eyetrackingR Demo

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load *eyetrackingR* and set data options

```
library(eyetrackingR)
```

```
## Loading required package: dplyr
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(lme4)
```

```
## Loading required package: Matrix
```

```
library(lmerTest)
```

```
##
## Attaching package: 'lmerTest'
```

```
## The following object is masked from 'package:lme4':
##
##     lmer
```

```
## The following object is masked from 'package:stats':
##
##     step
```

```
data("word_recognition")
dataset <- make_eyetrackingr_data(word_recognition,
                                  participant_column = "ParticipantName",
                                  trial_column = "Trial",
                                  time_column = "TimeFromTrialOnset",
                                  trackloss_column = "TrackLoss",
                                  aoi_columns = c('Animate','Inanimate'),
                                  treat_non_aoi_looks_as_missing = TRUE
)

str(dataset)
```

```
## Classes 'eyetrackingR_data', 'eyetrackingR_df', 'tbl_df', 'tbl' and 'data.frame':    195912 obs. of
##  $ ParticipantName      : Factor w/ 30 levels "ANCAT139","ANCAT18",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Sex                  : Factor w/ 2 levels "F","M": 1 1 1 1 1 1 1 1 1 1 ...
##  $ Age                  : num  21.9 21.9 21.9 21.9 21.9 ...
##  $ TrialNum             : num  1 1 1 1 1 1 1 1 1 1 ...
```

```
##  $ Trial                : Factor w/ 6 levels "FamiliarBird",..: 2 2 2 2 2 2 2 2 2 2 ...
##  $ TimeFromTrialOnset   : int  0 17 33 50 67 83 100 117 133 150 ...
##  $ Subphase             : Factor w/ 3 levels "Preview","Test",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ TimeFromSubphaseOnset: int  0 17 33 50 67 83 100 117 133 150 ...
##  $ AOI                  : Factor w/ 4 levels "","Animate","Inanimate",..: 4 4 4 4 4 4 4 4 4 4 ...
##  $ Animate              : logi  NA NA NA NA NA NA ...
##  $ Inanimate            : logi  NA NA NA NA NA NA ...
##  $ TrackLoss            : logi  TRUE TRUE TRUE TRUE TRUE TRUE ...
##  $ MCDI_Total           : int  47 47 47 47 47 47 47 47 47 47 ...
##  $ MCDI_Nouns           : int  29 29 29 29 29 29 29 29 29 29 ...
##  $ MCDI_Verbs           : int  8 8 8 8 8 8 8 8 8 8 ...
##  - attr(*, "eyetrackingR")=List of 1
##   ..$ data_options:List of 7
##   .. ..$ participant_column           : chr "ParticipantName"
##   .. ..$ trackloss_column             : chr "TrackLoss"
##   .. ..$ time_column                  : chr "TimeFromTrialOnset"
##   .. ..$ trial_column                 : chr "Trial"
##   .. ..$ item_columns                 : NULL
##   .. ..$ aoi_columns                  : chr  "Animate" "Inanimate"
##   .. ..$ treat_non_aoi_looks_as_missing: logi TRUE
```

```
head(dataset)
```

```
## # A tibble: 6 x 15
##   ParticipantName Sex     Age TrialNum Trial     TimeFromTrialOn~ Subphase
##   <fct>           <fct> <dbl>    <dbl> <fct>                <int> <fct>
## 1 ANCAT139        F      21.9        1 Familiar~                0 Preview
## 2 ANCAT139        F      21.9        1 Familiar~               17 Preview
## 3 ANCAT139        F      21.9        1 Familiar~               33 Preview
## 4 ANCAT139        F      21.9        1 Familiar~               50 Preview
## 5 ANCAT139        F      21.9        1 Familiar~               67 Preview
## 6 ANCAT139        F      21.9        1 Familiar~               83 Preview
## # ... with 8 more variables: TimeFromSubphaseOnset <int>, AOI <fct>,
## #   Animate <lgl>, Inanimate <lgl>, TrackLoss <lgl>, MCDI_Total <int>,
## #   MCDI_Nouns <int>, MCDI_Verbs <int>
```

remove trackloss-ridden trials

```
dataset_clean <- clean_by_trackloss(dataset,
                                    participant_prop_thresh = 1, trial_prop_thresh = .25,
                                    window_start_time = 15500, window_end_time = 21000)
```

```
## Performing Trackloss Analysis...
```

```
## Will exclude trials whose trackloss proportion is greater than : 0.25
```

```
##  ...removed  33  trials.
```

zoom in on response window

```
word_window <- subset_by_window(dataset_clean, rezero = FALSE,
                                window_start_time = 15500, window_end_time = 21000)
```

```
## Avg. window length in new data will be 5500
```

create a column indicating what type of trial:

