 1.0603448 | 0.6118547 | 0.5499206 | 0.6703748 |
|  | paroxytone | 0.0066301703 | 1.0603448 | 0.6086362 | 0.5489048 | 0.6652814 |
|  | paroxytone | 0.1259710505 | 1.0603448 | 0.6019312 | 0.5407925 | 0.6600469 |
|  | paroxytone | 0.3136801896 | 1.9224138 | 0.5726710 | 0.4610991 | 0.6773091 |
|  | paroxytone | 0.1479753639 | 2.7844828 | 0.5775608 | 0.4770975 | 0.6719924 |
|  | oxytone | -0.0275172015 | -1.5258621 | 0.5433121 | 0.4811575 | 0.6041467 |
|  | oxytone | -0.2448900432 | -1.5258621 | 0.5131756 | 0.4288903 | 0.5967182 |
|  | oxytone | -0.1948984480 | -1.5258621 | 0.5201229 | 0.4436600 | 0.5956546 |
|  | oxytone | -0.0835271545 | -1.5258621 | 0.5355683 | 0.4712668 | 0.5987087 |
|  | oxytone | 0.0904120051 | -1.5258621 | 0.5595441 | 0.4917307 | 0.6252060 |
|  | oxytone | 0.0911294018 | -1.5258621 | 0.5596425 | 0.4917562 | 0.6253691 |
|  | oxytone | -0.2230187203 | -1.5258621 | 0.5162158 | 0.4354819 | 0.5961121 |
|  | oxytone | -0.0566404424 | -0.6637931 | 0.6020308 | 0.5484108 | 0.6533089 |
|  | oxytone | -0.1519369208 | -0.6637931 | 0.5901403 | 0.5340026 | 0.6440234 |
|  | oxytone | -0.2383338005 | -0.6637931 | 0.5792680 | 0.5184393 | 0.6377813 |
|  | oxytone | 0.2096627054 | -0.6637931 | 0.6345876 | 0.5726287 | 0.6923894 |
|  | oxytone | 0.0368334257 | -0.6637931 | 0.6135781 | 0.5594503 | 0.6650374 |
|  | oxytone | -0.2339543818 | -0.6637931 | 0.5798210 | 0.5192784 | 0.6380535 |
|  | oxytone | -0.0524133979 | -0.6637931 | 0.6025555 | 0.5489767 | 0.6537836 |
|  | oxytone | 0.4948453619 | 0.1982759 | 0.7181119 | 0.6586295 | 0.7708360 |
|  | oxytone | 0.0022038311 | 0.1982759 | 0.6678857 | 0.6181168 | 0.7141677 |
|  | oxytone | -0.1457035285 | 0.1982759 | 0.6519540 | 0.5988250 | 0.7015536 |
|  | oxytone | 0.5002961553 | 0.1982759 | 0.7186413 | 0.6589273 | 0.7715256 |
|  | oxytone | 0.0757003774 | 0.1982759 | 0.6756643 | 0.6263499 | 0.7213656 |
|  | oxytone | -0.0531184080 | 0.1982759 | 0.6619692 | 0.6113220 | 0.7091566 |
|  | oxytone | -0.2829044854 | 0.1982759 | 0.6368643 | 0.5779363 | 0.6919502 |
|  | oxytone | 0.1735291939 | 0.1982759 | 0.6858691 | 0.6359436 | 0.7318351 |
|  | oxytone | -0.0261421578 | 0.1982759 | 0.6648606 | 0.6146994 | 0.7115559 |
|  | oxytone | -0.3283722035 | 0.1982759 | 0.6318019 | 0.5704689 | 0.6891492 |
|  | oxytone | -0.1042130213 | 0.1982759 | 0.6564594 | 0.6045956 | 0.7048414 |
|  | oxytone | -0.0511726117 | 0.1982759 | 0.6621781 | 0.6115697 | 0.7093268 |
|  | oxytone | 0.2097585350 | 1.0603448 | 0.7397246 | 0.6864559 | 0.7867546 |
|  | oxytone | 0.1795177705 | 1.0603448 | 0.7371442 | 0.6854067 | 0.7830660 |
|  | oxytone | -0.0509122388 | 1.0603448 | 0.7169493 | 0.6636319 | 0.7648106 |
