# **Appendices**

**Appendix 1.** p-values, F-values and degrees of freedom (df).

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| ***Butterfly*** | **p-value** | **df** | **F** |
| Total time across 3 trials (200-m) | 0.166 | 1.569 | 2.224 |
| Total time across 3 trials (400-m) | 0.089 | 1.131 | 0.589 |
| CS across 3 trials | 0.802 | 2 | 0.225 |
| D’ across 3 trials | 0.776 | 2 | 0.260 |
| ***Backstroke*** | **p-value** | **df** | **F** |
| Total time across 3 trials (200-m) | 0.462 | 2 | 0.816 |
| Total time across 3 trials (400-m) | 0.052 | 2 | 0.384 |
| CS across 3 trials | 0.506 | 2 | 0.716 |
| D’ across 3 trials | 0.335\* | 2 | 1.182 |
| ***Breaststroke*** | **p-value** | **df** | **F** |
| Total time across 3 trials (200-m) | 0.075 | 2 | 3.235 |
| Total time across 3 trials (400-m) | 0.202 | 2 | 1.831 |
| CS across 3 trials | 0.186 | 2 | 1.940 |
| D’ across 3 trials | 0.162 | 2 | 2.127 |
| ***Front crawl*** | **p-value** | **df** | **F** |
| Total time across 3 trials (200-m) | 0.054 | 2 | 3.447 |
| Total time across 3 trials (400-m) | 0.316 | 2 | 1.230 |
| CS across 3 trials | 0.802 | 2 | 0.225 |
| D’ across 3 trials | 0.224 | 1.307 | 1.688 |

***\**** *= D’ data calculated from trial 2 not normally distributed*

**Appendix 2:** 200-m descriptive data, TEM, SDCind, SDCgroup, SWC and ICC for 50m splits.

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| **200-m Trials** |
| ***Butterfly*** | **0-50 m** | **50-100 m** | **100-150 m** | **150-200 m** |
| Mean ± SD | 31.2 ± 1.5 | 35.3 ± 2.1 | 36.1 ± 2.2 | 36.2 ± 2.2 |
| Mean TEM *(% CoV)* | *0.51 (1.64)* | 0.54 *(1.54)* | 0.43 *(1.18)* | 0.79 *(2.19)* |
| SDCind *(% of the mean)* | *0.98 (3.13)* | 1.04 *(2.95)* | 0.82 *(2.26)* | 1.51 *(4.19)*  |
| SDCgroup *(% of the mean)* | 0.37 *(1.18)* | *0.39 (1.11)* | 0.31 *(0.86)* | 0.57 *(1.58)* |
| SWC *(% of the mean)* | 0.14 *(0.46)* | 0.15 *(0.44)* | 0.12 *(0.34)* | 0.22 *(0.62)* |
| ICC *(95% CI)* | 0.23*(-0.20-0.78)* | 0.42 *(-0.05-0.84)* | 0.41 *(-0.07-0.84)* | 0.45 *(-0.02-0.85)* |
| ***Backstroke*** | **0-50 m** | **50-100 m** | **100-150 m** | **150-200 m** |
| Mean ± SD  | 31.7 ± 1.7 | 34.4 ± 1.9 | 34.8 ± 1.9 | 33.9 ± 2.3 |
| Mean TEM *(% CoV)* | 0.69 *(2.16)* | 0.66 *(1.91)* | 0.84 *(2.40)* | 0.90 *(2.66)* |
| SDCind *(% of the mean)* | 1.31 *(4.13)* | 1.26 *(3.65)* | 1.60 *(4.59)* | 1.72 *(5.08)* |
| SDCgroup *(% of the mean)* | 0.46 *(1.46)* | 0.44 *(1.29)* | 0.57 *(1.62)* | 0.61 *(1.80)* |
| SWC *(% of the mean)* | 0.19 *(0.61)* | 0.19 *(0.54)* | 0.24 *(0.68)* | 0.26 *(0.75)* |
| ICC *(95% CI)* | -0.06 *(-0.19-0.43)* | 0.49 *(0.07-0.85)* | 0.22 *(-0.12-0.69)* | 0.45 *(0.05-0.83)* |
| ***Breaststroke*** | **0-50 m** | **50-100 m** | **100-150 m** | **150-200 m** |
| Mean ± SD  | 35.4 ± 2.5  | 39.4 ± 2.9 | 39.8 ± 2.8 | 39.7 ± 2.7 |
| Mean TEM *(% CoV)* | 0.66 *(1.87)* | 0.74 *(1.88)* | 0.46 *(1.15)* | 0.73 *(1.83)* |
| SDCind *(% of the mean)* | 1.27 *(3.58)* | 1.41 *(3.59)* | 0.88 *(2.20)* | 1.39 *(3.49)* |
| SDCgroup *(% of the mean)* | 0.48 *(1.35)* | 0.53 *(1.36)* | 0.33 *(0.83)* | 0.52 *(1.32)* |
| SWC *(% of the mean)* | 0.19 *(0.53)* | 0.21 *(0.53)* | 0.13 *(0.33)* | 0.21 *(0.52)* |
| ICC *(95% CI)* | 0.03 *(-0.25-0.58)* | -0.01 *(-0.28-0.54)* | 0.02 *(-0.35-0.62)* | -0.12 *(-0.30-0.38)* |
| ***Front crawl*** | **0-50 m** | **50-100 m** | **100-150 m** | **150-200 m** |
| Mean ± SD  | 29.4 ± 1.4 | 32.1 ± 1.6 | 32.4 ± 1.8 | 31.4 ± 2.0 |
| Mean TEM *(% CoV)* | 0.54 *(1.82)* | 0.56 *(1.74)* | 0.77 *(2.38)* | 0.79 *(2.51)* |
| SDCind *(% of the mean)* | 1.02 *(3.48)* | 1.07 *(3.32)* | 1.47 *(4.54)* | 1.50 *(4.79)* |
| SDCgroup *(% of the mean)* | 0.32 *(1.10)* | 0.34 *(1.05)* | 0.46 *(1.43)* | 0.48 *(1.51)* |
| SWC *(% of the mean)* | 0.15 *(0.52)* | 0.16 *(0.49)* | 0.22 *(0.67)* | 0.22 *(0.71)* |
| ICC *(95% CI)* | 0.72 *(0.39-0.92)* | 0.48 *(0.06-0.83)* | 0.56 *(0.14-0.86)* | 0.44 *(0.07-0.80)* |

