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RESEARCH ARTICLE

Figures and figure supplements

Positive and negative incentive contrasts lead to relative value perception in ants

Stephanie Wendt *et al*

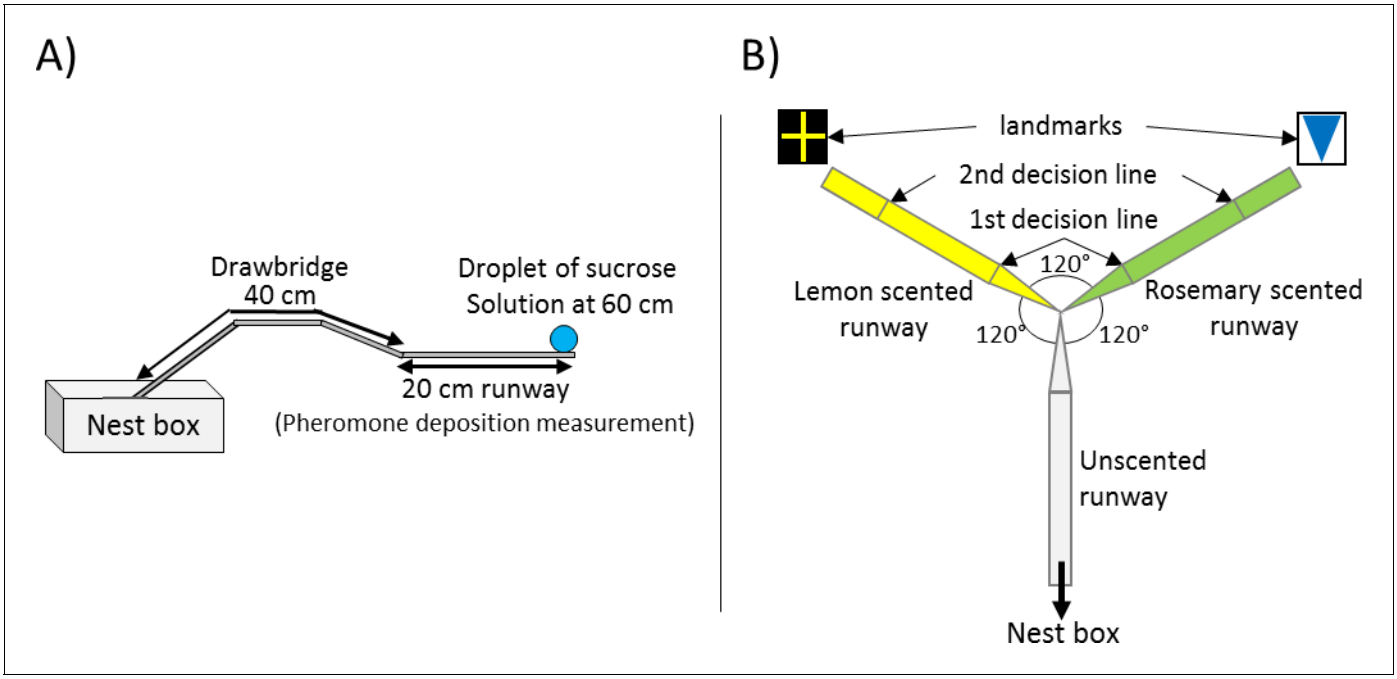

Figure 1. Experimental Setups. (**A**) General setup used for all presented experiments. The 20 cm long runway is connected to the nest box via a 40 cm long drawbridge. The droplet of sucrose solution is placed at the end of the runway (60 cm distance to the nest). (**B**) Y-maze used on the 10th visit of experiment 2. All arms were 10 cm long. The arm connected to the nest box was covered with unscented paper overlays while the other two arms were covered with lemon and rosemary scented paper overlays (one scent on each side). Visual cues (landmarks) were placed directly behind the two scented arms. The first decision line was located 2.5 cm from the Y-maze centre and marked the initial decision of an ant while the second decision line was located 7.5 cm from the centre and marked the final decision.