|  | oxytone | 0.0066301703 | 1.0603448 | 0.7220795 | 0.6715212 | 0.7675497 |
|  | oxytone | 0.1259710505 | 1.0603448 | 0.7325349 | 0.6826269 | 0.7771568 |
|  | oxytone | 0.3136801896 | 1.9224138 | 0.7912939 | 0.7118159 | 0.8533681 |
|  | oxytone | 0.1479753639 | 2.7844828 | 0.8197282 | 0.7559292 | 0.8697246 |
| AE | paroxytone | -0.5357382917 | -1.5258621 | 0.6544375 | 0.5233253 | 0.7656369 |
|  | paroxytone | 0.0334485781 | -1.5258621 | 0.6300321 | 0.5652918 | 0.6904111 |
|  | paroxytone | -0.2977457403 | -1.5258621 | 0.6443231 | 0.5554242 | 0.7242702 |
|  | paroxytone | 0.0504977558 | -0.6637931 | 0.6252406 | 0.5690978 | 0.6782046 |
|  | paroxytone | -0.2891534348 | -0.6637931 | 0.6326248 | 0.5674080 | 0.6933236 |
|  | paroxytone | -0.0818158577 | -0.6637931 | 0.6281243 | 0.5722826 | 0.6807426 |
|  | paroxytone | -0.1399597678 | -0.6637931 | 0.6293887 | 0.5720264 | 0.6833189 |
|  | paroxytone | 0.2195222500 | -0.6637931 | 0.6215438 | 0.5577710 | 0.6813736 |
|  | paroxytone | 0.2700510049 | -0.6637931 | 0.6204359 | 0.5530992 | 0.6834338 |
|  | paroxytone | -0.1420005627 | -0.6637931 | 0.6294330 | 0.5720001 | 0.6834244 |
|  | paroxytone | 0.0827997895 | -0.6637931 | 0.6245352 | 0.5675209 | 0.6782939 |
|  | paroxytone | -0.1245977672 | 0.1982759 | 0.6211592 | 0.5649760 | 0.6742698 |
|  | paroxytone | 0.4649976324 | 0.1982759 | 0.6212076 | 0.5546096 | 0.6835298 |
|  | paroxytone | 0.0006415938 | 0.1982759 | 0.6211695 | 0.5675110 | 0.6720181 |
|  | paroxytone | 0.0102753908 | 0.1982759 | 0.6211703 | 0.5675965 | 0.6719428 |
|  | paroxytone | 0.3185355180 | 0.1982759 | 0.6211956 | 0.5620161 | 0.6769748 |
|  | paroxytone | 0.1579068204 | 0.1982759 | 0.6211824 | 0.5668761 | 0.6726121 |
|  | paroxytone | 0.2550832071 | 0.1982759 | 0.6211904 | 0.5643984 | 0.6748437 |
|  | paroxytone | 0.4525697285 | 0.1982759 | 0.6212066 | 0.5553272 | 0.6828990 |
|  | paroxytone | -0.1398404992 | 0.1982759 | 0.6211579 | 0.5644964 | 0.6746958 |
|  | paroxytone | 0.4388311533 | 0.1982759 | 0.6212055 | 0.5561031 | 0.6822160 |
|  | paroxytone | -0.4097060838 | 0.1982759 | 0.6211358 | 0.5511259 | 0.6864389 |
|  | paroxytone | 0.0029849498 | 0.1982759 | 0.6211697 | 0.5675333 | 0.6719985 |
|  | paroxytone | 0.3320082132 | 0.1982759 | 0.6211967 | 0.5614399 | 0.6774885 |
|  | paroxytone | 0.2416477708 | 0.1982759 | 0.6211893 | 0.5648288 | 0.6744574 |
|  | paroxytone | -0.0779910196 | 1.0603448 | 0.6142359 | 0.5509440 | 0.6738875 |
|  | paroxytone | 0.1084099092 | 1.0603448 | 0.6183730 | 0.5600365 | 0.6734842 |
|  | paroxytone | 0.0184612913 | 1.0603448 | 0.6163787 | 0.5575209 | 0.6720133 |
|  | paroxytone | -0.0230523394 | 1.0603448 | 0.6154570 | 0.5551529 | 0.6724102 |
|  | paroxytone | 0.4474458455 | 1.9224138 | 0.6304778 | 0.5078177 | 0.7383211 |