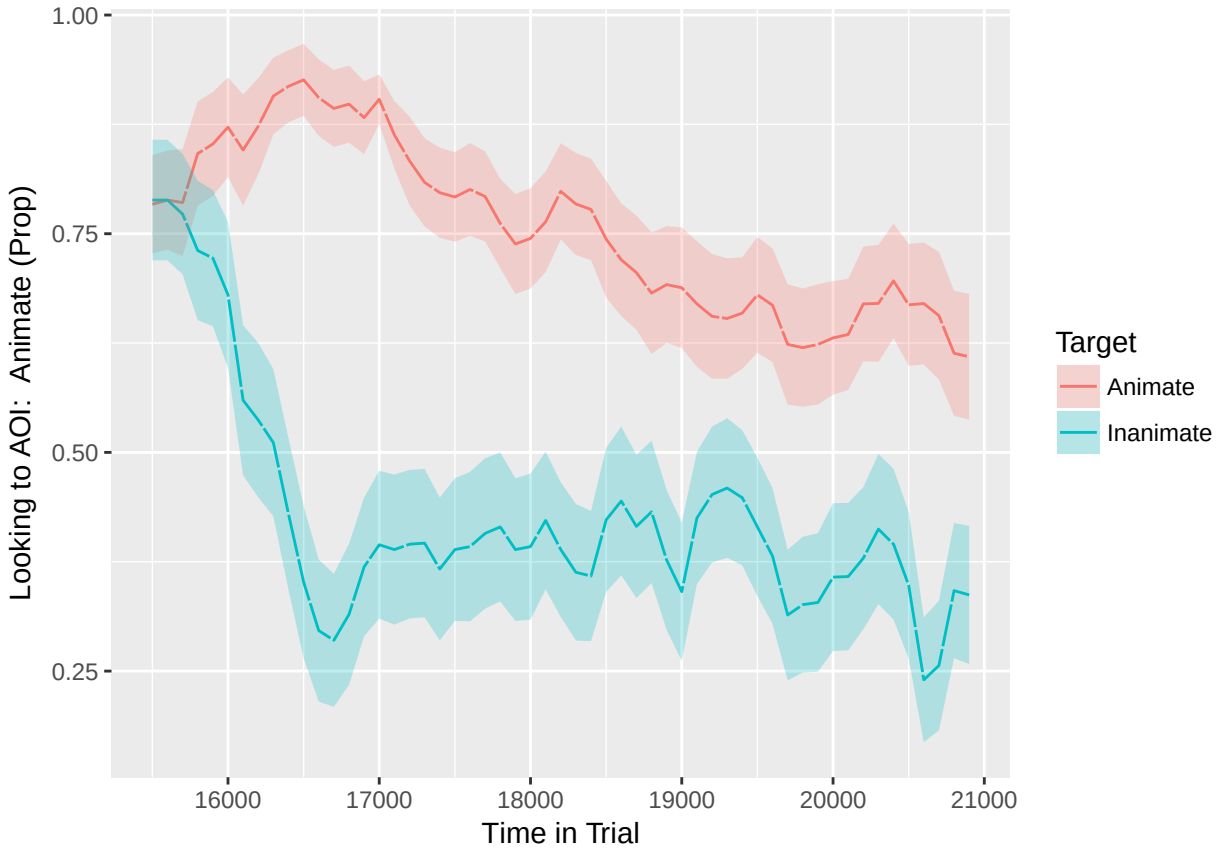
```
word_window$Target <- as.factor( ifelse(test = grepl('(Spoon|Bottle)', word_window$Trial),
                                        yes = 'Inanimate',
                                        no  = 'Animate') )
```