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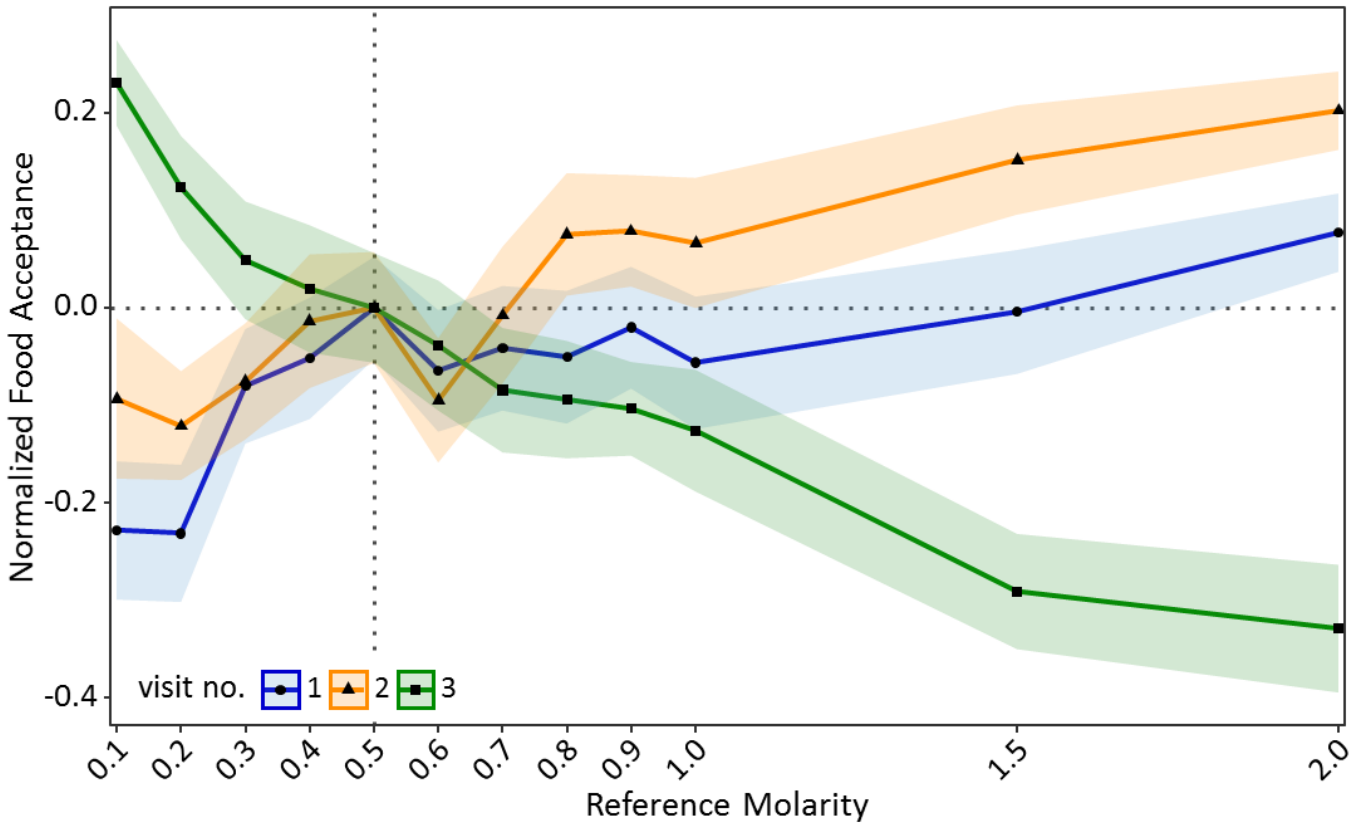

Figure 2. Food acceptance shown in experiment one for the two training visits (visit 1 and 2) in which ants received one of 12 molarities and the test visit (3) in which all ants received 0.5M (sample sizes: 0.1M: 57; 0.2M: 80; 0.3M: 76; 0.4M: 66; 0.5M: 77; 0.6M: 65; 0.7M: 73; 0.8M: 66; 0.9M: 72; 1M: 55; 1.5M: 72; 2M: 70). Shown are the mean food acceptance (points) and the 95% confidence intervals (coloured ribbons) for each reference molarity and visit. Data was normalised to show the mean food acceptance of the control group (received 0.5M on each visit) at 0 for all three visits. For a non-normalised graph of the data see ***Figure 2—figure supplement 1***.