|  | paroxytone | 0.2745942594 | 1.9224138 | 0.6229012 | 0.5338535 | 0.7043585 |
|  | paroxytone | 0.1017889971 | 1.9224138 | 0.6152661 | 0.5451750 | 0.6808785 |
|  | oxytone | -0.5357382917 | -1.5258621 | 0.4173967 | 0.2996606 | 0.5453687 |
|  | oxytone | 0.0334485781 | -1.5258621 | 0.5628605 | 0.4981430 | 0.6255064 |
|  | oxytone | -0.2977457403 | -1.5258621 | 0.4779286 | 0.3915975 | 0.5655988 |
|  | oxytone | 0.0504977558 | -0.6637931 | 0.6246169 | 0.5697720 | 0.6764406 |
|  | oxytone | -0.2891534348 | -0.6637931 | 0.5654238 | 0.5003338 | 0.6283333 |
|  | oxytone | -0.0818158577 | -0.6637931 | 0.6018946 | 0.5464368 | 0.6548544 |
|  | oxytone | -0.1399597678 | -0.6637931 | 0.5917623 | 0.5345906 | 0.6465543 |
|  | oxytone | 0.2195222500 | -0.6637931 | 0.6528533 | 0.5927284 | 0.7084678 |
|  | oxytone | 0.2700510049 | -0.6637931 | 0.6611000 | 0.5983906 | 0.7186219 |
|  | oxytone | -0.1420005627 | -0.6637931 | 0.5914052 | 0.5341579 | 0.6462761 |
|  | oxytone | 0.0827997895 | -0.6637931 | 0.6300860 | 0.5747102 | 0.6822382 |
|  | oxytone | -0.1245977672 | 0.1982759 | 0.6625697 | 0.6096157 | 0.7117374 |
|  | oxytone | 0.4649976324 | 0.1982759 | 0.7153497 | 0.6590032 | 0.7656958 |
|  | oxytone | 0.0006415938 | 0.1982759 | 0.6741859 | 0.6243984 | 0.7203299 |
|  | oxytone | 0.0102753908 | 0.1982759 | 0.6750709 | 0.6254344 | 0.7210633 |
|  | oxytone | 0.3185355180 | 0.1982759 | 0.7027058 | 0.6510810 | 0.7496297 |
|  | oxytone | 0.1579068204 | 0.1982759 | 0.6884738 | 0.6394697 | 0.7335920 |
|  | oxytone | 0.2550832071 | 0.1982759 | 0.6971286 | 0.6469083 | 0.7430433 |
|  | oxytone | 0.4525697285 | 0.1982759 | 0.7142894 | 0.6584109 | 0.7642993 |
|  | oxytone | -0.1398404992 | 0.1982759 | 0.6611421 | 0.6076560 | 0.7108068 |
|  | oxytone | 0.4388311533 | 0.1982759 | 0.7131146 | 0.6577406 | 0.7627611 |
|  | oxytone | -0.4097060838 | 0.1982759 | 0.6353992 | 0.5681551 | 0.6977430 |
|  | oxytone | 0.0029849498 | 0.1982759 | 0.6744013 | 0.6246517 | 0.7205073 |
|  | oxytone | 0.3320082132 | 0.1982759 | 0.7038824 | 0.6519040 | 0.7510631 |
|  | oxytone | 0.2416477708 | 0.1982759 | 0.6959401 | 0.6459584 | 0.7416874 |
|  | oxytone | -0.0779910196 | 1.0603448 | 0.7255992 | 0.6721106 | 0.7733052 |
|  | oxytone | 0.1084099092 | 1.0603448 | 0.7297640 | 0.6812431 | 0.7733563 |
|  | oxytone | 0.0184612913 | 1.0603448 | 0.7277592 | 0.6783847 | 0.7721002 |
|  | oxytone | -0.0230523394 | 1.0603448 | 0.7268308 | 0.6760684 | 0.7723174 |
|  | oxytone | 0.4474458455 | 1.9224138 | 0.7593542 | 0.6616576 | 0.8358399 |
|  | oxytone | 0.2745942594 | 1.9224138 | 0.7653971 | 0.6971918 | 0.8221583 |
|  | oxytone | 0.1017889971 | 1.9224138 | 0.7713323 | 0.7190404 | 0.8163770 |

