**Supplementary material**

***Experiment 1***

*1. Establishing the use of first or last attempt data for analysis*

One of the unexpected behaviours observed in the trials was the use of more than one route throughout a single trial by some individuals. Spiders sometime chose a route but then returned to the starting platform before completion and chose a different route (or the same route for again) to exit. The number of attempts before escaping the pool ranged from one (completion of the route on the first time) to three (two incomplete routes and one final complete route). Because of this, the results could have changed when using last attempt data (data from completed routes only) or when using first attempt data (data from the first attempt, including individuals that completed and those which did not complete the route). Therefore, we investigated whether the probability to choose the safe route differed between first and last attempt using McNemar's exact test with central confidence intervals (Fay 2010). We found no differences, either for *Portia* (sample estimates: 0.2, n = 62, Confidence Interval [CI] = 0.004 – 1.787, *P* = 0.218; Fig. S1) or for *Trite* (sample estimates = 0.5, n = 47, CI = 0.008 – 9.604, *P* = 1; Fig. S2) of the probability to choose safe routes between both datasets. Accordingly, all further analyses were based on data obtained from the last attempt, as this dataset was larger (N = 87), than first attempt data (n = 66).

***Table S1.*** Results of the generalized linear model of number of the proportion of dowels used by spiders while escaping a function of spider category (females, subadults, and males), spider species (*Portia* and *Trite*), Route choice (safe, risky), and direction of the pool (North, South, West, and East). CI = Confidence interval at 95%. “[]” indicates a specific category of each variable. Estimates and CI of estimates from Wald tests. NA: there are not estimates for the interaction between route choice and male category, due to none of *Trite* males chose the safe route.

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| **Variable** | **Estimate** | **CI** | ***t*** | ***P*** |
| Intercept | 1.443 | 0.266 – 2.820 | 2.250 | 0.026 |
| Category [Subadult] | 0.652 | -0.688 – 2.010 | 0.961 | 0.338 |
| Category [Male] | 0.527 | -1.968 – 0.867 | -0.737 | 0.462 |
| Route choice [Safe] | 0.205 | -1.565 – 1.139 | 0.301 | 0.764 |
| Species [*Trite*] | 1.495 | -0.081 – 3.401 | 1.748 | 0.083 |
| Direction [N] | 0.673 | -2.011 – 0.614 | -1.021 | 0.310 |
| Direction [S] | 0.782 | -1.934 – 0.235 | -1.436 | 0.154 |
| Direction [W] | 0.107 | -1.441 – 1.162 | -0.164 | 0.870 |
| Female: Route choice | 0.369 | -1.610 – 2.342 | 0.369 | 0.712 |
| Subadult: Route choice | 0.890 | -2.665 – 0.849 | -0.999 | 0.320 |
| Male: Route choice | NA | NA | NA | NA |
| Subadult: *Trite* | 0.593 | -2.846 – 1.510 | -0.551 | 0.583 |
| Male: *Trite* | 0.172 | -2.196 – 2.481 | 0.148 | 0.882 |
| *Trite*: Route choice | 0.458 | -1.652 – 2.711 | 0.425 | 0.672 |



***Figure S1****.* Proportion of *Portia* spiders using either the risky or the safe route based on data from both the first and last attempt to exit the arena in Experiment 1.



***Figure S2*.** Proportion of *Trite* spiders using either the risky or the safe route based on data from both the first and last attempt to exit the arena in Experiment 1.



***Figure S3.*** Experiment 1. Proportion of safe escape choices compared with the risky choices for each spider sex/age category in *Portia fimbriata*. Dotted line depicts the proportion of safe choices if spiders performed randomly (25% probability).

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***Figure S4.*** Experiment 1. Proportion of safe escape choices compared with the risky choices for each spider sex/age category in *Trite planiceps*. Dotted line depicts the proportion of safe choices if spiders performed randomly (25% probability).



