Procedural Learning 110320

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# Sample Size

##   
## Frequency table:  
## Subgroup  
## DD TYP   
## 31 31

# Rotary Pursuit

Question for JDE: Factor or continuous for trial?

### Statstical Analysis by Trial

There is a significant learning effect with increasing time on target on across trials. The interaction is significant with faster learning for the Dys group. The results remain the same after controlling for sex, age, and IQ.

##   
## Call:  
## lm(formula = prop\_on ~ Subgroup \* trial, data = rp2)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.38584 -0.08919 -0.00460 0.07904 0.49058   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.224478 0.014127 15.890 <2e-16 \*\*\*  
## SubgroupTYP 0.015062 0.019782 0.761 0.4466   
## trial 0.013220 0.001469 9.002 <2e-16 \*\*\*  
## SubgroupTYP:trial -0.005245 0.002053 -2.554 0.0108 \*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.1371 on 840 degrees of freedom  
## (4 observations deleted due to missingness)  
## Multiple R-squared: 0.1263, Adjusted R-squared: 0.1232   
## F-statistic: 40.47 on 3 and 840 DF, p-value: < 2.2e-16

##   
## Call:  
## lm(formula = prop\_on ~ Subgroup \* trial + background\_age + background\_sex +   
## kbit\_ss, data = rp2\_age\_gender\_iq)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.36739 -0.08772 -0.00276 0.07962 0.48331   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 1.162e-01 5.126e-02 2.268 0.0236 \*   
## SubgroupTYP 9.200e-03 1.996e-02 0.461 0.6450   
## trial 1.318e-02 1.467e-03 8.986 <2e-16 \*\*\*  
## background\_age 7.866e-04 8.676e-04 0.907 0.3648   
## background\_sex -3.303e-05 1.014e-02 -0.003 0.9974   
## kbit\_ss 8.195e-04 3.649e-04 2.246 0.0250 \*   
## SubgroupTYP:trial -5.217e-03 2.050e-03 -2.544 0.0111 \*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.1369 on 837 degrees of freedom  
## (4 observations deleted due to missingness)  
## Multiple R-squared: 0.1318, Adjusted R-squared: 0.1256   
## F-statistic: 21.17 on 6 and 837 DF, p-value: < 2.2e-16

## $`lsmeans of Subgroup | trial`  
## trial = 8.47:  
## Subgroup lsmean SE df lower.CL upper.CL  
## DD 0.336 0.00674 840 0.321 0.352  
## TYP 0.307 0.00660 840 0.292 0.322  
##   
## Confidence level used: 0.95   
## Conf-level adjustment: sidak method for 2 estimates   
##   
## $`pairwise differences of Subgroup | trial`  
## trial = 8.47:  
## contrast estimate SE df t.ratio p.value  
## DD - TYP 0.0293 0.00944 840 3.110 0.0019

#### Linear mixed-effect modeling:

marginal group differences, significant trial differences. Same results when controlling for age, sex, and IQ

