Mindprint - Math

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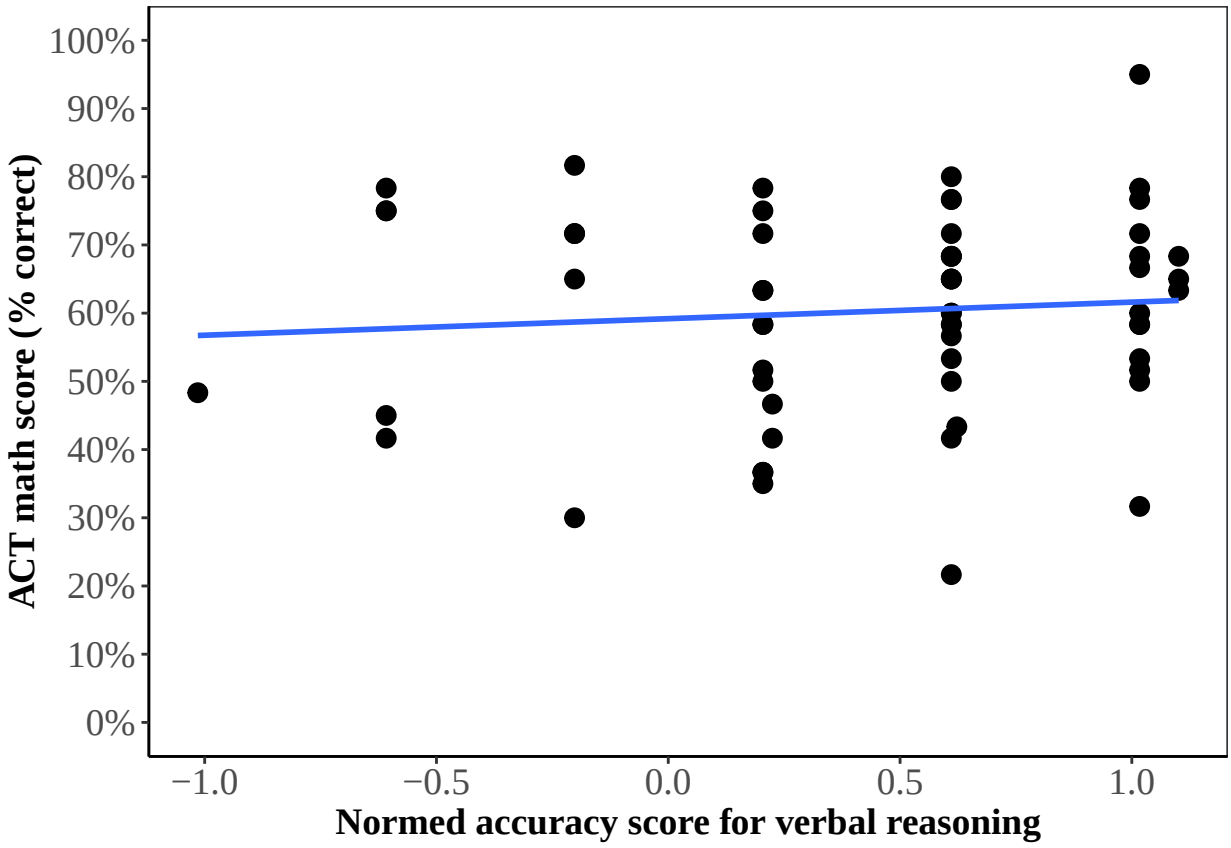
ACT Math (n = 61) | no binning

Overall score

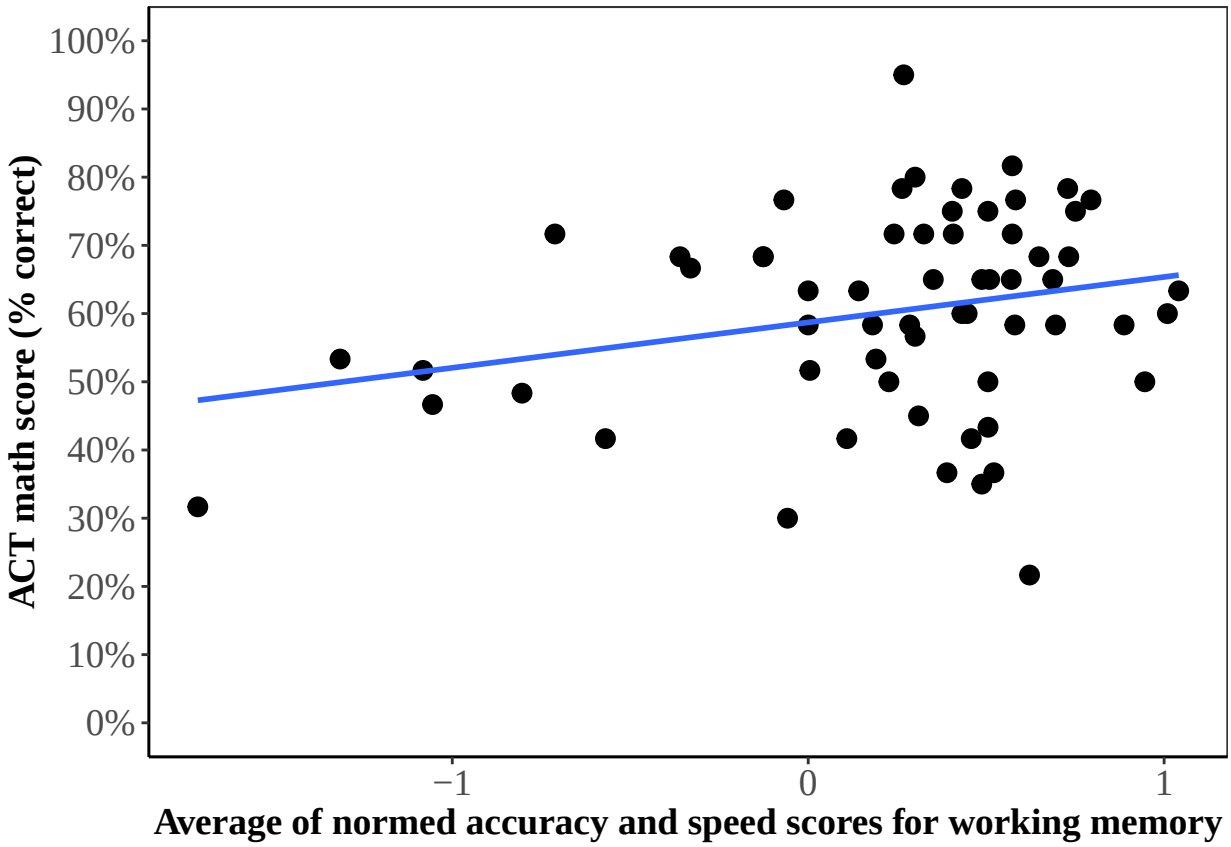
Verbal reasoning accuracy (no correlation)




```
##
##  Pearson's product-moment correlation
##
## data:  finalDF2$LAN_Az and finalDF2$ACTmathscore
## t = 0.66719, df = 59, p-value = 0.5073
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.1689678  0.3311398
## sample estimates:
##       cor
## 0.08653498
```