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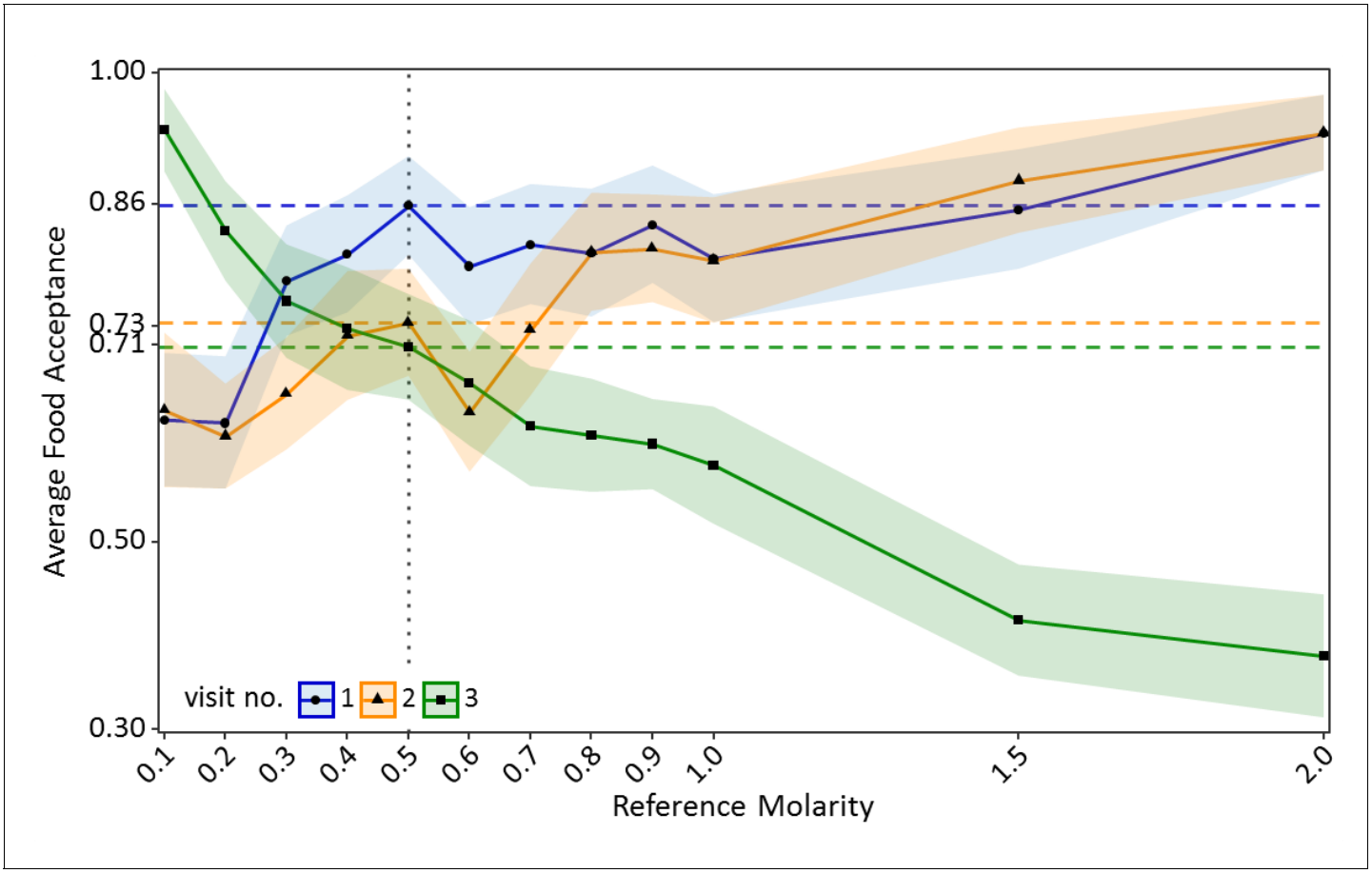

Figure 2—figure supplement 1. Food acceptance shown in experiment one for the two training visits (visit 1 and 2) in which ants received one of 12 molarities (Reference Molarity) and the test visit (3) in which all ants received 0.5M. Shown are the mean food acceptance (points) and the 95% confidence intervals (coloured ribbons) for each reference molarity and visit. Coloured dashed lines mark the mean food acceptance for ants which received 0.5M (control).