## refitting model(s) with ML (instead of REML)

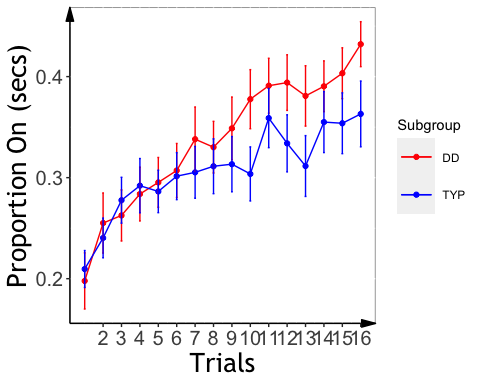
## Data: rp2  
## Models:  
## lmerrp1: prop\_on ~ Subgroup \* trial + (1 | PartID)  
## lmerrp2: prop\_on ~ Subgroup \* trial + (1 + trial | PartID)  
## npar AIC BIC logLik deviance Chisq Df Pr(>Chisq)   
## lmerrp1 6 -1868.4 -1839.9 940.18 -1880.4   
## lmerrp2 8 -2033.4 -1995.5 1024.71 -2049.4 169.05 2 < 2.2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
## lmerModLmerTest]  
## Formula: prop\_on ~ Subgroup \* trial + (1 + trial | PartID)  
## Data: rp2  
##   
## REML criterion at convergence: -2016.1  
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -3.0400 -0.5958 0.0145 0.5950 3.5228   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## PartID (Intercept) 1.475e-02 0.12146   
## trial 6.756e-05 0.00822 -0.28  
## Residual 3.527e-03 0.05939   
## Number of obs: 844, groups: PartID, 53  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) 0.228919 0.024599 50.994936 9.306 1.41e-12 \*\*\*  
## SubgroupTYP 0.011288 0.034461 50.975831 0.328 0.7446   
## trial 0.012373 0.001735 50.770798 7.132 3.44e-09 \*\*\*  
## SubgroupTYP:trial -0.004515 0.002429 50.641920 -1.859 0.0688 .   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) SbgTYP trial   
## SubgroupTYP -0.714   
## trial -0.336 0.240   
## SbgrpTYP:tr 0.240 -0.336 -0.714

## Slope Analysis

## Plot Rotary Pursuit

## `summarise()` regrouping output by 'Subgroup' (override with `.groups` argument)



### Alternative plots with fitted curve

## ANCOVA on individual slope

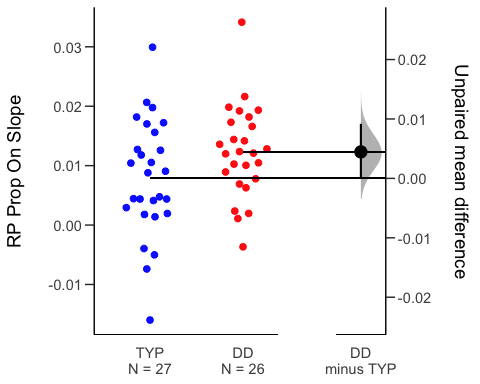
marginal group effect

## Analysis of Variance Table  
##   
## Response: slopeProp\_On  
## Df Sum Sq Mean Sq F value Pr(>F)   
## kbit\_ss 1 0.0000093 9.2530e-06 0.1153 0.7356   
## Subgroup 1 0.0002563 2.5635e-04 3.1955 0.0799 .  
## Residuals 50 0.0040111 8.0223e-05   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## $`lsmeans of Subgroup`  
## Subgroup lsmean SE df lower.CL upper.CL  
## DD 0.01238 0.00179 50 0.00824 0.0165  
## TYP 0.00779 0.00176 50 0.00374 0.0118  
##   
## Confidence level used: 0.95   
## Conf-level adjustment: sidak method for 2 estimates   
##   
## $`pairwise differences of Subgroup`  
## contrast estimate SE df t.ratio p.value  
## DD - TYP 0.00458 0.00256 50 1.788 0.0799

## Plotting RP Slope Effects

## `summarise()` regrouping output by 'PartID' (override with `.groups` argument)



# Mirror Tracing

### Statistical Analysis by Trial

Significant group differences in learning across trials for errors, but not time, with worse learning for Dys. Differences survive after controlling for age, sex, and IQ

##   
## Call:  
## lm(formula = time ~ Subgroup \* trial, data = mt2)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -24.904 -8.132 -2.094 3.899 200.796   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 35.7408 2.1174 16.880 < 2e-16 \*\*\*  
## SubgroupTYP 4.1745 2.9308 1.424 0.155   
## trial -2.3232 0.3394 -6.846 2.25e-11 \*\*\*  
## SubgroupTYP:trial -0.4279 0.4699 -0.910 0.363   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 14.95 on 496 degrees of freedom  
## (12 observations deleted due to missingness)  
## Multiple R-squared: 0.1951, Adjusted R-squared: 0.1903   
## F-statistic: 40.09 on 3 and 496 DF, p-value: < 2.2e-16