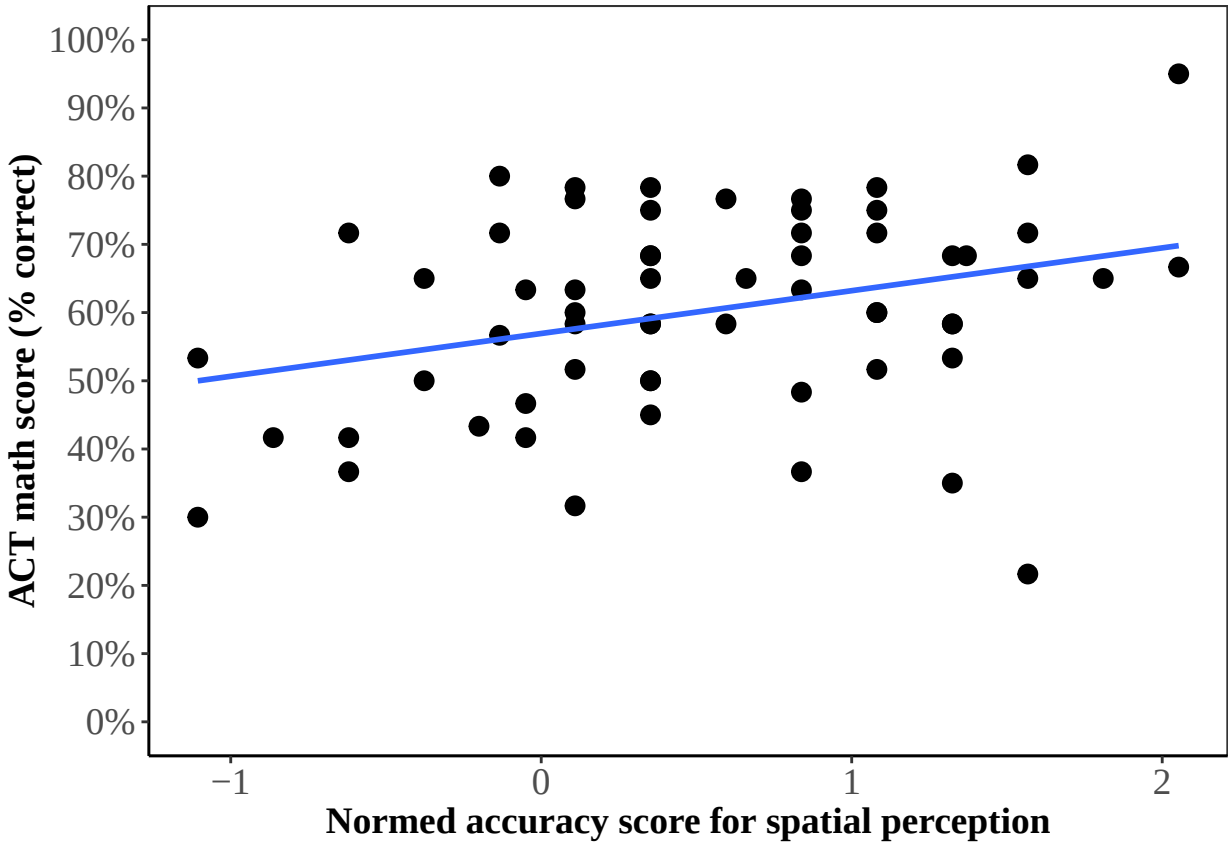
Working memory efficiency (p = 0.049, r = 0.25)

Average of normed accuracy and speed scores for working memory.




```
##
##  Pearson's product-moment correlation
##
## data:  finalDF2$WM_EFFICIENCY and finalDF2$ACTmathscore
## t = 2.0083, df = 59, p-value = 0.04919
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.001216049 0.474550976
## sample estimates:
##       cor
## 0.2529593
```

Spatial perception accuracy (p = 0.011, r = 0.32)




```
##
##  Pearson's product-moment correlation
##
## data:  finalDF2$SPA_Az and finalDF2$ACTmathscore
## t = 2.6027, df = 59, p-value = 0.01168
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.07516989 0.52991266
## sample estimates:
##       cor
## 0.3209159
```

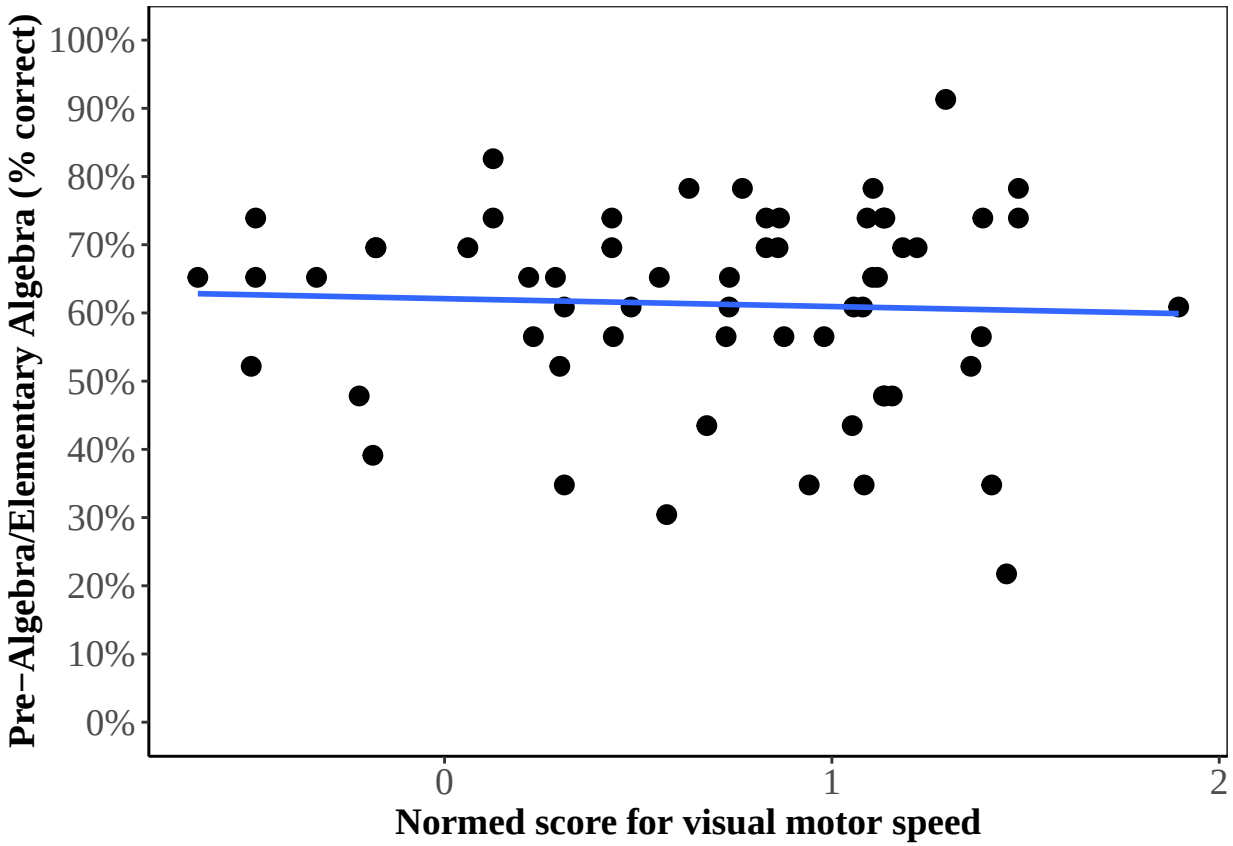
Multi-variate analysis

```
##
## Call:
## lm(formula = ACTmathscore ~ SPA_Az + WM_EFFICIENCY, data = finalDF2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.47021 -0.06918  0.00500  0.09832  0.25560
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.55762    0.02255  24.732   <2e-16 ***
## SPA_Az         0.05883    0.02371   2.481    0.016 *
## WM_EFFICIENCY  0.05960    0.03193   1.867    0.067 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1383 on 58 degrees of freedom
## Multiple R-squared:  0.1538, Adjusted R-squared:  0.1246
## F-statistic: 5.272 on 2 and 58 DF,  p-value: 0.007879
```

Spatial perception accuracy is a stronger predictor of overall math score compared to working memory efficiency, but WM efficiency is still important.