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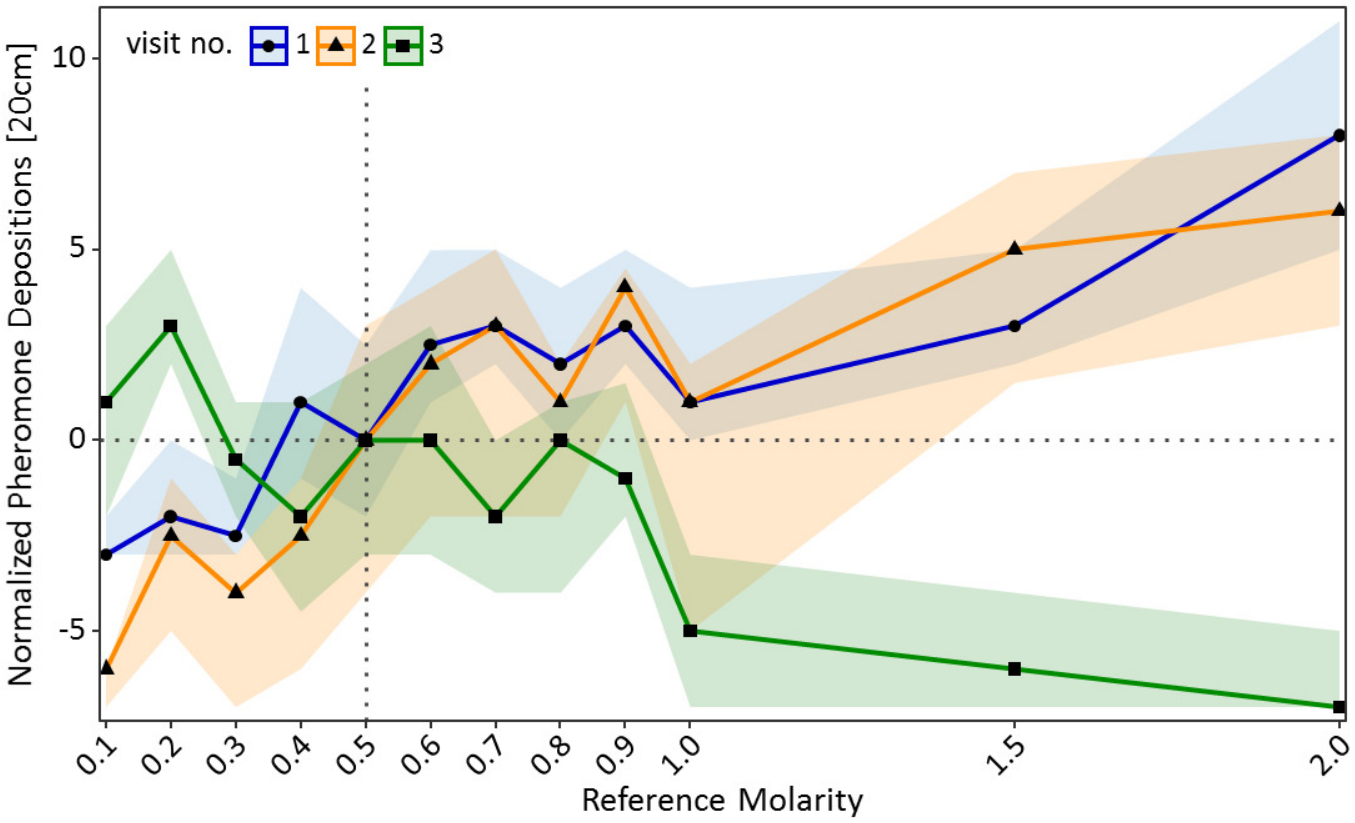

Figure 3. Pheromone depositions on the way back to the nest shown in experiment one for the two training visits (visit 1 and 2) in which ants received one of 12 molarities and the test visit (3) in which all ants received 0.5M (sample sizes: 0.1M: 57; 0.2M: 80; 0.3M: 76; 0.4M: 66; 0.5M: 77; 0.6M: 65; 0.7M: 73; 0.8M: 66; 0.9M: 72; 1M: 55; 1.5M: 72; 2M: 70). Shown are the median number of pheromone depositions (points) and the 95% confidence intervals (coloured ribbons) measured on a 20 cm track right behind the food source for each reference molarity and visit. Data was normalised to show the median number of pheromone depositions of the control group (received 0.5M on each visit) at 0 for all three visits. For a non-normalised graph of the data see ***Figure 3—figure supplement 1***.