##   
## Call:  
## lm(formula = error ~ Subgroup \* trial, data = mt2)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -23.239 -7.842 -1.985 3.946 57.832   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 25.0924 1.7507 14.333 < 2e-16 \*\*\*  
## SubgroupTYP 6.6216 2.4598 2.692 0.00734 \*\*   
## trial -1.8536 0.2817 -6.581 1.17e-10 \*\*\*  
## SubgroupTYP:trial -0.6921 0.3952 -1.751 0.08048 .   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 12.75 on 508 degrees of freedom  
## Multiple R-squared: 0.208, Adjusted R-squared: 0.2034   
## F-statistic: 44.48 on 3 and 508 DF, p-value: < 2.2e-16

##   
## Call:  
## lm(formula = time ~ Subgroup \* trial + background\_age + background\_sex +   
## kbit\_ss, data = mt2\_age\_gender\_iq)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -24.900 -7.259 -1.709 3.890 193.475   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 17.35233 7.05234 2.461 0.0142 \*   
## SubgroupTYP 4.53838 2.88956 1.571 0.1169   
## trial -2.32973 0.33033 -7.053 5.97e-12 \*\*\*  
## background\_age 0.61601 0.12313 5.003 7.87e-07 \*\*\*  
## background\_sex -5.79664 1.42988 -4.054 5.85e-05 \*\*\*  
## kbit\_ss 0.09343 0.05029 1.858 0.0638 .   
## SubgroupTYP:trial -0.41844 0.45744 -0.915 0.3608   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 14.55 on 493 degrees of freedom  
## (12 observations deleted due to missingness)  
## Multiple R-squared: 0.2421, Adjusted R-squared: 0.2329   
## F-statistic: 26.25 on 6 and 493 DF, p-value: < 2.2e-16

##   
## Call:  
## lm(formula = error ~ Subgroup \* trial + background\_age + background\_sex +   
## kbit\_ss, data = mt2\_age\_gender\_iq)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -24.812 -7.727 -2.026 4.530 60.026   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 31.13767 5.96939 5.216 2.67e-07 \*\*\*  
## SubgroupTYP 7.90815 2.43047 3.254 0.00122 \*\*   
## trial -1.85789 0.27551 -6.743 4.24e-11 \*\*\*  
## background\_age 0.32877 0.10333 3.182 0.00155 \*\*   
## background\_sex -3.07235 1.19538 -2.570 0.01045 \*   
## kbit\_ss -0.09759 0.04226 -2.309 0.02135 \*   
## SubgroupTYP:trial -0.70154 0.38660 -1.815 0.07017 .   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 12.47 on 505 degrees of freedom  
## Multiple R-squared: 0.2468, Adjusted R-squared: 0.2379   
## F-statistic: 27.58 on 6 and 505 DF, p-value: < 2.2e-16

## linear mixed modeling

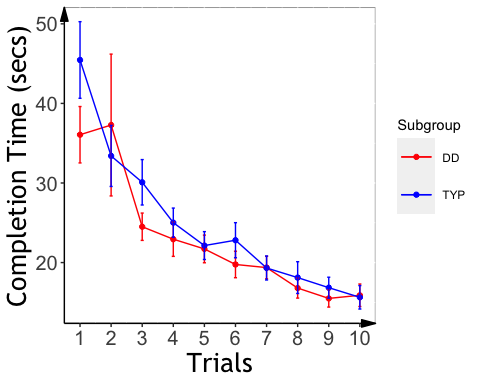
main effect of trial, no effect of subgroups