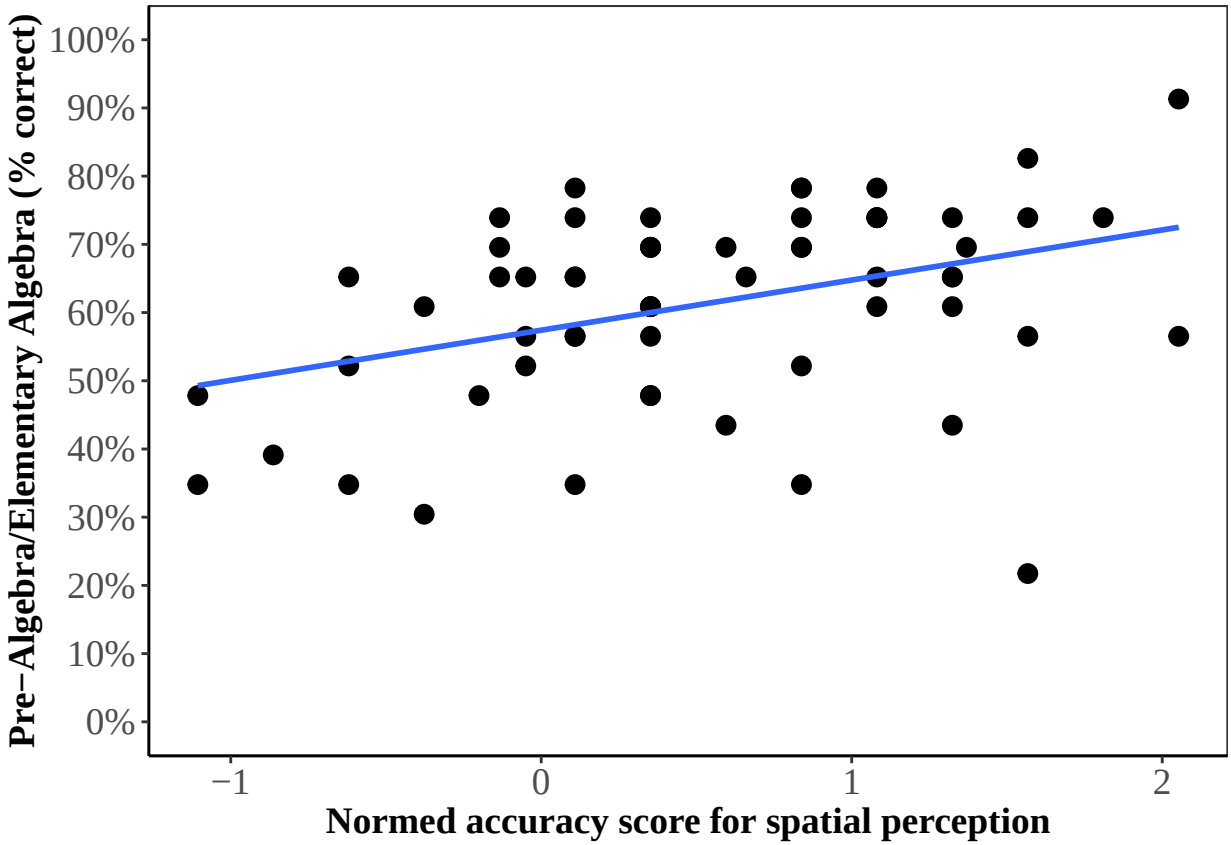
EA/ Pre-Algebra/Elementary Algebra Subsection

Visual motor speed (no correlation)




```
##
##  Pearson's product-moment correlation
##
## data:  EA_DF$SM_Sz and EA_DF$EAscore
## t = -0.36649, df = 59, p-value = 0.7153
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.2959277  0.2066422
## sample estimates:
##         cor
## -0.04765849
```

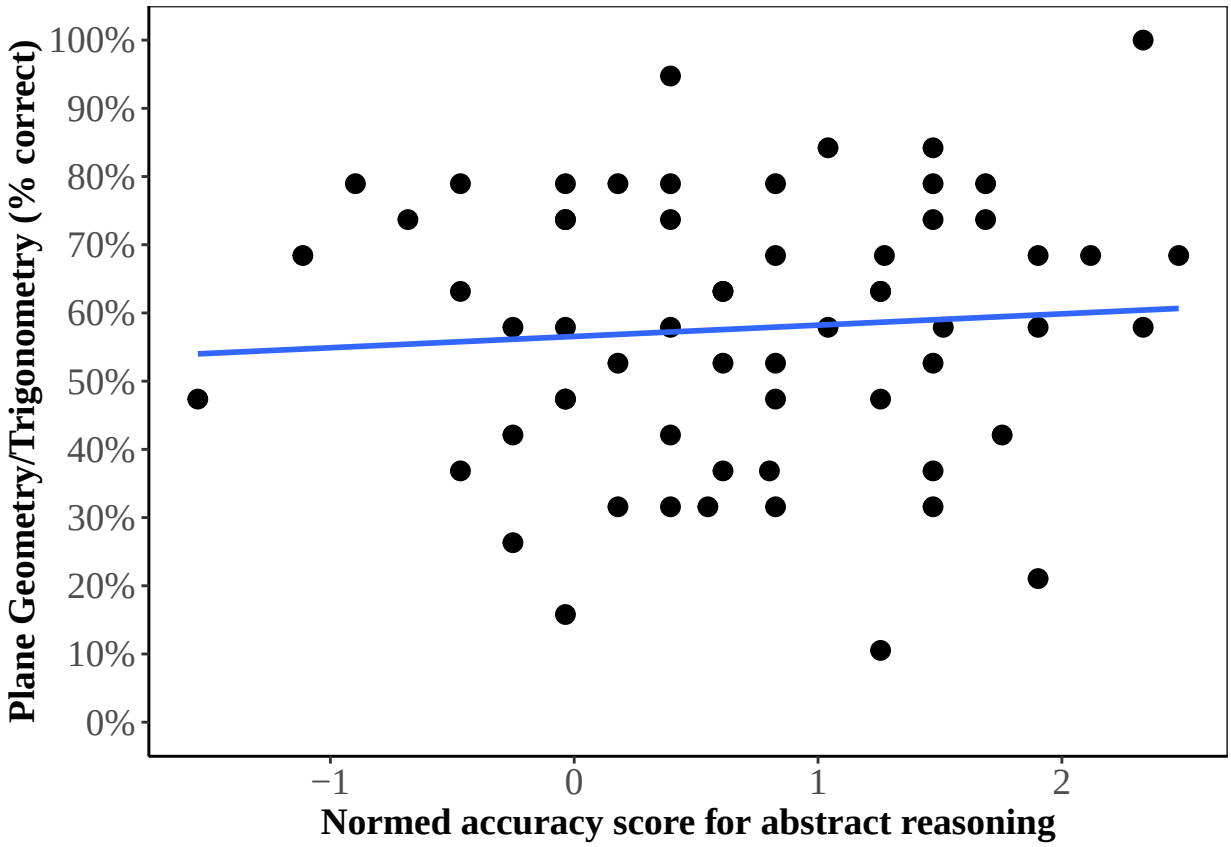
Spatial perception accuracy (p = 0.002, r = 0.39)




```
##
##  Pearson's product-moment correlation
##
## data:  EA_DF$SPA_Az and EA_DF$EAscore
## t = 3.2251, df = 59, p-value = 0.002055
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.1499307 0.5821980
## sample estimates:
##       cor
## 0.3871349
```