*Table 1*: Model estimates for probability of target fixations ±SE at 200 ms after the target syllable offset.

## Fixed effects

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| effect | Parameter | Estimate | SE | *t* | *p* |
| fixed | Intercept (γ00) | 1.784 | 0.177 | 10.096 | < .001 |
| fixed | stress\_sum (γ10) | −0.000 | 0.076 | −0.004 | .996 |
| fixed | car\_dev (γ20) | 0.098 | 0.245 | 0.398 | .691 |
| fixed | corsi (γ30) | 0.072 | 0.061 | 1.179 | .238 |
| fixed | Time1 (γ01) | 5.751 | 0.506 | 11.356 | < .001 |
| fixed | Time2 (γ11) | −0.733 | 0.382 | −1.916 | .055 |
| fixed | Time3 (γ21) | −1.219 | 0.181 | −6.733 | < .001 |
| fixed | GroupAE (γ31) | −0.770 | 0.204 | −3.784 | < .001 |
| fixed | GroupAM (γ02) | −0.666 | 0.203 | −3.273 | .001 |
| fixed | GroupIE (γ12) | −0.815 | 0.202 | −4.045 | < .001 |
| fixed | GroupIM (γ22) | −1.252 | 0.202 | −6.188 | < .001 |
| fixed | stress\_sum × car\_dev (γ32) | −0.177 | 0.182 | −0.976 | .329 |
| fixed | stress\_sum × corsi (γ03) | −0.052 | 0.046 | −1.122 | .262 |
| fixed | car\_dev × corsi (γ13) | 0.050 | 0.266 | 0.188 | .851 |
| fixed | stress\_sum × Time1 (γ23) | −0.195 | 0.185 | −1.052 | .293 |
| fixed | stress\_sum × Time2 (γ33) | 0.308 | 0.121 | 2.557 | .011 |
| fixed | stress\_sum × Time3 (γ04) | −0.027 | 0.146 | −0.185 | .854 |
| fixed | car\_dev × Time1 (γ14) | 0.918 | 0.827 | 1.109 | .267 |
| fixed | car\_dev × Time2 (γ24) | −0.500 | 0.565 | −0.886 | .376 |
| fixed | car\_dev × Time3 (γ34) | −0.099 | 0.437 | −0.226 | .821 |
| fixed | corsi × Time1 (γ05) | 0.287 | 0.205 | 1.396 | .163 |
| fixed | corsi × Time2 (γ15) | −0.232 | 0.140 | −1.653 | .098 |
| fixed | corsi × Time3 (γ25) | −0.215 | 0.109 | −1.976 | .048 |
| fixed | Time1 × GroupAE (γ35) | 1.491 | 0.582 | 2.563 | .010 |
| fixed | Time1 × GroupAM (γ06) | 0.374 | 0.582 | 0.643 | .520 |
| fixed | Time1 × GroupIE (γ16) | 0.751 | 0.576 | 1.303 | .193 |
| fixed | Time1 × GroupIM (γ26) | 0.702 | 0.578 | 1.214 | .225 |
| fixed | Time2 × GroupAE (γ36) | 2.309 | 0.471 | 4.898 | < .001 |
| fixed | Time2 × GroupAM (γ00) | 2.208 | 0.471 | 4.683 | < .001 |
| fixed | Time2 × GroupIE (γ10) | 2.252 | 0.467 | 4.825 | < .001 |
| fixed | Time2 × GroupIM (γ20) | 2.039 | 0.469 | 4.351 | < .001 |
| fixed | stress\_sum × car\_dev:corsi (γ30) | 0.200 | 0.557 | 0.359 | .720 |
| fixed | stress\_sum × car\_dev:Time1 (γ01) | −0.354 | 0.328 | −1.077 | .281 |
| fixed | stress\_sum × car\_dev:Time2 (γ11) | 0.285 | 0.327 | 0.870 | .384 |
| fixed | stress\_sum × car\_dev:Time3 (γ21) | −0.141 | 0.327 | −0.431 | .666 |
| fixed | stress\_sum × corsi:Time1 (γ31) | 0.084 | 0.084 | 0.996 | .319 |
| fixed | stress\_sum × corsi:Time2 (γ02) | 0.397 | 0.082 | 4.860 | < .001 |
| fixed | stress\_sum × corsi:Time3 (γ12) | −0.091 | 0.082 | −1.114 | .265 |
| fixed | car\_dev × corsi:Time1 (γ22) | −0.230 | 0.896 | −0.257 | .797 |
| fixed | car\_dev × corsi:Time2 (γ32) | 0.635 | 0.614 | 1.035 | .301 |
| fixed | car\_dev × corsi:Time3 (γ03) | −1.045 | 0.469 | −2.228 | .026 |
| fixed | stress\_sum × car\_dev:corsi:Time1 (γ13) | −1.045 | 1.010 | −1.035 | .301 |
| fixed | stress\_sum × car\_dev:corsi:Time2 (γ23) | −0.446 | 0.352 | −1.269 | .204 |
| fixed | stress\_sum × car\_dev:corsi:Time3 (γ33) | −0.122 | 0.352 | −0.347 | .729 |
| fixed | stress\_sum × car\_dev:corsi:GroupAE (γ04) | −0.090 | 0.662 | −0.136 | .892 |
| fixed | stress\_sum × car\_dev:corsi:GroupAM (γ14) | −0.304 | 0.632 | −0.481 | .630 |
| fixed | stress\_sum × car\_dev:corsi:GroupIE (γ24) | −0.400 | 0.742 | −0.540 | .590 |
| fixed | stress\_sum × car\_dev:corsi:GroupIM (γ34) | 0.367 | 0.813 | 0.451 | .652 |
| fixed | stress\_sum × car\_dev:corsi:Time1:GroupAE (γ05) | −0.345 | 1.200 | −0.287 | .774 |
| fixed | stress\_sum × car\_dev:corsi:Time1:GroupAM (γ15) | 2.146 | 1.147 | 1.872 | .061 |
| fixed | stress\_sum × car\_dev:corsi:Time1:GroupIE (γ25) | 2.554 | 1.348 | 1.895 | .058 |
| fixed | stress\_sum × car\_dev:corsi:Time1:GroupIM (γ35) | −0.521 | 1.478 | −0.352 | .725 |