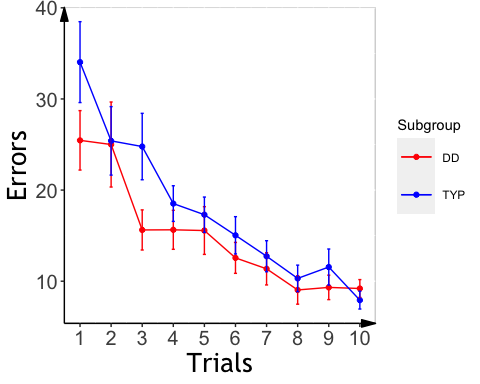
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
## lmerModLmerTest]  
## Formula: time ~ Subgroup \* trial + (1 + trial | PartID)  
## Data: mt2  
##   
## REML criterion at convergence: 3647.3  
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -2.6162 -0.3993 -0.1016 0.2615 5.5261   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## PartID (Intercept) 1330.79 36.480   
## trial 10.81 3.288 -0.99  
## Residual 51.93 7.207   
## Number of obs: 500, groups: PartID, 52  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) 42.7087 7.3731 46.4242 5.793 5.75e-07 \*\*\*  
## SubgroupTYP -3.0250 10.2292 46.3745 -0.296 0.76876   
## trial -2.8540 0.6786 33.9025 -4.206 0.00018 \*\*\*  
## SubgroupTYP:trial 0.1404 0.9414 33.8614 0.149 0.88232   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) SbgTYP trial   
## SubgroupTYP -0.721   
## trial -0.980 0.706   
## SbgrpTYP:tr 0.707 -0.980 -0.721

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
## lmerModLmerTest]  
## Formula: error ~ Subgroup \* trial + (1 + trial | PartID)  
## Data: mt2  
##   
## REML criterion at convergence: 3808.8  
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -3.0994 -0.4676 -0.0871 0.3291 4.8366   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## PartID (Intercept) 272.329 16.502   
## trial 2.027 1.424 -0.98  
## Residual 76.287 8.734   
## Number of obs: 512, groups: PartID, 53  
##   
## Fixed effects:  
## Estimate Std. Error df t value Pr(>|t|)   
## (Intercept) 26.4632 3.4612 49.4246 7.646 6.33e-10 \*\*\*  
## SubgroupTYP 5.8471 4.8479 49.4241 1.206 0.234   
## trial -1.9647 0.3402 48.5446 -5.775 5.34e-07 \*\*\*  
## SubgroupTYP:trial -0.6504 0.4770 48.8248 -1.363 0.179   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) SbgTYP trial   
## SubgroupTYP -0.714   
## trial -0.933 0.666   
## SbgrpTYP:tr 0.666 -0.934 -0.713  
## convergence code: 0  
## Model failed to converge with max|grad| = 0.0508139 (tol = 0.002, component 1)

## MT: Plot Time/Error by Trial

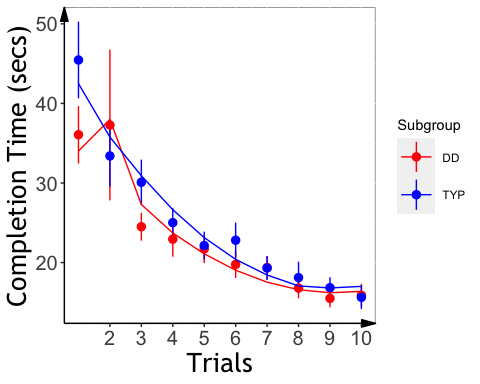
## `summarise()` regrouping output by 'Subgroup' (override with `.groups` argument)  
## `summarise()` regrouping output by 'Subgroup' (override with `.groups` argument)



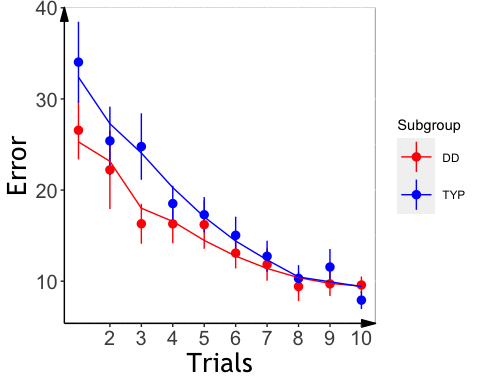


## Mirror Tracing Slopes

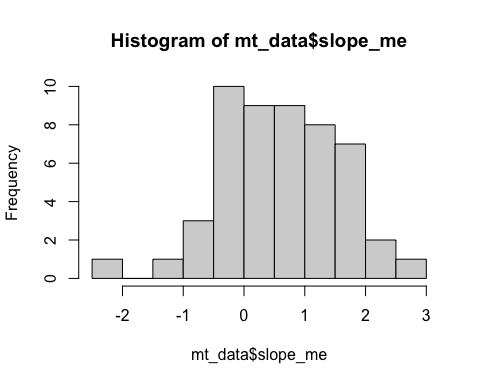
## No summary function supplied, defaulting to `mean\_se()`