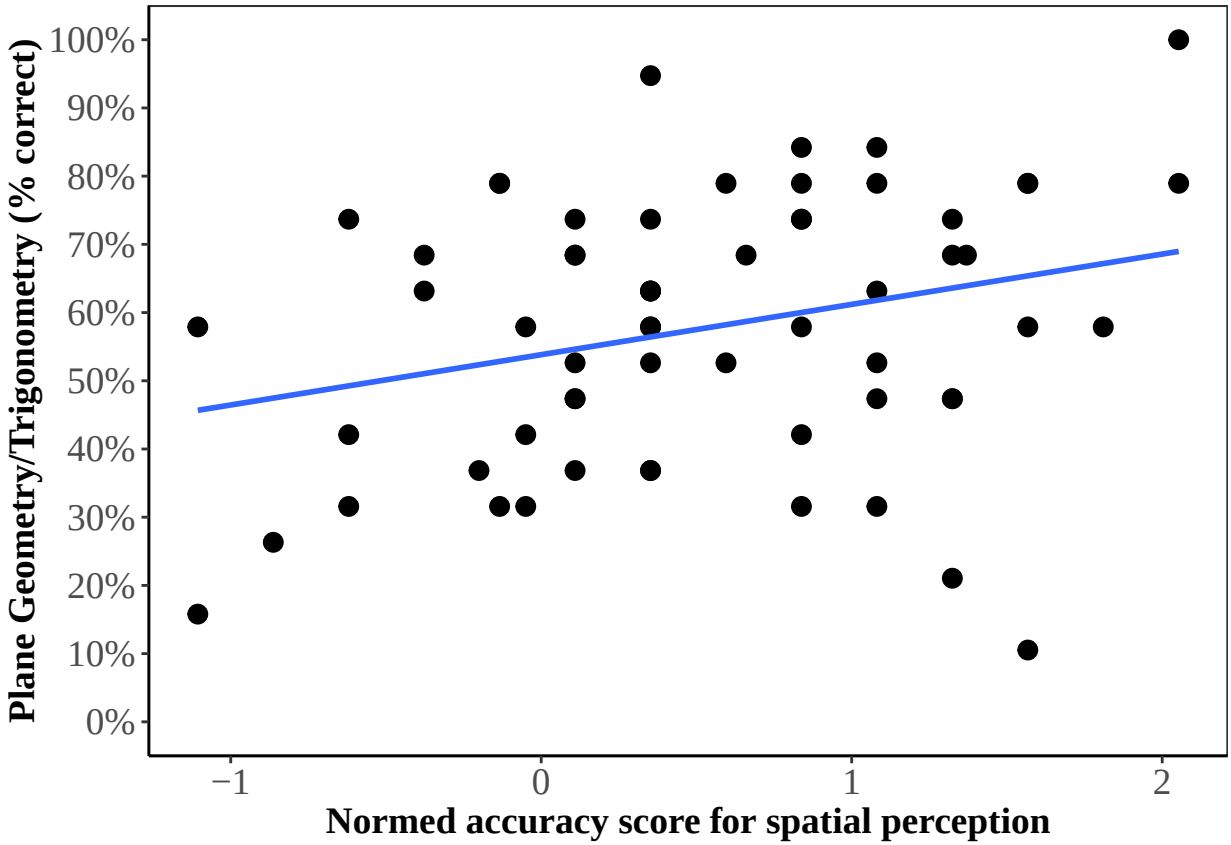
GT/ Plane Geometry/Trigonometry Subsection

Abstract reasoning accuracy (no correlation)




```
##
##  Pearson's product-moment correlation
##
## data:  GT_DF$NVR_Az and GT_DF$GTscore
## t = 0.58306, df = 59, p-value = 0.5621
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.1795533  0.3213849
## sample estimates:
##       cor
## 0.07568981
```

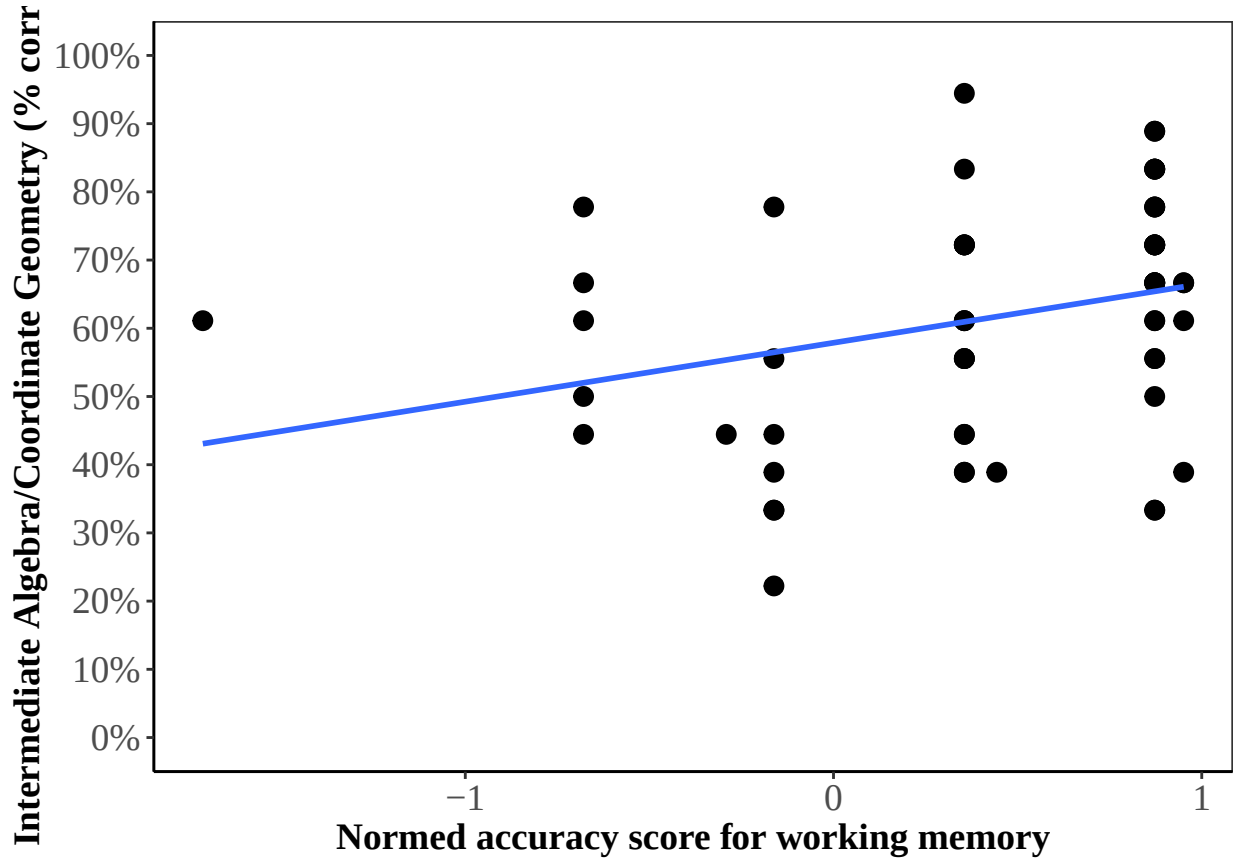
Spatial perception accuracy (p = 0.027, r = 0.28)




```
##
##  Pearson's product-moment correlation
##
## data:  GT_DF$SPA_Az and GT_DF$GTscore
## t = 2.2615, df = 59, p-value = 0.02743
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.03296079 0.49878278
## sample estimates:
##       cor
## 0.2824372
```

