

Dr Marina Papadopoulou

COMPUTATIONAL BIOLOGIST · POSTDOCTORAL RESEARCHER · SHE/HER

Nationality: Greek | Date of Birth: 5/1/1994

Current Address: Department of Biosciences, Swansea University, Singleton Park, Swansea SA2 8PP, United Kingdom

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Postdoctoral Research

Tuscia University & University of Pisa

Florence, Italy

POSTDOCTORAL RESEARCH ASSOCIATE, COLLECTIVE BEHAVIOUR

Sep. 2024 - Sep. 2025

- Project: "FALCOROBOT: Collective and individual responses of avian flocks to robotic predators."
- PI: Dr. C.Carere, Dr. D.Giunchi.
- Keywords: individual heterogeneity, pigeon flocks, homing, collective escape, RobotFalcon.

Humboldt University of Berlin & Excellence Cluster: "Science of Intelligence"

Berlin, Germany

POSTDOCTORAL VISITING FELLOW, COLLECTIVE BEHAVIOUR

Jan. - Apr. 2024

- Project: 'Investigating the impact of behavioural individuality and group size on leadership dynamics using genetically identical fish (*Poecilia formosa*) and the RoboFish'
- PI: Prof. Dr. J.Krause, Dr. D.Bierbach.
- Keywords: individual heterogeneity, fish schools, Amazon molly, RoboFish.

Swansea University

Swansea, UK

POSTDOCTORAL RESEARCH ASSOCIATE, COLLECTIVE BEHAVIOR

Mar. 2022- Sep. 2024

- Project: '2G-SWARM. Animals are not particles: a framework for second generation hetero-swarm robotics'
- PI: Dr. A.J.King.
- Keywords: collective motion, individual heterogeneity, agent-based models, fish schools, goat herds, baboon troops, swarm robotics

Main Education & Research

University of Groningen

Groningen, Netherlands

PHD, SELF-ORGANIZATION OF SOCIAL SYSTEMS

Oct. 2017 - Nov. 2022

- Thesis: 'Self-organized collective escape in bird flocks.'
- Supervision: Prof.Dr. C.K.Hemelrijk, Dr. H.Hildenbrandt.
- Keywords: collective escape, computational models, bird flocks, homing pigeons, European starlings, predation, self-organization

Imperial College London

London, UK

M.Sc., COMPUTATIONAL METHODS IN ECOLOGY AND EVOLUTION

Oct. 2016 - Sep. 2017

- Dissertation: 'The Cultural Evolution of Evolution'.
- Supervision: Dr. J.Rosindell, Prof.Dr. A.M.Leroi, Prof.Dr. T.Barraclough.
- First-Class Honor, Distinction.
- Keywords: science of science, machine learning, natural language processing, cultural evolution

Aristotle University of Thessaloniki

Thessaloniki, Greece

B.Sc., BIOLOGY

Sep. 2011 - Mar. 2016

- Dissertation: 'Habitat suitability of the sea turtle *Caretta caretta* in the Mediterranean region'.
- Supervision: Dr. A.Mazaris.
- 8.32/10
- Keywords: species-distribution modeling, sea turtles, migratory routes, maximum entropy

Affiliated Research Experience

Imperial College London

London, UK

INDEPENDENT RESEARCH

Mar. 2017 - Sep. 2018

- Project: 'BiasWatchEvol: Gender bias in Evolutionary Biology'.
- Creator of: www.biaswatchevol.com.
- Funded by the Equal Opportunities Initiative Fund of the European Society of Evolutionary Biology.

University of Glasgow

Glasgow, UK

UNDERGRADUATE RESEARCH INTERNSHIP

Oct. 2015 - Jan. 2016

- Project: 'Determinants of sea turtle nesting patterns & spatial asymmetries at the global scale'.
- Supervision: Dr. S.Spatharis, Prof.Dr. J.Matthiopoulos.
- Funded by the Erasmus+ Placement Program.

- Project: 'Monitoring of reproduction activities of the loggerhead sea turtles (*Caretta caretta*) in Zakynthos rookery'.
- Supervision: Dr. A.Mazaris.
- Funded by the DG Environment of the European Commission.

