

## Matthew J. Hasenjager

### **Contact Information:**

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Pronouns: He/Him/His

### **Education:**

- 2017 **Ph.D.** Biology. University of Louisville.  
Dissertation: *Social dynamics, network structure, and information diffusion in Trinidadian guppy (Poecilia reticulata) shoals*
- 2011 **M.S.** Zoo and Aquarium Management. Michigan State University.
- 2009 **B.Sc.** Zoology. Michigan State University.

### **Appointments:**

- 2022–present Intelligence Community Postdoctoral Research Fellow; Oak Ridge Institute for Science and Education. Host department: Department of Ecology and Evolutionary Biology; University of Tennessee, Knoxville.
- 2021–2022 Postdoctoral research associate. Department of Ecology and Evolutionary Biology; University of Tennessee, Knoxville.
- 2019 Guest lecturer. Department of Biological Sciences; Royal Holloway, University of London. Course: Animal behaviour (13 lectures; one practical).
- 2017–2021 Postdoctoral research associate. Department of Biological Sciences; Royal Holloway, University of London.

### **Peer-reviewed Publications (\*denotes mentored graduate student):**

11. **Hasenjager MJ**, Franks V, Leadbeater E. 2022. From dyads to collectives: a review of honeybee signalling. *Behavioral Ecology and Sociobiology*, **76**, 124. doi: 10.1007/s00265-022-03218-1
10. Easter C\*, Leadbeater E, **Hasenjager MJ**. 2022. Behavioural variation among workers promotes feed-forward loops in a simulated insect colony. *Royal Society Open Science*, **9**, 220120. doi: 10.1098/rsos.220120.
9. **Hasenjager MJ**, Hoppitt W, Leadbeater E. 2022. Do honey bees modulate dance following according to foraging distance? *Animal Behaviour*, **184**, 89-97. doi: 10.1016/j.anbehav.2021.12.010
8. **Hasenjager MJ**, Silk M, Fisher DN. 2021. Multilayer network analysis: new opportunities and challenges for studying animal social systems. *Current Zoology*, **67**, 45-48. doi: 10.1093/cz/zoab006
7. **Hasenjager MJ**, Leadbeater E, Hoppitt W. 2021. Detecting and quantifying social transmission using network-based diffusion analysis. *Journal of Animal Ecology*, **90**, 8-26. doi: 10.1111/1365-2656.13307
6. **Hasenjager MJ**, Hoppitt W, Dugatkin LA. 2020. Personality composition determines social learning pathways within shoaling fish. *Proceedings of the Royal Society B*, **287**, 20201871. doi: 10.1098/rspb.2020.1871
  - Featured in *Cultured Scene*: <https://www.cultured-scene.org/2020/12/08/personality-composition-may-determine-the-spread-of-social-information-in-shoaling-fish/>
5. **Hasenjager MJ**, Hoppitt W, Leadbeater E. 2020. Network-based diffusion analysis reveals context

- specific dominance of dance communication in foraging honeybees. *Nature Communications*, **11**, 625. doi: 10.1038/s41467-020-14410-0
- Research Highlight: Dubrovina E. 2020. Dance of the honeybee. *Nature Physics*, **16**, 240. doi: 10.1038/s41567-020-0849-1
  - Nature Research Community Invited Contribution: <https://natureecoevocommunity.nature.com/posts/59170-when-do-honeybee-foragers-rely-on-dances>
4. **Hasenjager MJ**, Dugatkin LA. 2017. Fear of predation shapes social network structure and the acquisition of foraging information in guppy shoals. *Proceedings of the Royal Society B*, **284**, 20172020. doi: 10.1098/rspb.2017.2020
  3. **Hasenjager MJ**, Dugatkin LA. 2017. Familiarity affects network structure and information flow in guppy (*Poecilia reticulata*) shoals. *Behavioral Ecology*, **28**, 233-242. doi:10.1093/beheco/arw152
  2. **Hasenjager MJ**, Dugatkin LA. 2015. Social network analysis in behavioral ecology. *Advances in the Study of Behavior*, **47**, 39-114. doi: 10.1016/bs.asb.2015.02.003
  1. **Hasenjager MJ**, Bergl R. 2015. Environmental Conditions Associated with Repetitive Behavior in a Group of African Elephants. *Zoo Biology*, **34**, 201-210. doi: 10.1002/zoo.21211

#### **Book Chapters & Invited Articles:**

5. **Hasenjager MJ**, Hoppitt W. 2021. Fish social networks. In: Kaufman A, Call J, Kaufman J, editors. *The Cambridge Handbook of Animal Cognition*, 486-502. Cambridge, UK: Cambridge University Press. doi: 10.1017/9781108564113.026
4. Leadbeater E, **Hasenjager MJ**. 2019. Honeybee communication: There's more on the dancefloor. *Current Biology*, **29**, R285-R287. doi: 10.1016/j.cub.2019.03.009
3. **Hasenjager MJ**, Leadbeater E. 2019. Insect social learning. In: Choe JC, editor. *Encyclopedia of Animal Behaviour* (2<sup>nd</sup> Ed.), **3**, 356-364. Amsterdam, NL: Elsevier, Academic Press. doi: 10.1016/B978-0-12-809633-8.20874-1
2. **Hasenjager MJ**. 2016. Cooperation among fishes. In: Shackelford TK, Weekes-Shackelford VA, editors. *Encyclopedia of Evolutionary Psychological Science*. New York, NY: Springer Science+Business Media. doi: 10.1007/978-3-319-16999-6\_1231-1
1. Dugatkin LA, **Hasenjager M**. 2015. The Networked Animal. *Scientific American*, **312**, 50-55. doi: 10.1038/scientificamerican0615-50