Appendix 1: Growth curve model fixed effects

## Random effects

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Group | Parameter | Variance | SD | Correlations |  |  |  |  |
| Participant | Intercept | 0.449 | 0.670 | 1.00 |  |  |  |  |
|  | stress\_sum | 0.226 | 0.476 | .11 |  |  |  | 1.00 |
|  | Time1 | 4.852 | 2.203 | .11 | 1.00 |  |  | .01 |
|  | Time2 | 1.758 | 1.326 | −.30 | −.10 | 1.00 |  | −.05 |
|  | Time3 | 0.713 | 0.844 | −.07 | −.89 | −.05 | 1.00 | .06 |
| Item | Intercept | 0.200 | 0.447 | 1.00 |  |  |  |  |
|  | Time1 | 1.300 | 1.140 | −.41 | 1.00 |  |  |  |
|  | Time2 | 0.395 | 0.628 | −.89 | .09 | 1.00 |  |  |
|  | Time3 | 0.678 | 0.823 | .33 | −.95 | −.12 | 1.00 |  |
| Residual |  | 14.568 | 3.817 |  |  |  |  |  |

Appendix 2: Growth curve model random effects

## Pairwise comparisons

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| effect | Parameter | Estimate | SE | *t* | *p* |
| fixed | GroupIE (γ08) | −0.045 | 0.176 | −0.255 | .799 |
| fixed | Time1 × GroupIE (γ18) | −0.740 | 0.503 | −1.472 | .141 |
| fixed | Time2 × GroupIE (γ28) | −0.057 | 0.407 | −0.139 | .889 |
| fixed | stress\_sum × car\_dev:corsi:GroupIE (γ09) | −0.310 | 0.612 | −0.507 | .612 |
| fixed | stress\_sum × car\_dev:corsi:Time1:GroupIE (γ19) | 2.899 | 1.112 | 2.606 | .009 |

Appendix 3: Pairwise comparisons between EN learner groups.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| effect | Parameter | Estimate | SE | *t* | *p* |
| fixed | GroupIM (γ08) | −0.586 | 0.181 | −3.244 | .001 |
| fixed | Time1 × GroupIM (γ18) | 0.328 | 0.517 | 0.635 | .525 |
| fixed | Time2 × GroupIM (γ28) | −0.169 | 0.419 | −0.404 | .686 |
| fixed | stress\_sum × car\_dev:corsi:GroupIM (γ09) | 0.671 | 0.660 | 1.018 | .309 |
| fixed | stress\_sum × car\_dev:corsi:Time1:GroupIM (γ19) | −2.667 | 1.198 | −2.225 | .026 |