Publications

- **Linking age-dependent energy availability, movement, and sociality in a wild primate (*Papio ursinus*)**
2024, Philosophical Transactions of the Royal Society B, In press. doi:10.1098/rstb.2022-0466
Fürtbauer I., Shergold C., Christensen C., Bracken A.M., Heistermann M., Papadopoulou M., O'Riain J., King A.J.
- **DaNCES: a framework for data-inspired agent-based models of collective escape**
2024, In: Brock, O., Krichmar, J. (eds) From Animals to Animats 17. SAB 2024. Lecture Notes in Computer Science, vol 14993, pp 194–207. Springer, Cham. doi:10.1007/978-3-031-71533-4_15
Papadopoulou M., Hildenbrandt H., and Hemelrijk C.K.
- **Diffusion during collective turns in bird flocks under predation**
2023, Frontiers in Ecology and Evolution, 11: 1198248. doi:10.3389/fevo.2023.1198248
Papadopoulou M., Hildenbrandt H. and Hemelrijk C.K.
- **Dynamics of collective motion across time and species**
2023, Philosophical Transactions of the Royal Society B, 378: 20220068. doi:10.1098/rstb.2022.0068
Papadopoulou M., Fürtbauer I., O'Bryan L., Garnier S., Georgopoulou D., Bracken A., Christensen C., and King A.J.
- **Biologically inspired herding of animal groups by robots**
2023, Methods in Ecology and Evolution. doi:10.1111/2041-210X.14049
King A.J., Portugal S.J., Strömbom D., Mann R.P., Carrillo J.A., Kalise D., de Croon G., Barnett H., Scerri P., Gross R., Chadwick D.R., Papadopoulou M.
- **Animals are not particles: towards a second generation of 'hetero-swarm' robotics**
2022, Swarm Intelligence: 13th International Conference, ANTS 2022, Malaga, Spain, November 2–4, Proceedings. Vol. 13491. Springer Natures. doi:10.1007/978-3-031-20176-9
Papadopoulou M., Fürtbauer I., and King A.J.
- **Emergence of splits and collective turns in pigeon flocks under predation**
2022, Royal Society Open Science, 9:211898. doi:10.1098/rsos.211898
Papadopoulou M., Hildenbrandt H., Sankey D.W.E., Portugal S.J., and Hemelrijk C.K.
- **Self-organization of collective escape in pigeon flocks**
2022, PLoS Computational Biology, 18(1): e1009772. doi: 10.1371/journal.pcbi.1009772
Papadopoulou M., Hildenbrandt H., Sankey D.W.E., Portugal S.J., and Hemelrijk C.K.
- **Relationship between conservation biology and ecology shown through machine reading of 32,000 articles**
2020, Conservation Biology, 34 (3), 721-732. doi: 10.1111/cobi.13435
Hintzen R., Papadopoulou M., Mounce R., Banks-Leite C., Holt R., Mills M., Knight A., Leroi A. and Rosindell J.
- **On Revolutions**
2020, Palgrave Communications 6 (1), 1-11. doi: 10.1057/s41599-019-0371-1
Leroi A., Lambert B., Mauch M., Papadopoulou M., Ananiadou S., Lindberg S. and Lindenfors P.

Submitted manuscripts

- **Bio-hybrid systems in animal behaviour**
Under review
Papadopoulou M., Ball M., Bartashevich P., Burns A.L.J., Chiara V., Clark M.A., Costelloe B.R., Fele M., French F., Hauert S., Heinrich M.K., Herbert-Read J.E., Hoitt J., Ioannou C.C., Landgraf T., Matchette S.R., Polverino G., Sankey D., Scott M.D., Sridhar V. H., Strömbom D., Trianni V., Vo-Doan T.T., King A. J.
- **Baboon travel progressions as a 'social spandrel' in collective animal behaviour**
Under review
Fele M., Fürtbauer I., Lurgi M., Papadopoulou M., Bracken A. M., Christensen C., O'Riain M.J., King, A.J.
- **swARmverse: an R package for the comparative analysis of collective motion**
Under review
Papadopoulou M., Garnier S., King A.J.
- **Starling murmurations under predation**
Under review
Papadopoulou M., Hildenbrandt H., Storms R., and Hemelrijk C.K.