AG/ Intermediate Algebra/Coordinate Geometry Subsection

Working memory accuracy (p = 0.019, r = 0.29)



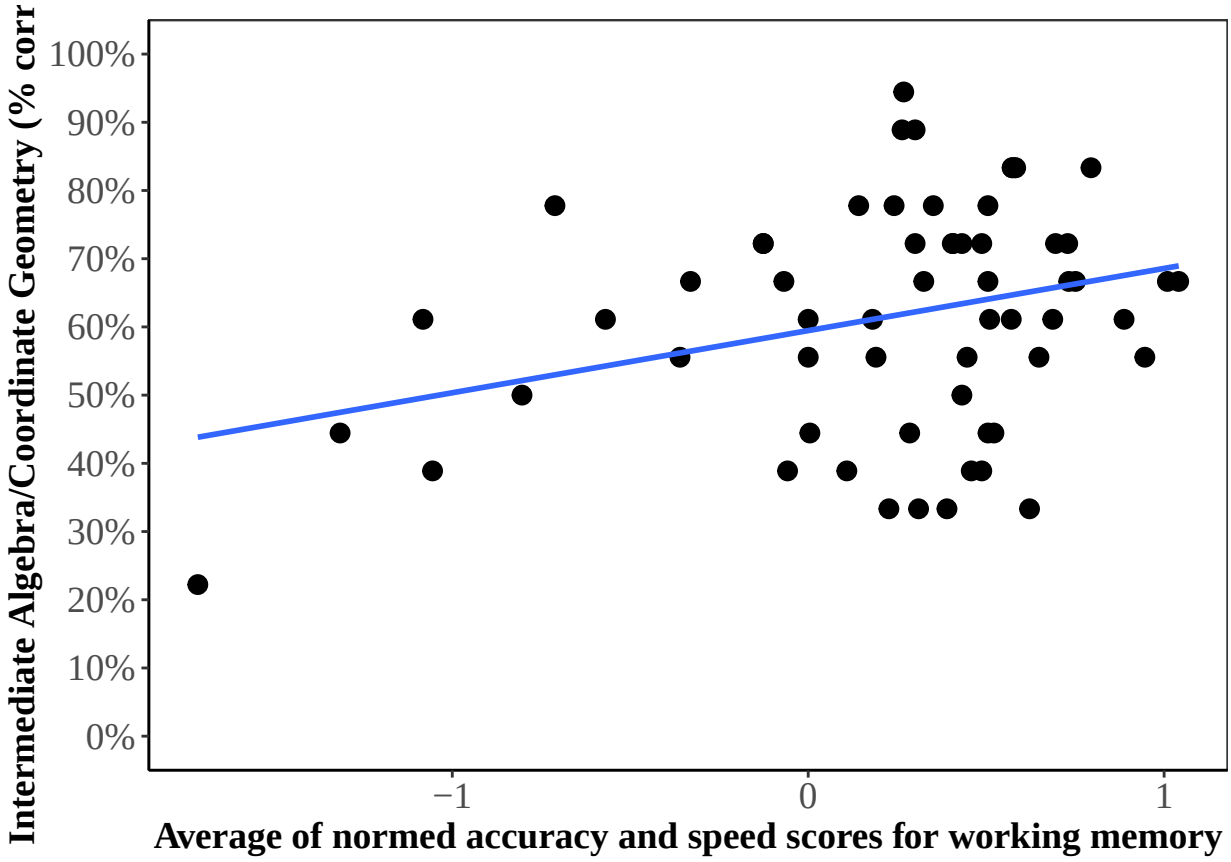

```
##
##  Pearson's product-moment correlation
##
## data:  AG_DF$WM_Az and AG_DF$AGscore
## t = 2.4009, df = 59, p-value = 0.01952
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.05029999 0.51171783
## sample estimates:
##       cor
## 0.2983418
```

Working memory speed (no correlation)


```
##
##  Pearson's product-moment correlation
##
## data:  AG_DF$WM_Sz and AG_DF$AGscore
## t = 1.3962, df = 59, p-value = 0.1679
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.07641755  0.41210561
## sample estimates:
##       cor
## 0.1788448
```

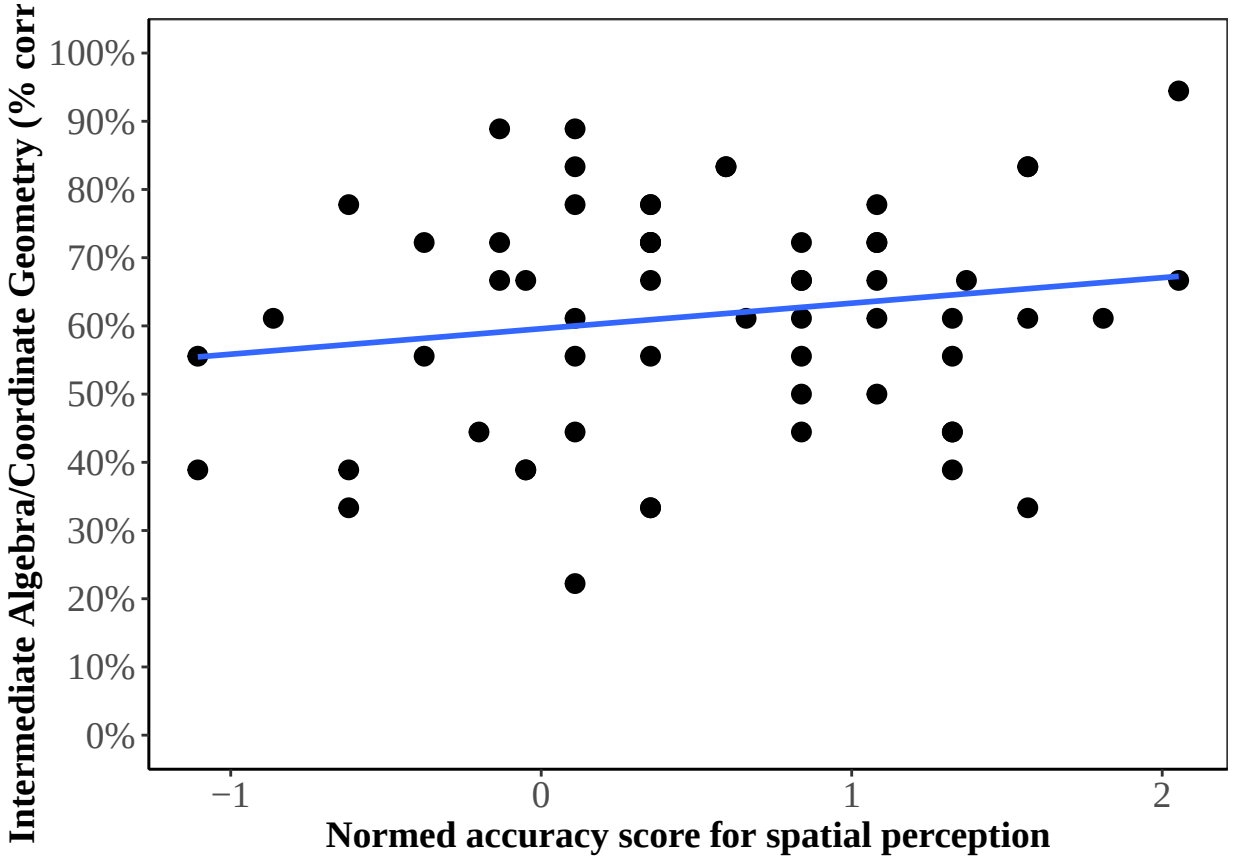
Working memory efficiency (p = 0.016, r = 0.3)