 #### fit polynomial curves for the MT error plots

## No summary function supplied, defaulting to `mean\_se()`



### Slope Analysis



### MT Slope Analysis:

A significant group effects for slope, with faster learning for Typ, even after controlling for age, sex, and IQ. If one outlier included, then no significant effect

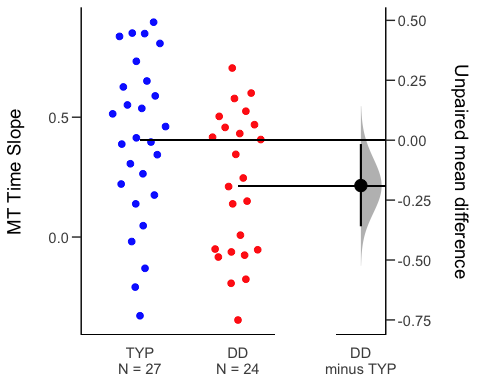
## Analysis of Variance Table  
##   
## Response: slope\_mt\_t  
## Df Sum Sq Mean Sq F value Pr(>F)   
## background\_age 1 0.0397 0.03970 0.3819 0.53963   
## background\_sex 1 0.0885 0.08854 0.8517 0.36089   
## kbit\_ss 1 0.0031 0.00307 0.0295 0.86440   
## Subgroup 1 0.5805 0.58051 5.5839 0.02241 \*  
## Residuals 46 4.7822 0.10396   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## Analysis of Variance Table  
##   
## Response: slope\_me\_t  
## Df Sum Sq Mean Sq F value Pr(>F)   
## background\_age 1 0.0104 0.01036 0.0681 0.795257   
## background\_sex 1 1.2341 1.23409 8.1151 0.006544 \*\*  
## kbit\_ss 1 0.0145 0.01453 0.0955 0.758656   
## Subgroup 1 0.9098 0.90984 5.9829 0.018330 \*   
## Residuals 46 6.9954 0.15207   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

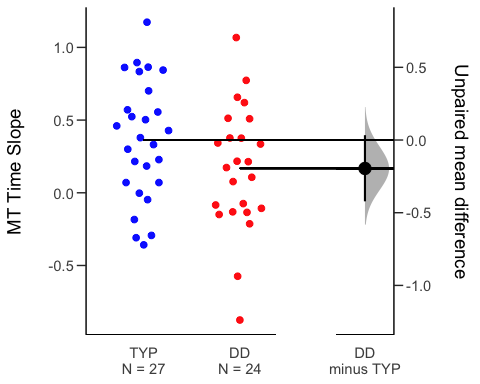
## $`lsmeans of Subgroup`  
## Subgroup lsmean SE df lower.CL upper.CL  
## DD 0.0965 0.0831 46 -0.0955 0.289  
## TYP 0.3794 0.0769 46 0.2015 0.557  
##   
## Results are averaged over the levels of: background\_sex   
## Confidence level used: 0.95   
## Conf-level adjustment: sidak method for 2 estimates   
##   
## $`pairwise differences of Subgroup`  
## contrast estimate SE df t.ratio p.value  
## DD - TYP -0.283 0.116 46 -2.446 0.0183   
##   
## Results are averaged over the levels of: background\_sex