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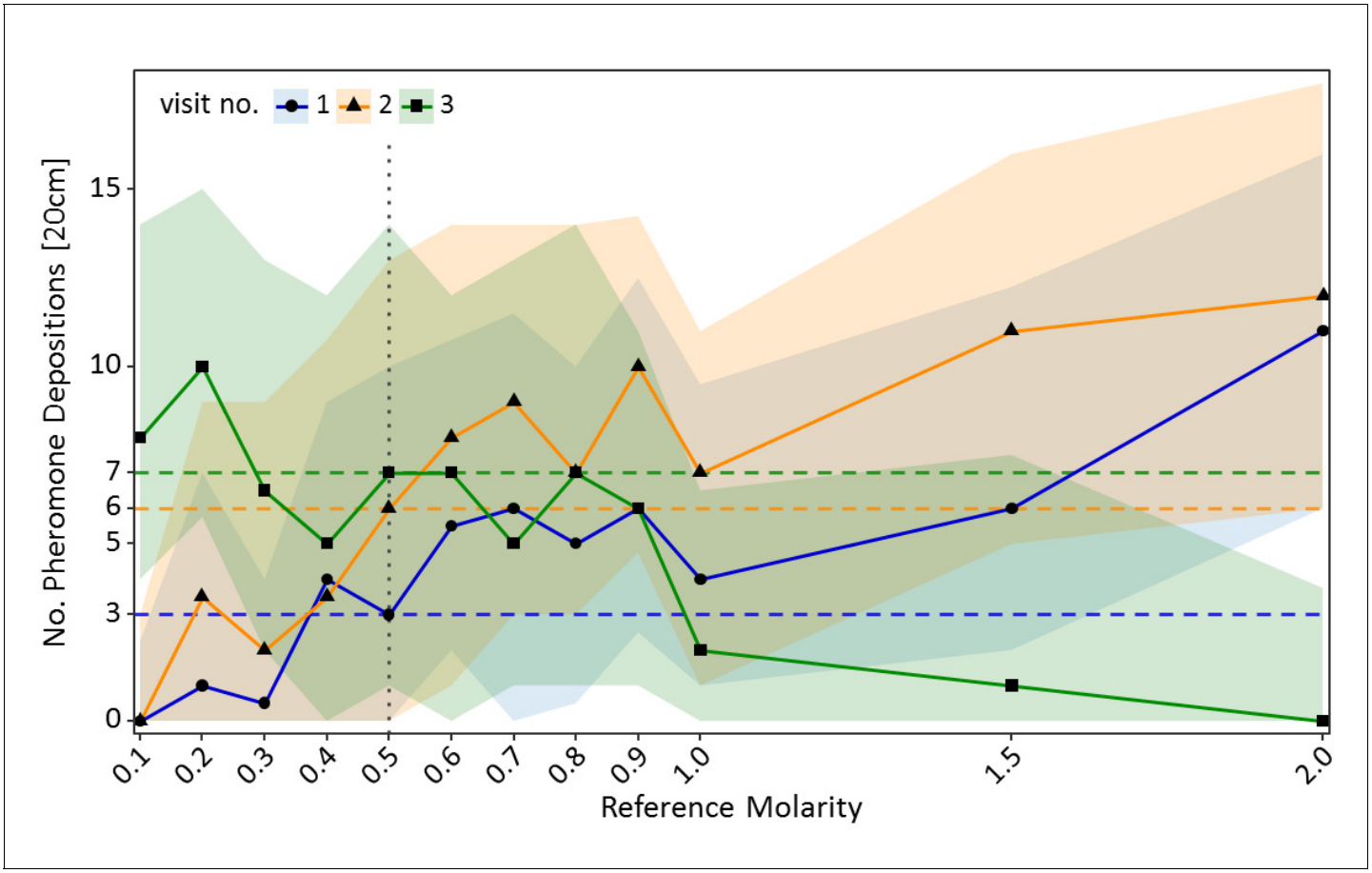

Figure 3—figure supplement 1. Pheromone depositions on the way back to the nest shown in experiment 1 for the two training visits (visit 1 and 2) in which ants received one of 12 molarities (Reference Molarity) and the test visit (3) in which all ants received 0.5M. Shown is the median number of pheromone depositions (points) and the 25/75% quartiles (coloured ribbons) measured on a 20-cm track right behind the food source for each reference molarity and visit. Coloured dashed lines mark the median pheromone depositions for ants which received 0.5M (control).