Software

- **swaRmverse: an R package for the analysis of collective motion**
2024, R, Available on CRAN and at marinapapa.github.io/swaRmverse/
Papadopoulou M., Garnier S.
- **DaNCES: a data-inspired modeling framework for agent-based simulations of collective escape (3D)**
2024, C++, Available at github.com/marinapapa/DaNCEs_framework
Papadopoulou M., Hildenbrandt H.
- **ColT: an agent-based model of collective turning in birds (2D)**
2023, C++, doi:10.5281/zenodo.10782467.
Papadopoulou M., Hildenbrandt H.
- **HoPE: an agent-based model of collective escape in pigeons (2D)**
2022, C++, doi:10.5281/zenodo.5889123
Papadopoulou M., Hildenbrandt H.

Fellowships, Grants, and Scholarships

2023	Postdoctoral International Travelling Fellowships (PITF) , FSBI, International Society for Fish Biology	UK - Germany
2022	Symposium Grant , Dutch Society for theoretical biology	NL
2017	Equal Opportunities Initiative Fund , European Society of Evolutionary Biology	UK
2016	Erasmus+ Internship Grant , European Commission	UK
2015	Travel Grant , International Sea Turtle Society	Turkey
2014	Contributory scholarship , Aristotle University of Thessaloniki	Greece
2011	Excellence Scholarship for National Admission Exams in Biology , Hellenic State Scholarships Foundation	Greece

Teaching Experience

Swansea University

Swansea, UK

GUEST LECTURER & PROJECT CO-SUPERVISOR IN BIOSCIENCES

Sep. 2022 - Present

- Courses: *Animal Behavior (BSc)*
- Project co-supervision for PhD and BSc students

University of Groningen

Groningen, NL

TEACHING ASSISTANT IN THEORETICAL BIOLOGY

Oct. 2017 - Feb. 2022

- Courses: *Biological modelling and model analysis (BSc)*, *Modelling in life sciences (BSc)*, *Practical modelling for biologists (MSc)*, *Self-organization of ecological and social systems (BSc)*, *Advanced self-organization of social systems (MSc)*
- Tasks: computer practicals (coordination, preparation and tutoring), lectures, projects supervision (BSc, MSc)

Professional Services

Reviewing & Editing

International

SCIENTIFIC PUBLISHING & SOFTWARE

Sep. 2018 - Present

- Active Reviewer, for a full list of journals see: Web of Science, Researcher ID GQP-2573-2022
- Guest Editor: special issue of *'Animal Behaviour'* on Biohybrid Systems in Animal Behaviour (2023-2024).
- R-OpenSci: *'nlrx'* R package (2019).

Research Training

Swansea, UK

POSTGRADUATE DEVELOPMENT AND TRAINING PROGRAM OF SWANSEA UNIVERSITY

Nov. 2022 - May 2024

- Designing and delivering workshops for postgraduate students and staff
- Workshop on Data Visualization for research (fundamentals and R practicals)

Event Organization

Swansea, UK

INTERNATIONAL WORKSHOP ON: 'BIO-HYBRID METHODS IN ANIMAL BEHAVIOR'

Sep. 2023

- Co-organizer of interdisciplinary workshop funded by the Association for the Study of Animal Behavior (ASAB)
- Number of participants: 50 | Budget: ~ 10.000 €.

Scientific Community Board

International

SEMF - SOCIETY FOR MULTIDISCIPLINARY AND FUNDAMENTAL RESEARCH

May 2021 - Dec. 2023

- Founding member
- Website: semf.org.es

Event Organization

PHD DAY GRONINGEN

- The largest annual event for PhD students in Europe (phd-day.nl)
- Chair of the board of the organizing committee (25 members)
- Number of participants: 700 | Budget: ~ 40.000 €

Groningen, NL

Oct. 2018 - Sep. 2019

Wildlife Rehabilitation Internship

'ACTION FOR WILDLIFE', ASSOCIATION FOR THE STUDY, TREATMENT AND REHABILITATION OF WILDLIFE

- Providing care to wild animals admitted in the rehabilitation center and analyzing their causes of morbidity.