convert data into a series of time-bins:

```
word_time <- make_time_sequence_data(word_window, time_bin_size = 100,
                                     predictor_columns = "Target", aois = c("Animate"))
plot(word_time, predictor_column = "Target")
```

```
## Warning: Removed 37 rows containing non-finite values (stat_summary).

## Warning: Removed 37 rows containing non-finite values (stat_summary).
```




```
# An important step in performing regression analysis is to center predictors (in order to make paramet
word_time$TargetC <- ifelse(word_time$Target == 'Animate', .5, -.5)
word_time$TargetC <- word_time$TargetC - mean(word_time$TargetC)
```

```r
#Using mixed-effects models
# mixed-effects linear model on subject*trial data
model_time_window <- lmer(Elog ~ TargetC + (1 + TargetC | Trial) + (1 | ParticipantName), data = word_t
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control
## $checkConv, : unable to evaluate scaled gradient
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control
## $checkConv, : Model failed to converge: degenerate Hessian with 1 negative
## eigenvalues
```

```
## Warning: Model failed to converge with 1 negative eigenvalue: -4.1e+02
```

```r
# cleanly show important parts of model (see `summary()` for more)
(est <- broom::tidy(model_time_window, effects="fixed"))
```

```
##          term estimate std.error statistic  p.value           NA
## 1 (Intercept) 0.736170 0.1498076 22.332549 4.914105 6.235896e-05
## 2     TargetC 1.764129 0.1857890  2.380166 9.495337 6.030007e-03
```

```r
summary(model_time_window)
```

```
## Linear mixed model fit by maximum likelihood . t-tests use
##   Satterthwaite's method [lmerModLmerTest]
## Formula: Elog ~ TargetC + (1 + TargetC | Trial) + (1 | ParticipantName)
##    Data: word_time
##
##      AIC      BIC   logLik deviance df.resid
##  28457.8  28505.2 -14221.9  28443.8     6499
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.2904 -0.9628  0.3745  0.6244  2.0900
##
## Random effects:
##  Groups          Name        Variance Std.Dev. Corr
##  ParticipantName (Intercept) 0.4416   0.6645
##  Trial           (Intercept) 0.0000   0.0000
##                  TargetC     0.1323   0.3637    NaN
##  Residual                    4.5701   2.1378
## Number of obs: 6506, groups:  ParticipantName, 27; Trial, 6
##
## Fixed effects:
##             Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)   0.7362     0.1498 22.3325   4.914 6.24e-05 ***
## TargetC       1.7641     0.1858  2.3802   9.495  0.00603 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##         (Intr)
## TargetC -0.251
## convergence code: 0
## unable to evaluate scaled gradient
## Model failed to converge: degenerate  Hessian with 1 negative eigenvalues
```

```r
# perform a growth-curve analysis
model <- lmer(Elog ~ TargetC*(ot1 + ot2 + ot3 + ot4 + ot5) + (1 | Trial) + (1 | ParticipantName), data =
broom::tidy(model, effects="fixed")
```

```
##           term    estimate std.error   statistic     p.value           NA
## 1  (Intercept)  0.73356474 0.1429224   28.701105   5.1326071 1.804418e-05
## 2      TargetC  1.75524473 0.1385365    5.428529  12.6699078 3.079279e-05
## 3          ot1 -2.81945229 0.1929438 6474.888099 -14.6128188 1.324302e-47
## 4          ot2  0.32236018 0.1932459 6474.314258   1.6681343 9.533743e-02
## 5          ot3 -0.57443217 0.1927003 6473.881999  -2.9809610 2.884142e-03
## 6          ot4 -0.31725945 0.1920604 6473.129670  -1.6518731 9.860893e-02
## 7          ot5  0.57347864 0.1923973 6472.942377   2.9806999 2.886600e-03
## 8  TargetC:ot1 -0.78914703 0.4010187 6473.899927  -1.9678558 4.912725e-02
## 9  TargetC:ot2 -1.73922537 0.4017806 6473.611621  -4.3287935 1.521870e-05
## 10 TargetC:ot3  4.21984068 0.4006809 6473.101634  10.5316732 9.958019e-26
## 11 TargetC:ot4 -1.81094160 0.3996476 6472.961277  -4.5313458 5.966198e-06
## 12 TargetC:ot5 -0.07777271 0.4003747 6472.927872  -0.1942498 8.459864e-01
```

```r
#drop1(model,~.,test="Chi")
```