**Appendix 3:** 400-m descriptive data, TEM, SDCind, SDCgroup, SWC and ICC for 50-m splits.

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| **400-m Trials** |
| ***Butterfly*** | **0-50 m** | **50-100 m** | **100-150 m** | **150-200 m** | **200-250 m** | **250-300 m** | **300-350 m** | **350-400 m** |
| Mean ± SD | 32.9 ± 1.6 | 37.2 ± 2.3 | 38.3 ± 2.6 | 38.8 ± 2.7 | 39.0 ± 2.6 | 39.5 ± 2.9 | 39.6 ± 3.0 | 38.6 ± 3.0 |
| Mean TEM *(% CoV)* | 0.53 *(1.61)* | 0.54 *(1.45)* | 0.89 *(2.31)* | 0.70 *(1.81)* | 0.76 *(1.95)* | 0.63 *(1.59)* | 0.56 *(1.42)* | 0.50 *(1.30)* |
| SDCind *(% of the mean)* | 1.01 *(3.07)* | 1.03 *(2.76)* | 1.69 *(4.41)* | 1.34 *(3.46)* | 1.45 *(3.73)* | 1.20 *(3.04)* | 1.08 *(2.72)* | 0.96 *(2.49)* |
| SDCgroup *(% of the mean)* | 0.38 *(1.16)* | 0.39 *(1.04)* | 0.64 *(1.67)* | 0.51 *(1.31)* | 0.55 *(1.41)* | 0.45 *(1.15)* | 0.41 *(1.03)* | 0.36 *(0.94)* |
| SWC *(% of the mean)* | 0.15 *(0.46)* | 0.15 *(0.41)* | 0.25 *(0.65)* | 0.20 *(0.51)* | 0.22 *(0.55)* | 0.18 *(0.45)* | 0.16 *(0.40)* | 0.14 *(0.37)* |
| ICC *(95% CI)* | 0.86 *(0.59-0.97)* | 0.79 *(0.43-0.96)* | 0.70 *(0.30-0.93)* | 0.12 *(-0.32-0.71)* | 0.37 *(-0.13-0.83)* | 0.56 *(0.11-0.89)* | 0.87 *(0.63-0.97)* | 0.46 *(-0.00-0.86)* |
| ***Backstroke*** | **0-50 m** | **50-100 m** | **100-150 m** | **150-200 m** | **200-250 m** | **250-300 m** | **300-350 m** | **350-400 m** |
| Mean ± SD | 33.0 ± 2.1 | 35.8 ± 2.4 | 36.3 ± 2.2 | 36.4 ± 2.0 | 36.0 ± 2.0 | 36.2 ± 1.9 | 36.0 ± 1.9 | 34.9 ± 2.1 |
| Mean TEM *(% CoV)* | 0.39 *(1.19)* | 0.38 *(1.07)* | 0.46 *(1.26)* | 0.32 *(0.88)* | 0.41 *(1.15)* | 0.38 *(1.04)* | 0.41 *(1.15)* | 0.51 *(1.45)* |
| SDCind *(% of the mean)* | 0.75 *(2.27)* | 0.73 *(2.04)* | 0.87 *(2.40)* | 0.61 *(1.68)* | 0.79 *(2.20)* | 0.72 *(1.98)* | 0.79 *(2.19)* | 0.97 *(2.77)* |
| SDCgroup *(% of the mean)* | 0.26 *(0.80)* | 0.26 *0.72)* | 0.31 *(0.85)* | 0.22 *(0.59)* | 0.28 *(0.78)* | 0.25 *(0.70)* | 0.28 *(0.77)* | 0.34 *(0.98)* |
| SWC *(% of the mean)* | 0.11 *(0.34)* | 0.11 *(0.30)* | 0.13 *(0.36)* | 0.09 *(0.25)* | 0.12 *(0.33)* | 0.11 *(0.29)* | 0.12 *(0.32)* | 0.14 *(0.41)* |
| ICC *(95% CI)* | 0.52 *(0.10-0.86)* | 0.84 *(0.58-0.96)* | 0.56 *(0.15-0.87)* | 0.69 *(0.32-0.92)* | 0.63 *(0.23-0.90)* | 0.66 *(0.28-0.91))* | 0.67 *(0.30-0.91)* | 0.71 *(0.35-0.92)* |