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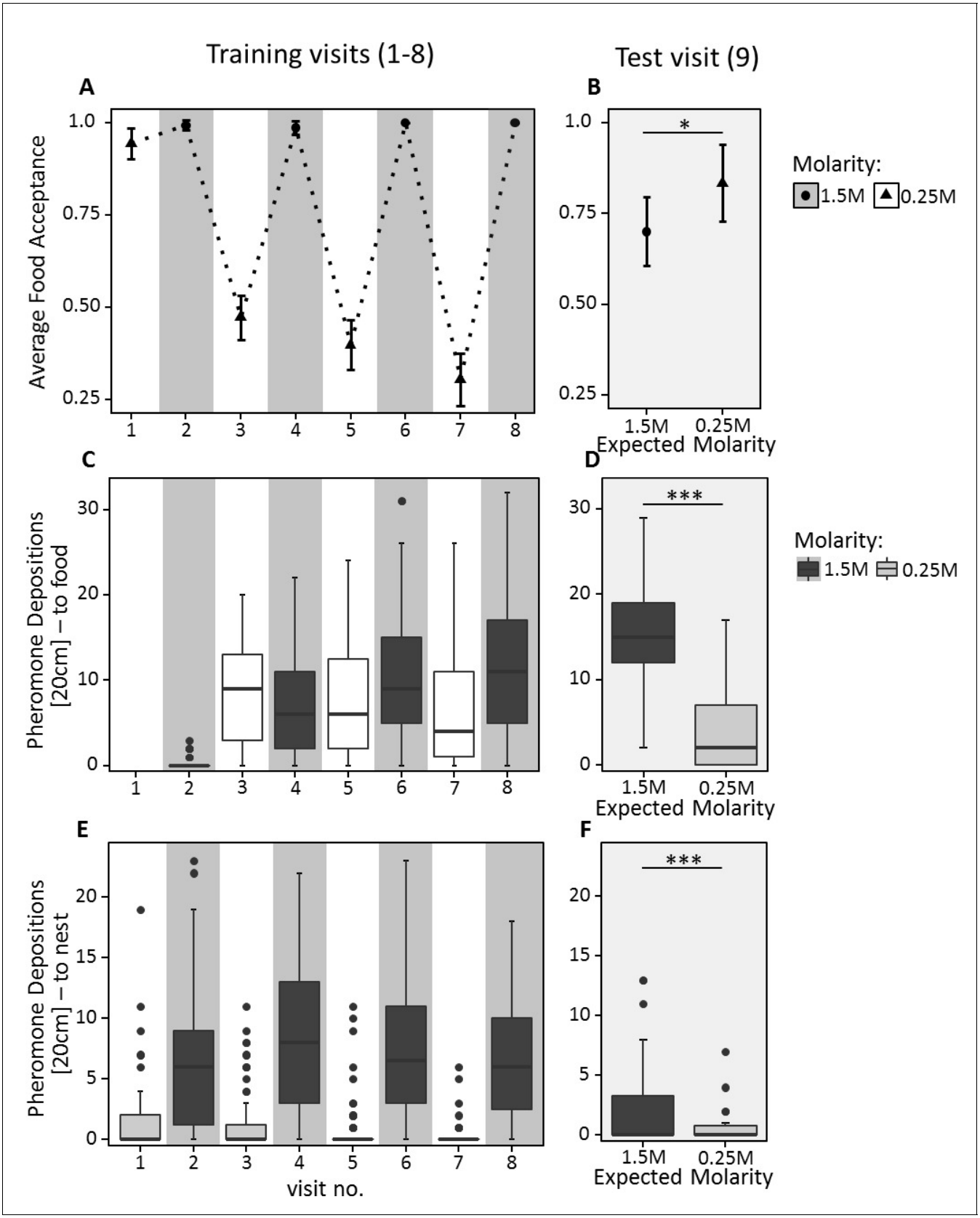

Figure 4. Food acceptance (**A** and **B**) and number of pheromone depositions towards the food source (**C** and **D**) and towards the nest (**E** and **F**) in experiment 2. The left panels (**A**, **C**, **E**) show behaviour over the eight training trials, in which ants received 0.25M coupled with one scent and 1.5M

Figure 4 continued on next page

Figure 4 continued

coupled with another scent on alternating visits. The right panels (**B, D, F**) show behaviour on the test visit, in which ants always received unscented 0.5M sucrose solution, but the runway leading towards the food source was impregnated with one of the learned scents, causing ants to expect either a high or low reward. 40 ants were induced to expect a high reward, and 32 to expect a low reward. **A** and **B** show the mean food acceptance (points) and the 95% confidence intervals (error bars) for each visit; **C** – **F** show the median number of pheromone depositions on a 20 cm track leading to the food source and the 75%/25% quantiles for each visit.