Appendix 4: Pairwise comparisons between MA learner groups.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| effect | Parameter | Estimate | SE | *t* | *p* |
| fixed | GroupAM (γ08) | 0.104 | 0.182 | 0.571 | .568 |
| fixed | Time1 × GroupAM (γ18) | −1.117 | 0.522 | −2.141 | .032 |
| fixed | Time2 × GroupAM (γ28) | −0.101 | 0.423 | −0.239 | .811 |
| fixed | stress\_sum × car\_dev:corsi:GroupAM (γ09) | −0.214 | 0.484 | −0.443 | .658 |
| fixed | stress\_sum × car\_dev:corsi:Time1:GroupAM (γ19) | 2.491 | 0.879 | 2.836 | .005 |

Appendix 5: Pairwise comparisons between advanced learner groups.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| effect | Parameter | Estimate | SE | *t* | *p* |
| fixed | GroupIM (γ08) | −0.437 | 0.178 | −2.456 | .014 |
| fixed | Time1 × GroupIM (γ18) | −0.048 | 0.509 | −0.095 | .924 |
| fixed | Time2 × GroupIM (γ28) | −0.214 | 0.412 | −0.518 | .605 |
| fixed | stress\_sum × car\_dev:corsi:GroupIM (γ09) | 0.767 | 0.773 | 0.993 | .321 |
| fixed | stress\_sum × car\_dev:corsi:Time1:GroupIM (γ19) | −3.075 | 1.405 | −2.188 | .029 |

Appendix 6: Pairwise comparisons between intermediate learner groups.

# Results

The full model summary is available in Appendices X (fixed effects) and Y (random effects). Pairwise comparisons are available in Appendices Z-J. Only the linear term was kept for the mulitple-factor interactions. There was a main effect at the intercept (*γ*00 = 1.784, SE = 0.177, *t* = 10.096, *p* = < .001), which suggests the SS were fixating on the target comparably more to on the distractor or elsewhere in both conditions at target syllable offset. There was a main effect of the linear (*γ*01 = 5.751, SE = 0.506, *t* = 11.356, *p* = < .001) and cubic time terms too (*γ*21 = −1.219, SE = 0.181, *t* = −6.733, *p* = < .001). The effect on the linear term indicate that the slope for the L2 speakers is steeper, meaning they tend to increase their gaze fixations on the target faster than SS once they know what they are going to hear. The effect on the cubic term indicates that the curves are more bowed in the L2 groups, and the two curves form an inverse N shape. There was also a main effect of each group (AE: *γ*31 = −0.770, SE = 0.204, *t* = −3.784, *p* = < .001; AM: *γ*02 = −0.666, SE = 0.203, *t* = −3.273, *p* = .001; IE: *γ*12 = −0.815, SE = 0.202, *t* = −4.045, *p* = < .001; IM: *γ*22 = −1.252, SE = 0.202, *t* = −6.188, *p* = < .001). The negative trend of these effects suggest that all L2 groups anticipated less than SS across conditions.

The model also estimates some interactions. The first one is of stress in the quadratic term (*γ*33 = 0.308, SE = 0.121, *t* = 2.557, *p* = .011). This estimate points that the number of fixations on the target verb in the preterit conditions was higher than in the present tense. The increased number of fixations thus suggests preterit was slightly easier to anticipate. There was an effect on the interaction between visuospatial WM and the cubic term (*γ*25 = −0.215, SE = 0.109, *t* = −1.976, *p* = .048). This estimate indicates the curves in the cubic term were more bowed in the present tense than in the preterit tense.

