

Bumble bees are surprisingly innovative

by Virginia Norell, Science, 23 Feb 2017

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Agenda

- Bumble bees
- The experiment
- The outcome
- The conclusions

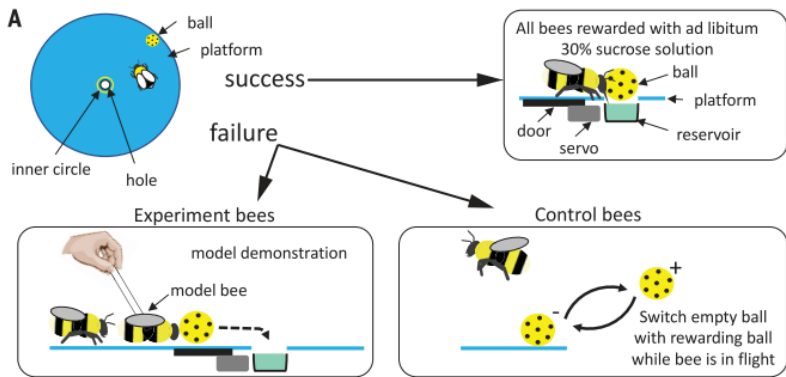
Bumble bee

- Possess complex navigational skills
- Have rudimentary culture
- Have emotions
- Can use tools
- **Can learn**



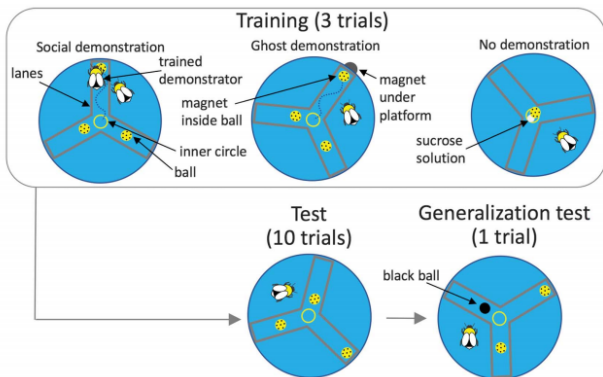
The experiment

Move a ball to the target — get a sugar!



Learning

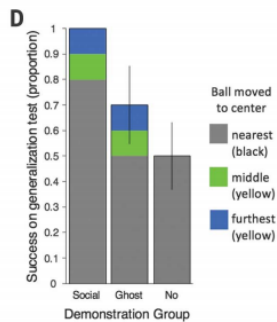
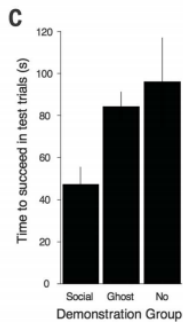
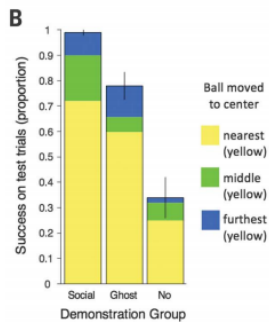
- 1 Watching another trained bumble bee
- 2 Watching a 'ghost' bee (actually magnet)
- 3 No training — ball already at the target (with reward)



Challenges

- Three balls on the different distance
- While learning only the farthest ball was moved
- Yellow ball replaced with black ball

Outcome



Analysis

- In all cases — learned successfully
- Moved mostly nearest ball even if 'teacher' moved the farthest (optimal solution)
- Moved black ball as well as yellow (understood concept)
- Sometimes pulled the ball even if 'teacher' only pushed it (innovation)

Conclusion

- Small brain doesn't mean no intelligence
- Bumble bees can develop entirely novel behaviors when the environment changes

Thank you



References

- Bumble bees are surprisingly innovative,
Virginia Morell, Feb 23, 2017,
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Loukola et al., *Science* 355, 833–836 (2017),
<http://science.sciencemag.org/content/sci/355/6327/833.full.pdf>