#### **Submitted Articles (\* denotes mentored graduate student):**

1. **Hasenjager MJ**, Hoppitt W, Cunningham-Eurich I\*, Franks V, Leadbeater E. Coupled information networks drive honeybee collective foraging.
2. **Hasenjager MJ**, Guo X, Pinter-Wollman N, Fefferman N. Designing sustainable systems using nature's toolbox.

#### **Software:**

1. Hoppitt W, Photopoulou T, **Hasenjager M**, Leadbeater E. NBDA: a package for implementing network-based diffusion analysis. R package version 0.9.4 (2020). Available at: <https://github.com/whoppitt/NBDA/>

#### **Grants & Fellowships:**

- 2022 Intelligence Community Postdoctoral Research Fellowship; Oak Ridge Institute for Science and Education.
- Host institute: Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville.

- Fellowship topic: Quantifying betweenness centrality in dynamic and heterogeneous hypernetworks
- 2016 Kentucky Science and Engineering Foundation: Research Development and Excellence Program: Emerging Ideas. "Social networks: A behavioral ecology approach." (\$28,424)
- I was the primary author but could not be listed on the grant in order to use it for its intended purpose.
- 2013–2016 University of Louisville; Awarded numerous graduate student research and travel grants (\$1435 total)
- 2014 Animal Behavior Society; Student Research Grant (\$1,100)
- 2013 Fisheries Society of the British Isles; Small Research Grant (£503)
- 2012 University of Louisville; Research Initiation Grant (\$5,000)
- 2011, 2014 University of Louisville; Graduate Research Fellowship.

**Awards:**

- 2016 Best Presentation Award; Department of Biology, University of Louisville.
- 2015 Stuart E. Neff Award; Department of Biology, University of Louisville.
- 2015 Best Publication Award; Department of Biology, University of Louisville.

**Teaching experience:**

- 2019 Guest lecturer (13 lectures; one practical); Animal Behaviour; Royal Holloway, University of London.
- 2015–2016 Graduate teaching assistant; Introduction to Biological Systems (Lab). University of Louisville.
- 2014 Graduate teaching assistant; Principles of Biology (Lab). University of Louisville.
- 2012–2014 Graduate teaching assistant; Genetics (Lab). University of Louisville.
- 2010–2011 Graduate teaching assistant; Organisms and Populations (Lab); Michigan State University.
- 2009 Graduate teaching assistant; Applications in Biological Science (Lab); Michigan State University.

**Mentorship Experience:**

- 2021–present Organized and hosted the NIMBioS Job Application Workshop Series. Co-organizers: Dr. Kimberlyn Roosa; Dr. Alex Pritchard.
- 2018, 2021 Served as a postdoctoral mentor at meetings of the Animal Behavior Society and the International Society for Behavioral Ecology.
- 2017–2022 Mentored a Ph.D. candidate at the University of Leeds on a collaborative project (Easter *et al.*, 2022) modelling the effects of behavioral variation on insect interaction networks.
- 2017–present Assisted junior lab members (undergraduates, graduate students, field assistants) with experimental designs and statistical analysis; provided feedback on manuscripts and presentations; wrote letters of recommendation.

**Service:**

- 2019–2021 Guest editor for *Current Zoology*. Special column: "Embracing the complexity of animal social systems using multilayer network analysis."
- 2019 Organized the symposium "Embracing the complexity of animal social systems using multilayer network analysis" at the Animal Behavior Society Annual Meeting. Chicago, IL. Co-organizers: Dr. Matthew Silk, Dr. David Fisher.

- 2017 Organized a workshop on insect social networks at the International Union for the Study of Social Insects Northwest European Chapter Winter Meeting. Co-organizer: Sam Duckerin.
- 2013–2016 Held numerous offices of responsibility and representation in graduate student government at the University of Louisville (e.g., treasurer of the Biology Graduate Student Association).

#### **Reviewed for:**

*Granting agencies:* National Environment Research Council

*Journals:* Animal Behaviour, Animal Cognition, Behavioral Ecology, Behavioral Ecology & Sociobiology, Current Zoology, Ecology Letters, eLife, Environmental Biology of Fishes, Journal of Zoology, PeerJ, Proceedings of the Royal Society B, Royal Society Open Science

#### **Outreach:**

- 2018–2019 Science Festival. Engaged with children (ages ~6–12) and parents about bee behavior and conservation. Royal Holloway, University of London.
- 2009 Public talks to zoo visitors about wildlife conservation; gave lessons to elementary and middle school students about zoo animal training and enrichment. The Toledo Zoo, Toledo, OH.