Simple interactions with the linear, quadratic and cubic time terms and multiple interactions at the linear time term were kept because they improved the model (*β*(78) = 219483, *p* = .006). There was an interaction between AE and the linear (*γ*35 = 1.491, SE = 0.582, *t* = 2.563, *p* = .010) and quadratic time terms (*γ*36 = 2.309, SE = 0.471, *t* = 4.898, *p* = < .001). The linear interaction suggests the fit slope was steeper for AE, as they tend to increase their gaze on the target faster than the other groups. The quadratic interaction means the curve in AE is more closed than the one for SS. Therefore, AE appear to be anticipating later than SS. There is also an interaction with the quadratic term in the other L2 groups (AM: *γ*00 = 2.208, SE = 0.471, *t* = 4.683, *p* = < .001; IE: *γ*10 = 2.252, SE = 0.467, *t* = 4.825, *p* = < .001; IM: *γ*20 = 2.039, SE = 0.469, *t* = 4.351, *p* = < .001). As in the interaction with AE, these effects reflect a more bowed curved for all L2 groups, who start anticipating later than SS.

Lastly, there were two multiple interactions. There first one is between stress x corsi x quadratic term (*γ*02 = 0.397, SE = 0.082, *t* = 4.860, *p* = < .001). This interaction suggests that visuospatial WM influenced differently the ability to anticipate depending on the tense condition. Specifically, variability in visuospatial WM capacity determined more strongly ability to anticipate the preterit, such that individuals with higher WM started to anticipate earlier. In the present tense, in contrast, visuospatial WM did not exert such a great impact. Figure X represents visually this difference. The second multiple interaction is between visuospatial anticipation x visuospatial WM x cubic time term (*γ*03 = −1.045, SE = 0.469, *t* = −2.228, *p* = .026). This interaction suggests that individuals with higher visuospatial WM were those who also tended to wait longer to signal the car in the visuospatial anticipation task would appear, and these individuals tended to anticipate better.

Pairwise comparisons for proficiency and L1 provided more insights. Within the English speakers’ groups, there was an interaction effect between stress x visuospatial anticipation x visuospatial WM in the linear time term (*γ*19 = −2.667, SE = 1.198, *t* = −2.225, *p* = .026). This interaction indicates that the slope for IE in the present tense was steeper, while for AE was steeper in the preterit tense. Moreover, the higher the visuospatial WM and the better the visuospatial anticipation score, the faster participants focused on the predicted target in the preterit tense. For Mandarin speakers, those at the intermediate level anticipated less than those at the advanced level (*γ*08 = −0.586, SE = 0.181, *t* = −3.244, *p* = .001). In addition, Mandarin speakers with better visuospatial prediction and WM scores increased fixations on the target faster in the preterit tense. This effect is particularly clear for AM, although IM also shows a trend, such that anticipation performance was significantly faster in the advanced group when compared to the intermediate one. Across L1s, the slope for AE was steeper than the slope of AM (*γ*18 = −1.117, SE = 0.522, *t* = −2.141, *p* = .032). This effect indicates AM increased their fixations on the target slower than AE once they started predicting. Also in the linear time term, there was an interaction between stress x visuospatial anticipation abilities x visuospatial WM (*γ*19 = 2.491, SE = 0.879, *t* = 2.836, *p* = .005). This result stems from participants in both groups diverting their gaze more rapidly to the target in the preterit tense, especially AM, when their visuospatial WM score was higher and they anticipated the reappearance of the car closer to the specific ms but tended to wait longer. Estimates for all participants in each group are the same in the present tense regardless of their visuospatial abilities. At intermediate proficiency, there was an effect at the intercept (*γ*08 = −0.048, SE = 0.509, *t* = −0.095, *p* = .924), such that IM anticipated slower than IE. Finally, there was an effect of stress x visuospatial anticipation abilities x visuospatial WM in the linear term (*γ*19 = 2.491, SE = 0.879, *t* = 2.836, *p* = .005). Participants in both groups with higher visuospatial WM and who were closer to anticipating the reappearance of the car but tended to wait longer increased fixations on the target more quickly in the preterit tense, although in the Mandarin group this pattern is not as stable and still predict more slowly. In the present tense there was no variability depending on visuospatial abilities.

Figure 1 plots the model estimates from the GCA and We report the results for the M group and then provide comparisons with and between the learner groups. The model intercept estimates the log odds of M fixating on the target, averaging over the time course and lexical stress. The log odds were *γ*00 = 1.78 (proportion: .86). The linear, quadratic, and cubic polynomial time terms captured the sigmoid shape of the time course and were retained in the model (γ10 = −0.00; SE = 0.08; *t* = −0.00; *p* = .996; γ20 = 0.10; SE = 0.24; *t* = 0.40; *p* = .691; γ30 = 0.07; SE = 0.06; *t* = 1.18; *p* = .238).