| ***Breaststroke*** | **0-50 m** | **50-100 m** | **100-150 m** | **150-200 m** | **200-250 m** | **250-300 m** | **300-350 m** | **350-400 m** |
| Mean ± SD | 36.6 ± 2.2 | 41.2 ± 2.3 | 41.6 ± 2.2 | 41.5 ± 2.3 | 41.2 ± 2.4 | 41.3 ± 2.5 | 41.0 ± 2.6 | 40.5 ± 2.7 |
| Mean TEM *(% CoV)* | 0.82 *(2.25)* | 1.31 *(3.18)* | 1.02 *(2.46)* | 0.91 *(2.20)* | 0.87 *(2.11)* | 0.64 *(1.56)* | 0.54 *(1.33)* | 0.86 *(2.11)* |
| SDCind *(% of the mean)* | 1.57 *(4.29)* | 2.50 *(6.08)* | 1.96 *(4.71)* | 1.74 *(4.19)* | 1.66 *(4.03)* | 1.23 *(2.98)* | 1.04 *(2.54)* | 1.64 *(4.04)* |
| SDCgroup *(% of the mean)* | 0.59 *(1.62)* | 0.95 *(2.30)* | 0.74 *(1.78)* | 0.66 *(1.59)* | 0.63 *(1.52)* | 0.47 *(1.13)* | 0.39 *(0.96)* | 0.62 *(1.53)* |
| SWC *(% of the mean)* | 0.23 *(0.64)* | 0.37 *(0.90)* | 0.29 *(0.70)* | 0.26 *(0.62)* | 0.25 *(0.60)* | 0.18 *(0.44)* | 0.15 *(0.38)* | 0.24 *(0.60)* |
| ICC *(95% CI)* | 0.78 *(0.39-0.95)* | -0.06 *(-0.42-0.57)* | 0.18 *(-0.26-0.74)* | -0.02 *(-0.37-0.60)* | 0.03 *(-0.35-0.64* | 0.24 *(-0.24-0.77)* | 0.14 *(-0.30-0.71)* | -0.12 *(-0.45-0.53)* |
| ***Front crawl*** | **0-50 m** | **50-100 m** | **100-150 m** | **150-200 m** | **200-250 m** | **250-300 m** | **300-350 m** | **350-400 m** |
| Mean ± SD | 30.4 ± 1.6 | 33.2 ± 1.8 | 33.7 ± 1.9 | 33.8 ± 1.8 | 33.6 ± 1.7 | 33.8 ± 1.6 | 33.6 ± 1.6 | 32.4 ± 1.9 |
| Mean TEM *(% CoV)* | 0.48 *(1.58)* | 0.52 *(1.56)* | 0.50 *(1.48)* | 0.64 *(1.89)* | 0.55 *(1.62)* | 0.48 *(1.41)* | 0.51 *(1.53)* | 0.50 *(1.54)* |
| SDCind *(% of the mean)* | 0.92 *(3.03)* | 0.99 *(2.99)* | 0.95 *(2.83)* | 1.22 *(3.61)* | 1.04 *(3.10)* | 0.91 *(2.69)* | 0.98 *(2.93)* | 0.95 *(2.94)* |
| SDCgroup *(% of the mean)* | 0.29 *(0.96)* | 0.31 *(0.94)* | 0.30 *(0.90)* | 0.39 *(1.14)* | 0.33 *(0.98)* | 0.29 *(0.85)* | 0.31 *(0.93)* | 0.30 *(0.93)* |
| SWC *(% of the mean)* | 0.14 *(0.45)* | 0.15 *(0.44)* | 0.14 *(0.42)* | 0.18 *(0.53)* | 0.15 *0.46)* | 0.13 *(0.40)* | 0.15 *0.43)* | 0.14 *(0.44)* |
| ICC *(95% CI)* | 0.72 *(0.08-0.81)* | 0.31 *(-0.04-0.73)* | 0.08 *(-0.27-0.59)* | 0.15 *(-0.22-0.64)* | 0.25 *(-0.07-0.68)* | 0.51 *(0.12-0.83)* | 0.09 *(-0.20-0.56)* | 0.34 *(-0.02-0.74)* |