## MT: Plot Slope Effects

## `summarise()` regrouping output by 'PartID' (override with `.groups` argument)



## `summarise()` regrouping output by 'PartID' (override with `.groups` argument)



# Statistical Learning

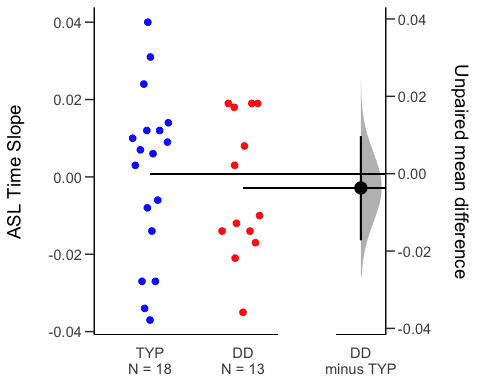
##   
## Dyslexic Typical   
## 17 24

## Slope analyses (ZQ notes: the group difference analysis should refer to abcd\_sl\_analysis.pdf)

## Analysis of Variance Table  
##   
## Response: aud\_slope\_scale  
## Df Sum Sq Mean Sq F value Pr(>F)  
## Subgroup 1 0.0001022 0.00010219 0.2444 0.6248  
## Residuals 29 0.0121282 0.00041821

##ASL Slope Effects (ZQ notes: the group difference analysis should refer to abcd\_sl\_analysis.pdf)

## `summarise()` regrouping output by 'PartID' (override with `.groups` argument)

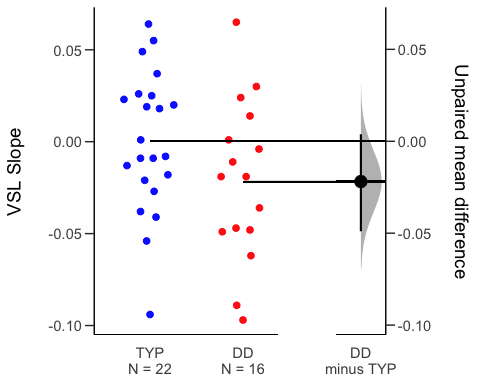


##VSL Slope Analysis (ZQ notes: the group difference analysis should refer to abcd\_sl\_analysis.pdf, both the linear models and the lmer models are available with trials entered as continuous variables)

## Analysis of Variance Table  
##   
## Response: vis\_slope\_scale  
## Df Sum Sq Mean Sq F value Pr(>F)  
## background\_age 1 0.002070 0.0020696 1.2302 0.2752  
## background\_sex 1 0.000336 0.0003361 0.1998 0.6577  
## Subgroup 1 0.004031 0.0040306 2.3958 0.1309  
## Residuals 34 0.057200 0.0016823

##VSL Effect Plot (ZQ notes: the group difference analysis should refer to abcd\_sl\_analysis.pdf, significant group effect)

## `summarise()` regrouping output by 'PartID' (override with `.groups` argument)



##RT Slope No significant differences in RT for either task.

## Analysis of Variance Table  
##   
## Response: aud\_fam\_rt  
## Df Sum Sq Mean Sq F value Pr(>F)  
## background\_age 1 0 0.0 0.0000 0.9984  
## background\_sex 1 14523 14523.4 1.6219 0.2137  
## Subgroup 1 14248 14248.2 1.5911 0.2180  
## Residuals 27 241777 8954.7

## Analysis of Variance Table  
##   
## Response: vis\_fam\_rt  
## Df Sum Sq Mean Sq F value Pr(>F)  
## background\_age 1 6080 6079.7 1.2305 0.2751  
## background\_sex 1 12178 12178.2 2.4649 0.1257  
## Subgroup 1 1555 1555.3 0.3148 0.5784  
## Residuals 34 167984 4940.7