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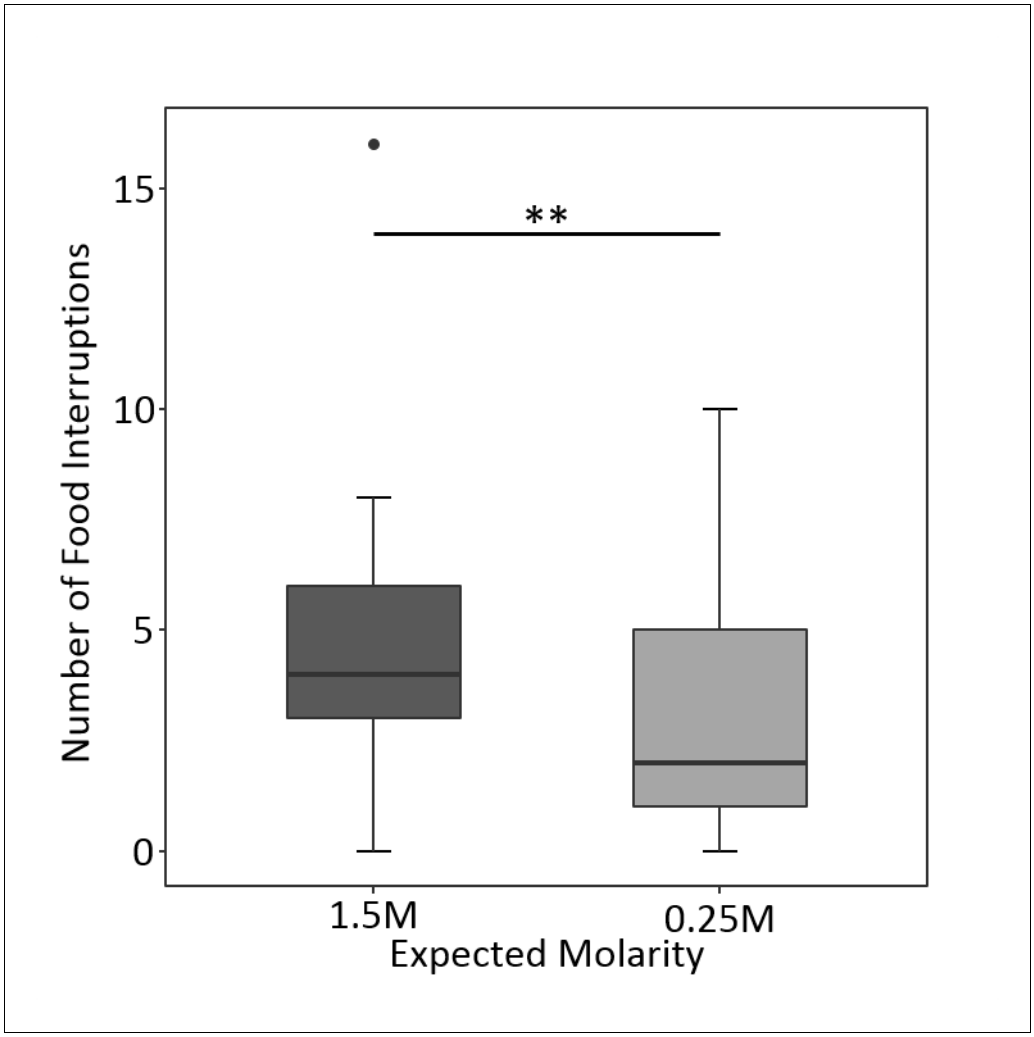

Figure 4—figure supplement 1. Number of food interruptions on the last (9th) visit depending on the ant's expectations until the crop was filled.

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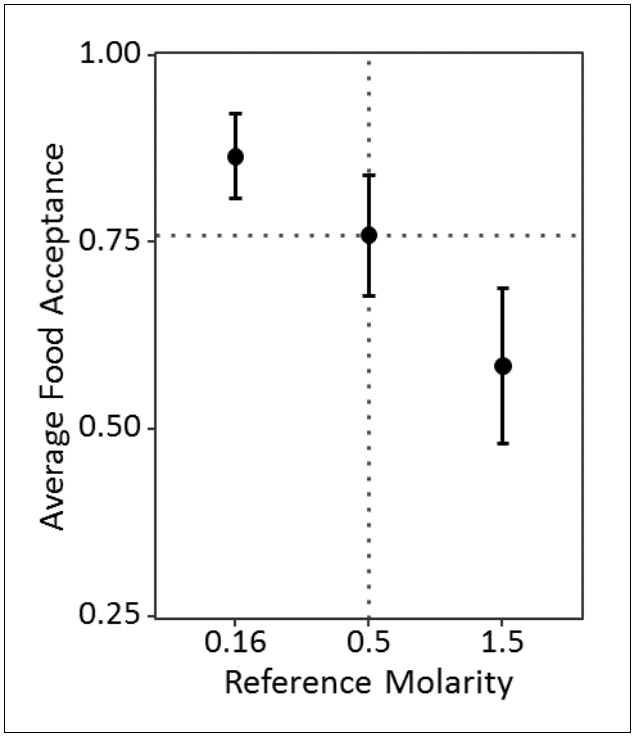

Figure 5. Food acceptance shown in experiment 3 for the receivers which received either 0.16, 0.5 or 1.5M through trophallaxis in the nest and then found 0.5M at the end of the runway (sample sizes: 0.16M 63; 0.5M: 52; 1.5M: 53). Shown are the mean food acceptance (points) and the 95% confidence intervals (error bars) for each reference molarity.