Average of normed accuracy and speed scores for working memory.




```
##
##  Pearson's product-moment correlation
##
## data:  AG_DF$WM_EFFICIENCY and AG_DF$AGscore
## t = 2.4711, df = 59, p-value = 0.01638
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.05897705 0.51811333
## sample estimates:
##       cor
## 0.3062495
```

Spatial perception accuracy (no correlation)

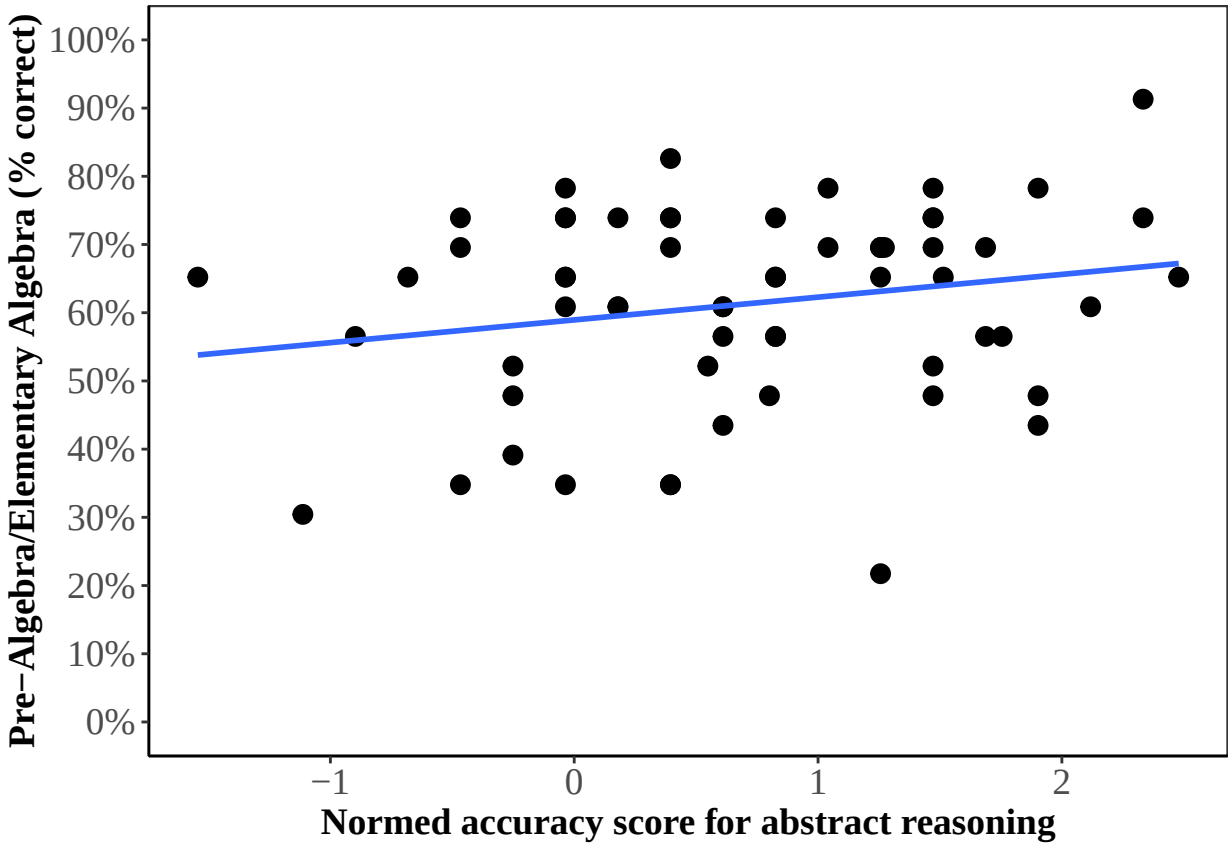



```
##
##  Pearson's product-moment correlation
##
## data:  AG_DF$SPA_Az and AG_DF$AGscore
## t = 1.3187, df = 59, p-value = 0.1924
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.08629409  0.40381802
## sample estimates:
##       cor
## 0.1692035
```

Appleseed Suggested Analyses

EA - abstract reasoning model

```
##
## Call:
## lm(formula = EAscore ~ NVR_Az, data = EA_DF)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.41398 -0.08279  0.02081  0.10058  0.24574
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.58945    0.02306  25.560   <2e-16 ***
## NVR_Az       0.03336    0.02024   1.648    0.105
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1415 on 59 degrees of freedom
## Multiple R-squared:  0.04401,    Adjusted R-squared:  0.02781
## F-statistic: 2.716 on 1 and 59 DF,  p-value: 0.1047
```



Elementary algebra is not predicted by abstract reasoning accuracy (p=0.1).

EA - abstract reasoning broken down by difficulty of questions

Level 1 EA

```
##
## Call:
## lm(formula = EA1 ~ NVR_Az, data = finalDF3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.4254 -0.0419  0.0132  0.1260  0.1711
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.85480    0.02539  33.672   <2e-16 ***
## NVR_Az       0.02326    0.02229   1.044    0.301
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1557 on 59 degrees of freedom
## Multiple R-squared:  0.01813,    Adjusted R-squared:  0.001485
## F-statistic: 1.089 on 1 and 59 DF,  p-value: 0.3009
```

Level 2 EA

```
##
## Call:
## lm(formula = EA2 ~ NVR_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.65725 -0.11427  0.04395  0.14433  0.30371
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.73211    0.03414  21.445   <2e-16 ***
## NVR_Az       0.03991    0.02997   1.332    0.188
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2094 on 59 degrees of freedom
## Multiple R-squared:  0.02918,    Adjusted R-squared:  0.01273
## F-statistic: 1.774 on 1 and 59 DF,  p-value: 0.1881
```

Level 3 EA

```
##
## Call:
## lm(formula = EA3 ~ NVR_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.55366 -0.27832 -0.03677  0.21323  0.48856
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.52974    0.04613  11.484   <2e-16 ***
## NVR_Az       0.03921    0.04049   0.968    0.337
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.283 on 59 degrees of freedom
## Multiple R-squared:  0.01564,    Adjusted R-squared:  -0.001044
## F-statistic: 0.9375 on 1 and 59 DF,  p-value: 0.3369
```