#### **Invited Presentations & Interviews:**

- 2022 Finding your partner on the dancefloor: coupled information networks drive honeybee collective foraging. 19<sup>th</sup> Congress of the International Union for the Study of Social Insects. Symposium: Advances in collective behavior using quantitative behavioral tools. San Diego, CA.
- 2018 Network-based diffusion analysis reveals ecological influences over social transmission in animal groups. XXXVIII Sunbelt Conference. Session: Social network analysis in the life sciences. Utrecht, The Netherlands.
- 2015 Sirius XM Science Radio. Interviewed by Dr. Anthony Atala on animal social networks. September 26<sup>th</sup>, 2015.
- 2015 Animal social networks: Exploring the interconnectedness of animal societies. TEDxUofL, Louisville, KY.

#### **Conference Presentations:**

- Hasenjager MJ**, Hoppitt W, Leadbeater E. 2021. Finding your partner on the dancefloor: self organization in honeybee forager networks. Animal Behavior Society Annual Meeting. Virtual meeting. **Talk.**
- Hasenjager MJ**, Hoppitt W, Leadbeater E. 2020. There's more on the dance-floor: how honeybee information networks combine to drive collective foraging. Association for the Study of Animal Behaviour Winter Conference. Virtual meeting. **Talk.**
- Hasenjager MJ**, Silk M, Fisher D. 2019. Using multilayer networks to study the ecological and evolutionary consequences of social structure. Animal Behavior Society Annual Meeting. Chicago, IL. **Talk.**
- Hasenjager MJ**, Hoppitt W, Leadbeater E. 2019. Disentangling the relative importance of honeybee communication pathways using network-based diffusion analysis. Animal Behavior Society Annual Meeting. Chicago, IL. **Talk.**
- Hasenjager MJ**, Hoppitt W, Leadbeater E. 2018. Disentangling the relative importance of honeybee communication pathways using network-based diffusion analysis. Annual meeting of the British Ecological Society. Birmingham, United Kingdom. **Talk.**

- Hasenjager MJ**, Hoppitt W, Leadbeater E. 2018. Disentangling the relative importance of honeybee communication pathways using network-based diffusion analysis. International Society for Behavioral Ecology Annual Conference. Minneapolis, MN. **Talk.**
- Hasenjager MJ**, Hoppitt W, Leadbeater E. 2017. Information flow in honeybee networks during collective foraging. International Union for the Study of Social Insects Northwest European Annual Meeting. York, UK. **Poster.**
- Hasenjager MJ**, Dugatkin LA. 2017. Fear of predation shapes social network structure and the acquisition of foraging information. Animal Behavior Society Annual Meeting. Toronto, Canada. **Talk.**
- Hasenjager MJ**, Dugatkin LA. 2016. The effects of behavioral composition on network dynamics and information flow in Trinidadian guppy shoals. Animal Behavior Society Annual Meeting. Columbia, MO. **Talk.**
- Hasenjager MJ**, Dugatkin LA. 2016. Familiarity affects network structure and information flow in guppy (*Poecilia reticulata*) shoals. The Center for the Integrative Study of Animal Behavior, Indiana University. Bloomington, IN. **Talk.**
- Hasenjager MJ**, Dugatkin LA. 2015. The effects of familiarity in shoaling fish: social dynamics, network structure, and social learning. Animal Behavior Society Annual Meeting. Anchorage, AK. **Talk.**
- Hasenjager MJ**, Dugatkin LA. 2015. The effects of familiarity on information diffusion through guppy social networks. The Center for the Integrative Study of Animal Behavior, Indiana University. Bloomington, IN. **Poster.**
- Hasenjager MJ**, Dugatkin LA. 2014. The effects of familiarity on information diffusion through social networks. International Society of Behavioral Ecology Annual Conference. New York City, NY. **Poster.**

**Related Professional Experience:**

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| 2020 | Inclusivity Pathways Training; workshop participant; Royal Holloway, University of London.  |
| 2019 | Recognizing and addressing imposter syndrome; workshop participant; Royal Holloway, University of London.   |
| 2015 | Grant Writing Academy; course participant; School of Interdisciplinary and Graduate Studies; University of Louisville.  |
| 2012 | Submitted strategy (parasiticLearner) to 2 <sup>nd</sup> Social Learning Strategies Tournament ( <a href="http://lalandlab.st-andrews.ac.uk/tournaments/">http://lalandlab.st-andrews.ac.uk/tournaments/</a> ). |
| 2011 | Elephant Behavior Research Intern; North Carolina Zoo, Asheboro, NC.  |
| 2009 | Enrichment and Research Intern; The Toledo Zoo, Toledo, OH.   |
| 2008 | Animal Welfare Judging Competition; Participant; Michigan State University.   |
| 2008 | Mammal Department Intern; Detroit Zoological Society, Royal Oak, MI.  |

**Professional Society Memberships:**

- Animal Behavior Society  
 International Society for Behavioral Ecology  
 International Union for the Study of Social Insects