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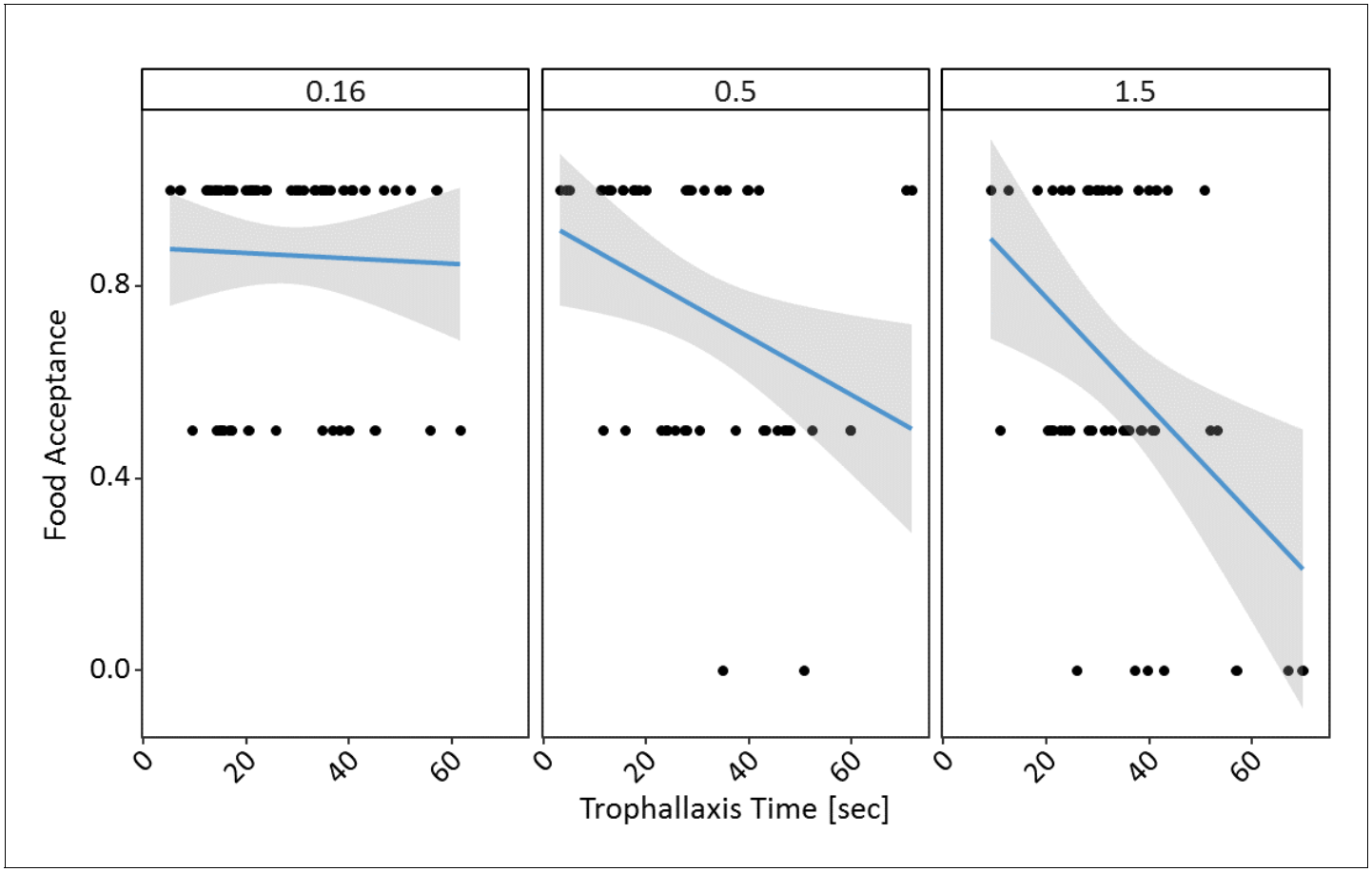

Figure 5—figure supplement 1. Food acceptance scores dependent on the trophallaxis time [sec] of receiving foragers for all three reference molarities (each plot represents data for 1 of 3 reference molarities).

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