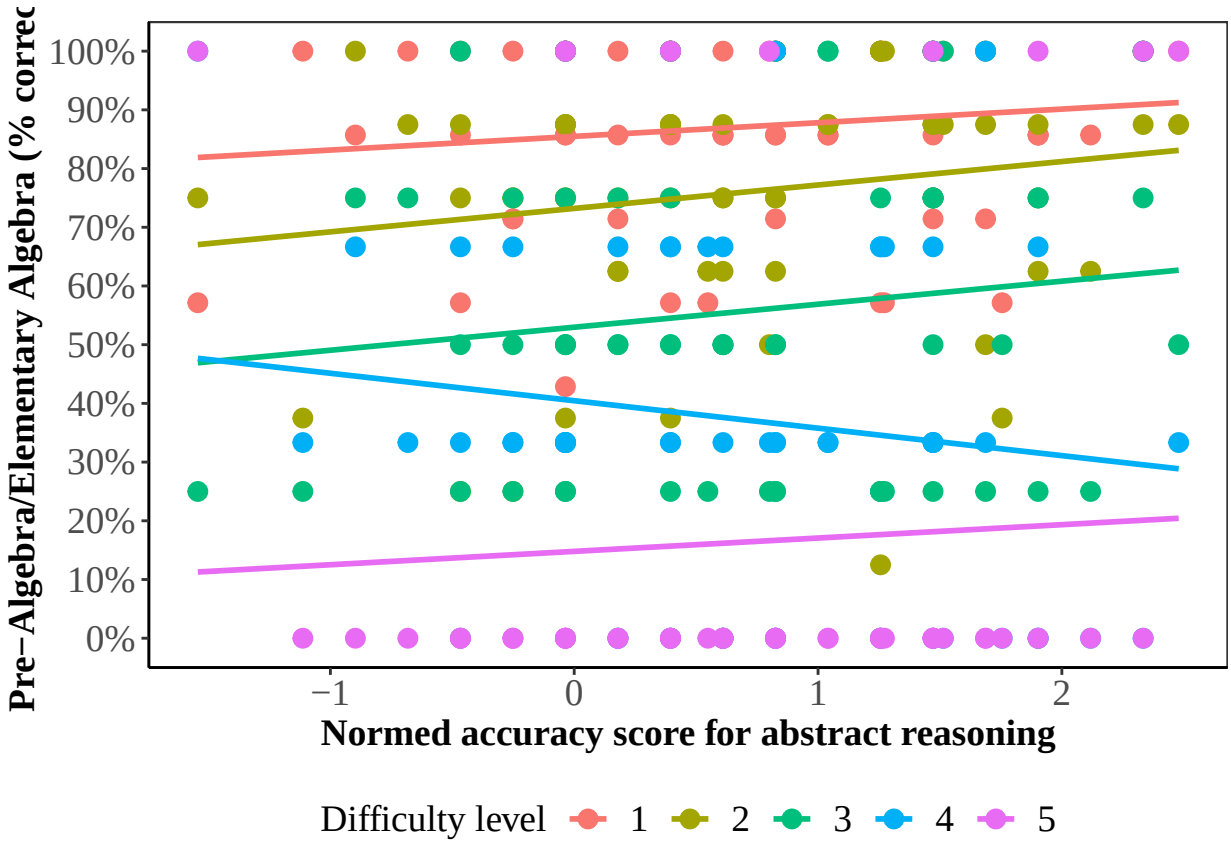
Level 4 EA

```
##
## Call:
## lm(formula = EA4 ~ NVR_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.42638 -0.31559 -0.05276  0.27050  0.70456
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.40455    0.05161   7.838 1.03e-10 ***
## NVR_Az      -0.04676    0.04531  -1.032    0.306
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3166 on 59 degrees of freedom
## Multiple R-squared:  0.01773,    Adjusted R-squared:  0.001085
## F-statistic: 1.065 on 1 and 59 DF,  p-value: 0.3063
```

Level 5 EA

```
##
## Call:
## lm(formula = EA5 ~ NVR_Az, data = finalDF3)
```

```
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.2010 -0.1765 -0.1569 -0.1373  0.8872
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.14790    0.06127   2.414   0.0189 *
## NVR_Az       0.02275    0.05379   0.423   0.6739
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3759 on 59 degrees of freedom
## Multiple R-squared:  0.003023,   Adjusted R-squared:  -0.01388
## F-statistic: 0.1789 on 1 and 59 DF,  p-value: 0.6739
```



GT - abstract reasoning & spatial perception

```
##
## Call:
## lm(formula = GTscore ~ NVR_Az + SPA_Az, data = GT_DF)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.54855 -0.15501  0.01489  0.13689  0.38310
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.5383367  0.0338266  15.915   <2e-16 ***
## NVR_Az      -0.0001412  0.0286241  -0.005   0.9961
## SPA_Az       0.0738042  0.0341645   2.160   0.0349 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1926 on 58 degrees of freedom
## Multiple R-squared:  0.07977,    Adjusted R-squared:  0.04804
## F-statistic: 2.514 on 2 and 58 DF,  p-value: 0.08974
```

Plane geometry/trigonometry is predicted by spatial perception accuracy (p=0.034).

GT - abstract reasoning & spatial perception broken down by difficulty of questions

Level 1 GT

```
##
## Call:
## lm(formula = GT1 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.55251 -0.11299  0.09844  0.16147  0.23454
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.83067    0.03604  23.047   <2e-16 ***
## NVR_Az      -0.04181    0.03050  -1.371    0.176
## SPA_Az       0.05825    0.03640   1.600    0.115
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2052 on 58 degrees of freedom
## Multiple R-squared:  0.05708,    Adjusted R-squared:  0.02457
## F-statistic: 1.756 on 2 and 58 DF,  p-value: 0.1819
```

Level 2 GT

```
##
## Call:
## lm(formula = GT2 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.49224 -0.22356  0.03266  0.22540  0.34613
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.694324   0.041792  16.614   <2e-16 ***
## NVR_Az      0.005774   0.035365   0.163    0.871
## SPA_Az      0.058903   0.042210   1.395    0.168
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2379 on 58 degrees of freedom
## Multiple R-squared:  0.03754,    Adjusted R-squared:  0.004349
## F-statistic: 1.131 on 2 and 58 DF,  p-value: 0.3297
```

Level 3 GT

```
##
## Call:
## lm(formula = GT3 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.64725 -0.20224 -0.01614  0.18714  0.49292
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.44476    0.04635   9.595 1.41e-13 ***
## NVR_Az       0.02658    0.03923   0.678   0.5007
## SPA_Az       0.10790    0.04682   2.305   0.0248 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2639 on 58 degrees of freedom
## Multiple R-squared:  0.1095, Adjusted R-squared:  0.07884
## F-statistic: 3.568 on 2 and 58 DF,  p-value: 0.03457
```

Level 4 GT

```
##
## Call:
## lm(formula = GT4 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.46669 -0.19826 -0.05629  0.17840  0.53098
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.224076   0.047565   4.711 1.58e-05 ***
## NVR_Az      0.005419   0.040250   0.135  0.89337
## SPA_Az      0.150470   0.048040   3.132  0.00272 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2708 on 58 degrees of freedom
## Multiple R-squared:  0.1576, Adjusted R-squared:  0.1285
## F-statistic: 5.424 on 2 and 58 DF,  p-value: 0.006928
```

Level 5 GT

```
##
```

```
## Call:
## lm(formula = GT5 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.34153 -0.17890  0.03582  0.11754  0.50998
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.14082    0.03635   3.874 0.000275 ***
## NVR_Az       0.03406    0.03076   1.107 0.272729
## SPA_Az       0.09141    0.03671   2.490 0.015672 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.207 on 58 degrees of freedom
## Multiple R-squared:  0.1422, Adjusted R-squared:  0.1126
## F-statistic: 4.808 on 2 and 58 DF,  p-value: 0.01169
```

The more difficult questions of plane geometry/trigonometry (level 3-5) is predicted by spatial perception accuracy.

AG - abstract reasoning & spatial perception

```
##
## Call:
## lm(formula = AGscore ~ NVR_Az + SPA_Az, data = AG_DF)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.36879 -0.14144  0.01698  0.11534  0.29510
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.591279   0.029384  20.122   <2e-16 ***
## NVR_Az      0.008661   0.024865   0.348    0.729
## SPA_Az      0.034607   0.029678   1.166    0.248
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1673 on 58 degrees of freedom
## Multiple R-squared:  0.03066,    Adjusted R-squared:  -0.002768
## F-statistic: 0.9172 on 2 and 58 DF,  p-value: 0.4054
```

Algebra/coordinate geometry is not predicted by abstract reasoning or spatial perception.

