

Deprivation of Olfaction and Vision in Bumblebees (*Bombus impatiens*)

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Research Questions: What is the impact of olfaction and vision deprivation on bumblebee foraging?
Will the same foraging skills develop when deprived?

Literature:

- Foraging experience has been linked to mushroom body growth in the medial calyx
- However, restructuring of the bumblebee brain occurs in the first 21 days
- Recent research has shown mushroom body growth may be initialized by development and enforced by experience and stimuli
- Full deprivation of olfaction or vision to control for experience is limited in past research

Participants:

- Callow workers (inexperienced, newly hatched workers) selected from a colony of *Bombus impatiens*
- Randomly assigned to either olfaction deprivation (n = 6), vision deprivation (n = 6), or control (n = 6)

Procedure:

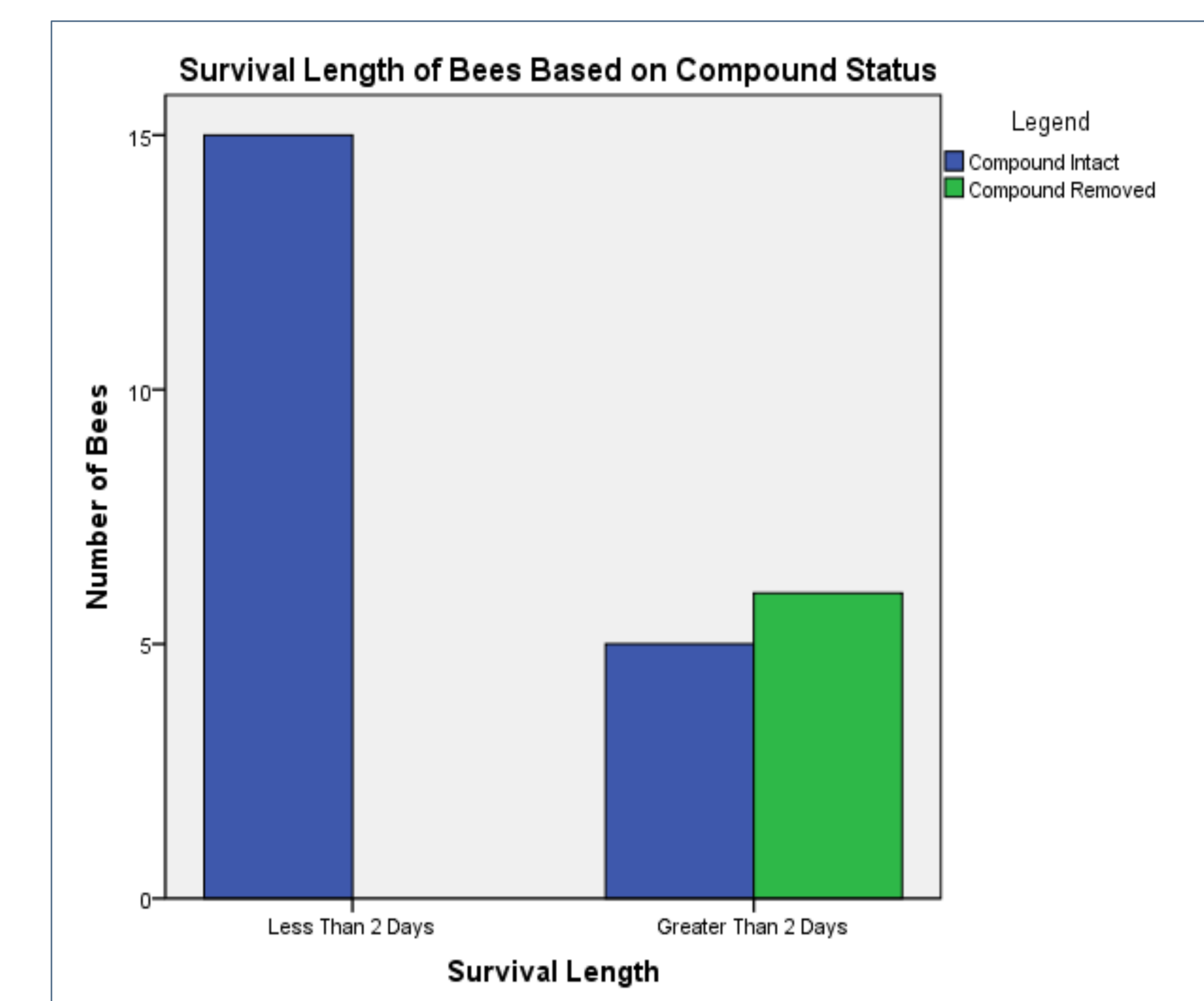
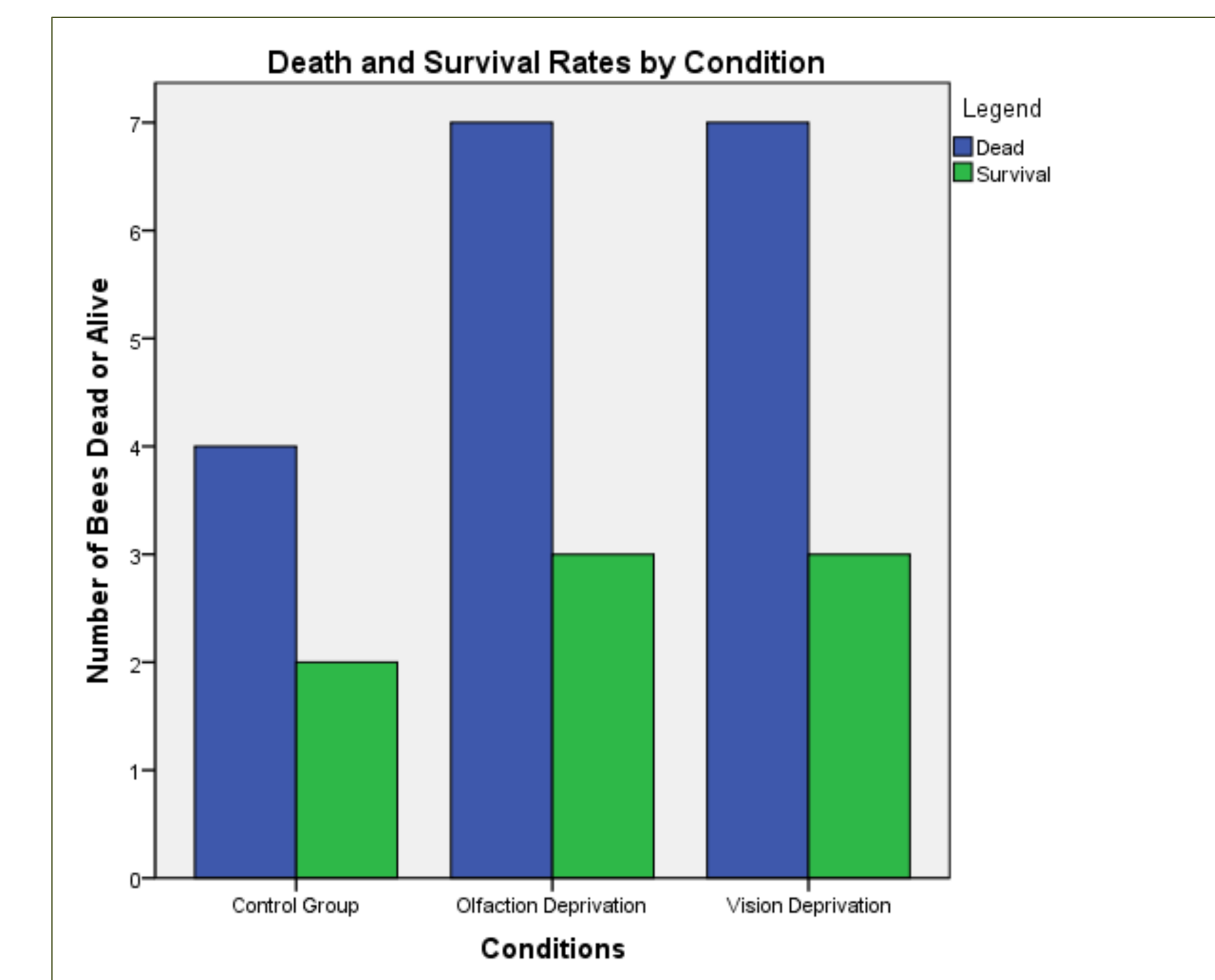
- A dental impression compound was applied to the antennae of the olfaction deprivation group to block smell
- The vision deprivation group had the compound applied to the full ommatidia to block vision
- The control group had the compound applied to their thorax
- Callow workers were placed in a nest of only manipulated individuals, with free access to pollen and sugar water in multiple locations
- Testing was to be done on the foraging skills of the three groups after three days of living with the conditions
- Due to mortality prior to two days tests could not be conducted

Results:

- A chi-square test was conducted examining the relationships between the conditions and death or survival – this relationship was not significant
- A chi-square test was also conducted between whether the compound was removed and the length of survival – this relationship was significant.

Discussion:

- The significant chi-square test showed that there is a relationship between compound removal and length of survival
- This suggests that if callows removed the compound, they may have lived longer
- Due to inconsistency mortality could not be owed dependably to deprivation
- Other studies have noted mortality with experiments using a similar compound, but this death was not examined further to determine the cause, be it deprivation or the compound
- Post experiment, this colony was found to have a moth infestation resulting in unhealthy workers and callows



Further Research:

Needs to fully examine deprivation and its impact on foraging skills, and further what this impact is in comparison to age matched, non-deprived callows of a healthy colony

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