**Appendix 4.** Example of how coaches and practitioners may make practically meaningful inferences from individual swimmer’s critical speed data from before and after a training block, using smallest worthwhile change (grey zone) and 68% confidence limits of true change (bars).

**Appendix 5.** Test-retest reliability of critical speed (s.100m-1) across three performance trials

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| --- | --- |
|  | **Critical Speed (s.100m-1)** |
|  | **Butterfly** | **Backstroke** | **Breaststroke** | **Front crawl** |
| Trial 1  | 82.26 ± 6.19 | 75.10 ± 4.11 | 85.70 ± 4.48 | 70.52 ± 3.12 |
| Trial 2  | 82.93 ± 7.40 | 74.34 ± 6.23 | 86.29 ± 3.59 | 69.28 ± 3.76 |
| Trial 3 | 82.18 ± 7.06 | 75.32 ± 4.37 | 83.89 ± 5.45 | 69.14 ± 4.39 |
| TEM 1-2 *(% CoV)* | 2.66 *(3.22)* | 1.71 *(2.29)* | 2.59 *(3.01)* | 2.02 *(2.88)* |
| TEM 2-3 *(% CoV)* | 0.83 *(1.01)* | 2.18 *(2.92)* | 2.60 *(3.05)* | 2.49 *(3.59)* |
| Mean TEM *(% CoV)* | 1.97 *(2.39)* | 1.96 *(2.52)* | 2.59 *(3.04)* | 2.26 *(3.25)* |
| SDCind *(% of the mean)* | 5.46 *(6.63)* | 5.43 *(7.25)* | 7.19 *(8.43)* | 6.27 *(9.01)* |
| SDCgroup *(% of the mean)* | 2.06 *(2.50)* | 1.92 *(2.56)* | 2.72 *(3.18)* | 1.98 (*2.85)* |
| SWC *(% of the mean)* | 1.38 *(1.67)* | 1.00 *(1.33)* | 0.91 *(1.07)* | 0.76 *(1.09)* |