AG - abstract reasoning & spatial perception broken down by difficulty of questions

Level 1 AG

```
##
## Call:
## lm(formula = AG1 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.9618 -0.1525  0.1128  0.2140  0.4255
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.732804   0.055892  13.111   <2e-16 ***
## NVR_Az      0.005217   0.047296   0.110   0.9126
## SPA_Az      0.141974   0.056451   2.515   0.0147 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3182 on 58 degrees of freedom
## Multiple R-squared:  0.1077, Adjusted R-squared:  0.07689
## F-statistic: 3.499 on 2 and 58 DF,  p-value: 0.03676
```

Level 2 AG

```
##
## Call:
## lm(formula = AG2 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.7800 -0.2171  0.2216  0.2798  0.3424
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.731320   0.057273  12.769   <2e-16 ***
## NVR_Az       0.007302   0.048464   0.151    0.881
## SPA_Az      -0.044210   0.057845  -0.764    0.448
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3261 on 58 degrees of freedom
## Multiple R-squared:  0.01003,    Adjusted R-squared:  -0.02411
## F-statistic: 0.2937 on 2 and 58 DF,  p-value: 0.7466
```

Level 3 AG

```
##
## Call:
## lm(formula = AG3 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.50628 -0.15479  0.04543  0.17675  0.36403
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.57201    0.03959  14.448   <2e-16 ***
## NVR_Az       0.04406    0.03350   1.315    0.194
## SPA_Az       0.05488    0.03999   1.372    0.175
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2254 on 58 degrees of freedom
## Multiple R-squared:  0.07863,    Adjusted R-squared:  0.04685
## F-statistic: 2.475 on 2 and 58 DF,  p-value: 0.09304
```

Level 4 AG

```
##
## Call:
## lm(formula = AG4 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.48170 -0.12493 -0.03673  0.21216  0.59689
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.40678    0.05152   7.896 9.15e-11 ***
## NVR_Az      -0.04464    0.04359  -1.024    0.310
## SPA_Az       0.05503    0.05203   1.058    0.295
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2933 on 58 degrees of freedom
## Multiple R-squared:  0.02859,    Adjusted R-squared:  -0.004911
## F-statistic: 0.8534 on 2 and 58 DF,  p-value: 0.4312
```

Level 5 AG

```
##
```

```
## Call:
## lm(formula = AG5 ~ NVR_Az + SPA_Az, data = finalDF3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.2824 -0.1593 -0.1180  0.2780  0.8413
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.19015    0.04677   4.065 0.000146 ***
## NVR_Az      -0.05879    0.03958  -1.486 0.142825
## SPA_Az       0.01333    0.04724   0.282 0.778814
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2663 on 58 degrees of freedom
## Multiple R-squared:  0.0369, Adjusted R-squared:  0.003687
## F-statistic: 1.111 on 2 and 58 DF,  p-value: 0.3361
```

Overall algebra/coordinate geometry is not predicted by abstract reasoning or spatial perception. But level 1 algebra/coordinate geometry is predicted by spatial perception.

AG - abstract reasoning & spatial perception & flexible thinking

```
##
## Call:
## lm(formula = AGscore ~ NVR_Az + SPA_Az + ABF_Az, data = AG_DF)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.39359 -0.12459  0.03113  0.11493  0.31446
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.58965    0.02931  20.118   <2e-16 ***
## NVR_Az       0.01183    0.02492   0.475    0.637
## SPA_Az       0.02498    0.03065   0.815    0.418
## ABF_Az       0.02656    0.02225   1.194    0.238
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1667 on 57 degrees of freedom
## Multiple R-squared:  0.05429,    Adjusted R-squared:  0.004517
## F-statistic: 1.091 on 3 and 57 DF,  p-value: 0.3605
```

Algebra/coordinate geometry is not predicted by abstract reasoning, spatial perception or flexible thinking.

AG - abstract reasoning & spatial perception & flexible thinking broken down by difficulty of questions

Level 1 AG

```
##
## Call:
## lm(formula = AG1 ~ NVR_Az + SPA_Az + ABF_Az, data = finalDF3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.9540 -0.1449  0.1157  0.2146  0.4224
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.731896   0.056383  12.981   <2e-16 ***
## NVR_Az      0.006984   0.047933   0.146   0.8847
## SPA_Az      0.136614   0.058960   2.317   0.0241 *
## ABF_Az      0.014795   0.042809   0.346   0.7309
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3207 on 57 degrees of freedom
## Multiple R-squared:  0.1095, Adjusted R-squared:  0.06266
## F-statistic: 2.337 on 3 and 57 DF,  p-value: 0.08322
```

Level 2 AG

```
##
## Call:
## lm(formula = AG2 ~ NVR_Az + SPA_Az + ABF_Az, data = finalDF3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.7912 -0.2146  0.1733  0.2716  0.4011
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.72897    0.05745  12.689   <2e-16 ***
## NVR_Az       0.01186    0.04884   0.243    0.809
## SPA_Az      -0.05805    0.06008  -0.966    0.338
## ABF_Az       0.03819    0.04362   0.876    0.385
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3267 on 57 degrees of freedom
```

```
## Multiple R-squared:  0.02317,    Adjusted R-squared:  -0.02825
## F-statistic: 0.4506 on 3 and 57 DF,  p-value: 0.7178
```

Level 3 AG

```
##
## Call:
## lm(formula = AG3 ~ NVR_Az + SPA_Az + ABF_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.47882 -0.15379  0.02629  0.18046  0.37681
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.57058    0.03978  14.345   <2e-16 ***
## NVR_Az       0.04683    0.03382   1.385    0.171
## SPA_Az       0.04649    0.04160   1.118    0.268
## ABF_Az       0.02314    0.03020   0.766    0.447
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2262 on 57 degrees of freedom
## Multiple R-squared:  0.08802,    Adjusted R-squared:  0.04002
## F-statistic: 1.834 on 3 and 57 DF,  p-value: 0.1513
```

Level 4 AG

```
##
## Call:
## lm(formula = AG4 ~ NVR_Az + SPA_Az + ABF_Az, data = finalDF3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.49148 -0.13051 -0.03335  0.20272  0.59529
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.40600    0.05198   7.811 1.42e-10 ***
## NVR_Az      -0.04312    0.04419  -0.976    0.333
## SPA_Az       0.05042    0.05435   0.928    0.358
## ABF_Az       0.01274    0.03946   0.323    0.748
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2956 on 57 degrees of freedom
## Multiple R-squared:  0.03036,    Adjusted R-squared:  -0.02068
```

```
## F-statistic: 0.5949 on 3 and 57 DF,  p-value: 0.6209
```

Level 5 AG

```
##
## Call:
## lm(formula = AG5 ~ NVR_Az + SPA_Az + ABF_Az, data = finalDF3)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.3035 -0.1726 -0.1211  0.2479  0.8752
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.188458   0.046987   4.011 0.000178 ***
## NVR_Az      -0.055510   0.039945  -1.390 0.170045
## SPA_Az       0.003367   0.049136   0.069 0.945611
## ABF_Az       0.027499   0.035675   0.771 0.443995
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2672 on 57 degrees of freedom
## Multiple R-squared:  0.04683,    Adjusted R-squared:  -0.003334
## F-statistic: 0.9335 on 3 and 57 DF,  p-value: 0.4305
```

Algebra/coordinate geometry is not predicted by abstract reasoning, spatial perception or flexible thinking but level 1 algebra/coordinate geometry is predicted by spatial perception.

Summary

1. Overall math score is predicted by spatial perception and WM efficiency.
2. Elementary algebra score is predicted by spatial perception. It is not predicted by abstract reasoning even when broken down by question difficulty.
3. Plane geometry/trigonometry score is predicted by spatial perception accuracy. Specifically, the more difficult questions of plane geometry/trigonometry (level 3-5) is predicted by spatial perception accuracy.
4. Intermediate algebra/coordinate geometry is predicted by WM efficiency. But level 1 intermediate algebra/coordinate geometry is predicted by spatial perception.