***Figure S5*.** Accelerated Failure Time model curves depicting the probability of continuing to escape using the chosen route over time in Experiment 1 for (A) *Portia* and *Trite* spiders and (B) sex and age categories of both species combined. *Portia* was more likely to stay *en route* than *Trite*, and females and subadults were more likely to stay on the chosen route than males.

***Experiment 2***

*2. Determining route preference for both species*

Apart from providing information about the effect of the explanatory variables on route choice, the cumulative link model (CLM) also estimates the coefficient thresholds. These are the intercepts of each chosen route distributed in a cumulative fashion. To calculate the cumulative probability of choosing each route by order of route length (4-dowel, 5-dowel, 6-dowel, and 7-dowel route), we ran different versions of the CLM while re-arranging the levels of the species and spider category variables. Each model calculates threshold coefficients (estimates and standard errors) of a particular species/category combination. After obtaining all values for the three thresholds (4|5, 5|6, and 6|7) in the six different combinations (females, males and subadults for both species), we calculated the inverse variance weighted mean (IVWM) for each threshold belonging to each species (including male, female, and subadult thresholds). We used the IVWM to account for the variance given by the estimated standard errors of each CLM. Finally, the IVWM was transformed to the inverse logit in order to obtain the probability values of each threshold. Confidence intervals were calculated by using the summary of the inverse variances of female, male and subadult threshold coefficients, and then transformed to the inverse logit (Table S2).

***Table S2.*** Cumulative probabilities (*P*) and confidence intervals (CI) of both species and their chosen routes. Values were calculated from ordinal logistic regression models for all data (shortcut-taking and non-shortcut-taking spiders), and separately for non-shortcut-taking spiders. Threshold 4|5 = intercept of using 4-dowel route against 5-dowel route or longer. 5|6 = intercept at choosing either 4 or 5-dowel route against choosing 6 and 7-dowel routes. 6|7 = intercept at choosing 4, 5 or 6-dowel route against using the 7-dowel route.

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| All data included | | | | |
|  | *Portia* | | *Trite* | |
| Thresholds | *P* | CI | *P* | CI |
| 4|5 | 0.348 | 0.279, 0.425 | 0.247 | 0.188, 0.317 |
| 5|6 | 0.555 | 0.481, 0.628 | 0.435 | 0.359, 0.513 |
| 6|7 | 0.688 | 0.620, 0.749 | 0.576 | 0.50, 0.648 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Non-shortcut-taking spiders only | | | | |
|  | *P* | CI | *P* | CI |
| 4|5 | 0.484 | 0.364, 0.606 | 0.342 | 0.248, 0.450 |
| 5|6 | 0.681 | 0.566, 0.777 | 0.542 | 0.436, 0.644 |
| 6|7 | 0.784 | 0.683, 0.859 | 0.667 | 0.569, 0.753 |



***Figure S6.*** Experiment 2. (A) Combined data from *Portia* and *Trite* spiders showing the proportion of individuals that took or did not take shortcuts relative to the total that chose each route. (B) Proportion of *Portia* spiders that took shortcuts to different degrees for each chosen route. (C) Proportion of *Trite* spiders that took shortcuts to different degrees for each chosen route. Level of shortcut-taking of each spider was classified according to their performance coefficient: non-shortcut-taking spiders: performance coefficient > 0.75; shortcut-taking spiders: performance coefficient ≤ 0.75.



***Figure S7*.** Accelerated Failure Time model curves for non-shortcut-taking in Experiment 2, depicting the probability of continuing on the route chosen over for (A) *Portia* and *Trite* and (B) routes varying in length for both species combined. In (A) two values are removed from the plot for *Portia* as they are higher than 2000 s. In (B) six values are removed from the plot in 7-dowel route group. *Portia* were more likely to remain on the chosen route than *Trite*, and route length affected the probability of the spider remaining on that route.

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***Figure S8.*** Experiment 2. Comparison of median (box represents 25th and 75th quartiles; whiskers are min to max) (A) scanning duration, and (B) route duration among shortcut-taking *Portia* and *Trite* spiders of different categories. M = males, F = females, S = subadults. N for each group depicted in (A).