###Cross-task correlations

###Everyone

## kbit\_ss\_2 gort\_ori\_ss\_2 ctopp\_nonword\_raw\_2  
## kbit\_ss\_2   
## gort\_ori\_ss\_2 0.25\*   
## ctopp\_nonword\_raw\_2 0.17 0.48\*\*\*\*   
## ctopp\_elision\_raw\_2 0.47\*\*\* 0.42\*\*\* 0.15   
## ctopp\_blending\_raw\_2 0.26\* 0.42\*\*\* 0.24\*   
## wais\_dsb\_ss\_2 0.51\*\*\*\* 0.43\*\*\* 0.26\*   
## slopeProp\_On -0.05 -0.05 -0.19   
## slope\_mt\_t -0.02 0.26\* -0.04   
## slope\_me\_t -0.11 0.08 -0.07   
## vis\_slope\_scale 0.14 0.28\* 0.09   
## aud\_slope\_scale 0.04 -0.09 0.07   
## vis\_acc 0.06 0.06 0.20   
## aud\_acc 0.12 0.38\*\* 0.17   
## quicksin\_snr\_loss\_2 -0.12 -0.59\*\*\*\* -0.37\*\*   
## ctopp\_elision\_raw\_2 ctopp\_blending\_raw\_2 wais\_dsb\_ss\_2  
## kbit\_ss\_2   
## gort\_ori\_ss\_2   
## ctopp\_nonword\_raw\_2   
## ctopp\_elision\_raw\_2   
## ctopp\_blending\_raw\_2 0.56\*\*\*\*   
## wais\_dsb\_ss\_2 0.42\*\*\* 0.41\*\*\*   
## slopeProp\_On 0.08 0.06 0.08   
## slope\_mt\_t 0.14 0.08 0.01   
## slope\_me\_t 0.18 -0.01 -0.15   
## vis\_slope\_scale 0.09 -0.26 0.21   
## aud\_slope\_scale 0.07 0.00 0.03   
## vis\_acc 0.19 0.17 0.00   
## aud\_acc 0.19 0.24 0.26   
## quicksin\_snr\_loss\_2 -0.17 -0.35\*\* -0.13   
## slopeProp\_On slope\_mt\_t slope\_me\_t vis\_slope\_scale  
## kbit\_ss\_2   
## gort\_ori\_ss\_2   
## ctopp\_nonword\_raw\_2   
## ctopp\_elision\_raw\_2   
## ctopp\_blending\_raw\_2   
## wais\_dsb\_ss\_2   
## slopeProp\_On   
## slope\_mt\_t 0.14   
## slope\_me\_t 0.13 0.77\*\*\*\*   
## vis\_slope\_scale 0.19 -0.01 0.10   
## aud\_slope\_scale -0.06 -0.02 0.04 -0.18   
## vis\_acc -0.18 -0.10 0.02 -0.35\*   
## aud\_acc 0.20 0.06 0.00 0.07   
## quicksin\_snr\_loss\_2 -0.07 0.08 0.23 -0.08   
## aud\_slope\_scale vis\_acc aud\_acc  
## kbit\_ss\_2   
## gort\_ori\_ss\_2   
## ctopp\_nonword\_raw\_2   
## ctopp\_elision\_raw\_2   
## ctopp\_blending\_raw\_2   
## wais\_dsb\_ss\_2   
## slopeProp\_On   
## slope\_mt\_t   
## slope\_me\_t   
## vis\_slope\_scale   
## aud\_slope\_scale   
## vis\_acc 0.08   
## aud\_acc -0.16 -0.12   
## quicksin\_snr\_loss\_2 -0.02 -0.02 -0.23

###Dys only both the rotary pursuit and ASL accuracy/RT are related to reading

## kbit\_ss\_2 gort\_ori\_ss\_2 wrmt\_id\_ss\_2 wrmt\_wa\_ss\_2 towre\_sw\_ss\_2  
## kbit\_ss\_2   
## gort\_ori\_ss\_2 0.06   
## wrmt\_id\_ss\_2 0.18 0.41\*   
## wrmt\_wa\_ss\_2 0.08 0.22 0.67\*\*\*\*   
## towre\_sw\_ss\_2 -0.10 0.52\*\* 0.40\* 0.07   
## towre\_pde\_ss\_2 0.03 0.29 0.28 0.58\*\*\* 0.46\*\*   
## slopeProp\_On 0.07 0.26 0.58\*\* 0.61\*\*\* -0.08   
## slope\_mt 0.14 -0.15 -0.12 -0.11 -0.34   
## slope\_me 0.24 0.60\*\* 0.18 0.01 0.01   
## aud\_acc -0.26 0.13 0.41 0.50\* 0.14   
## vis\_acc 0.11 0.17 -0.31 -0.22 0.00   
## aud\_slope\_scale 0.19 -0.38 0.00 -0.43 -0.14   
## vis\_slope\_scale -0.07 0.05 -0.31 -0.23 -0.25   
## towre\_pde\_ss\_2 slopeProp\_On slope\_mt slope\_me aud\_acc  
## kbit\_ss\_2   
## gort\_ori\_ss\_2   
## wrmt\_id\_ss\_2   
## wrmt\_wa\_ss\_2   
## towre\_sw\_ss\_2   
## towre\_pde\_ss\_2   
## slopeProp\_On 0.09   
## slope\_mt -0.07 0.04   
## slope\_me -0.05 0.20 0.42\*   
## aud\_acc 0.33 0.22 0.49\* 0.35   
## vis\_acc 0.20 -0.20 0.42 0.34 -0.08   
## aud\_slope\_scale -0.50\* 0.08 0.30 -0.33 0.07   
## vis\_slope\_scale -0.28 0.27 -0.01 -0.04 -0.22   
## vis\_acc aud\_slope\_scale  
## kbit\_ss\_2   
## gort\_ori\_ss\_2   
## wrmt\_id\_ss\_2   
## wrmt\_wa\_ss\_2   
## towre\_sw\_ss\_2   
## towre\_pde\_ss\_2   
## slopeProp\_On   
## slope\_mt   
## slope\_me   
## aud\_acc   
## vis\_acc   
## aud\_slope\_scale -0.16   
## vis\_slope\_scale -0.28 0.16

###Typ only better VSL is related to worse reading…

## kbit\_ss\_2 gort\_ori\_ss\_2 wrmt\_id\_ss\_2 wrmt\_wa\_ss\_2 towre\_sw\_ss\_2  
## kbit\_ss\_2   
## gort\_ori\_ss\_2 0.30   
## wrmt\_id\_ss\_2 0.16 0.38\*   
## wrmt\_wa\_ss\_2 -0.04 0.11 -0.04   
## towre\_sw\_ss\_2 0.12 0.43\* 0.15 0.17   
## towre\_pde\_ss\_2 0.14 0.69\*\*\*\* 0.38\* 0.12 0.44\*   
## slopeProp\_On -0.01 0.10 -0.08 0.16 -0.11   
## slope\_mt 0.10 -0.09 -0.11 -0.19 -0.10   
## slope\_me 0.07 -0.24 -0.17 -0.04 0.02   
## aud\_acc 0.08 0.19 0.29 0.02 0.26   
## vis\_acc 0.10 0.23 0.11 0.01 -0.12   
## aud\_slope\_scale -0.13 -0.05 -0.10 0.24 -0.29   
## vis\_slope\_scale 0.15 0.30 0.14 -0.20 0.27   
## towre\_pde\_ss\_2 slopeProp\_On slope\_mt slope\_me aud\_acc  
## kbit\_ss\_2   
## gort\_ori\_ss\_2   
## wrmt\_id\_ss\_2   
## wrmt\_wa\_ss\_2   
## towre\_sw\_ss\_2   
## towre\_pde\_ss\_2   
## slopeProp\_On -0.20   
## slope\_mt 0.16 -0.38\*   
## slope\_me 0.14 -0.27 0.83\*\*\*\*   
## aud\_acc -0.01 0.16 -0.20 -0.27   
## vis\_acc 0.11 -0.16 -0.11 -0.22 -0.12   
## aud\_slope\_scale 0.04 -0.13 0.15 0.23 -0.36   
## vis\_slope\_scale 0.51\*\* 0.15 0.17 0.14 0.08   
## vis\_acc aud\_slope\_scale  
## kbit\_ss\_2   
## gort\_ori\_ss\_2   
## wrmt\_id\_ss\_2   
## wrmt\_wa\_ss\_2   
## towre\_sw\_ss\_2   
## towre\_pde\_ss\_2   
## slopeProp\_On   
## slope\_mt   
## slope\_me   
## aud\_acc   
## vis\_acc   
## aud\_slope\_scale 0.25   
## vis\_slope\_scale -0.36\* -0.48\*