Thessaloniki, Greece

Mar. 2012 - Sep. 2016

Invited Talks

Centre for Research in Animal Behaviour (CRAB), University of Exeter

INVITED SEMINAR SPEAKER

TBA

Exeter, UK

20 Nov. 2024

Workshop on "Diverse processes in networks across biological levels", MPI for Evolutionary Biology

INVITED KEYNOTE SPEAKER

TBA

Plön, GE

12 - 14 Nov. 2024

Department of Ecological and Biological Sciences (DEB), Tuscia University

INVITED SEMINAR SPEAKER

'Collective escape in bird flocks: disentangling their emergence through data-inspired computational models'

Viterbo, IT

26 Jun. 2024

Workshop on "Collective Motion of Animals and Robots", Cargèse

INVITED KEYNOTE SPEAKER

'Animal groups into the Swarm-Verse: understanding collective motion across species & ecological contexts'

Corsica, FR

27 - 31 May 2024

Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB)

INVITED SEMINAR SPEAKER

'The role of behavioural individuality in collective animal behaviour'

Berlin, GE

16 Feb. 2024

Workshop on "Understanding self-organization in complex systems: A multidisciplinary approach", ETH Zürich

INVITED KEYNOTE SPEAKER

'Self-organized collective behaviour in social systems'

Zurich, SWITZ

17 - 19 Jan. 2024

Centre for Biomathematics, Swansea University

INVITED SEMINAR SPEAKER

'Understanding the collective motion of animals through individual-based models across species and ecological contexts'

Swansea, UK

4 Oct. 2023

Farewell Symposium of Prof. Dr. Charlotte Hemelrijk

INVITED SPEAKER

'Understanding collective motion and escape through data-inspired computational models'

Groningen, NL

1 Sep. 2022

Workshop on "Descriptive & Normative Models of Collective Behaviour", University of Leeds

INVITED PARTICIPANT

'Data-inspired models of collective escape in bird flocks'

Leeds, UK

20 - 24 Jun. 2022

International School of Groningen

SCIENCE COMMUNICATION - SPECIALIST TALK

'Collective behavior of bird flocks' - for primary school students

Groningen, NL

9 Apr. 2019

The Young Researchers

SCIENCE COMMUNICATION - SPECIALIST TALK

'Computational models of collective behavior of bird flocks' - for kids, teenagers and adults

Groningen, NL

7 Dec 2018

Conference Contributions

SAB 2024

California, USA

PAPADOPOULOU M., HILDENBRANDT H., HEMELRIJK C.K.

9 - 12 Sep. 2024

DaNCES: a framework for data-inspired agent-based models of collective escape (Oral presentation)

FSBI Annual Meeting 2024

Bilbao, Spain

PAPADOPOULOU M., BIERBACH D., KRAUSE J., KING A.J.

15 - 19 Jul. 2024

A tale of clones, robots, and agents: the role of behavioural individuality in the schooling dynamics of the Amazon molly (Poster presentation)

ASAB Spring 2024

Exeter, UK

PAPADOPOULOU M., BIERBACH D., KRAUSE J., KING A.J.

23 - 25 Apr. 2024

A tale of clones, robots, and agents: the role of behavioural individuality in the collective behaviour of vertebrates (Oral presentation)

Behaviour 2023

Bielefeld, Germany

PAPADOPOULOU M., HILDENBRANDT H., HEMELRIJK C.K.

14 - 19 Aug. 2023

The self-organization of collective escape in starlings and pigeons (Oral presentation)

Santa Fe Institute Symposium, Collective Intelligence | Foundations + Radical Ideas

Santa Fe, USA

PAPADOPOULOU M.

19 - 23 Jun. 2023

Collective Intelligence into the Swarmverse (Poster presentation)

ASAB Spring 2023

Bangor, UK

PAPADOPOULOU M.

4 - 6 Mar. 2023

Dynamics of collective motion across species and contexts. (Oral presentation)

European Conference on Behavioural Biology (ECBB)

Groningen, NL

PAPADOPOULOU M., FÜRTBAUER I., KING A.J.

20 - 24 Jun. 2022

The role of individual heterogeneity in collective behavior across species. (Poster presentation)

European Conference on Behavioural Biology (ECBB)

Groningen, NL

PAPADOPOULOU M., HILDENBRANDT H., HEMELRIJK C.K.

20 - 24 Jun. 2022

Disentangling patterns of collective escape in starling flocks. (Poster presentation)

Collective animal behavior through time

London, UK

PAPADOPOULOU M., FÜRTBAUER I., KING A.J.

23 - 24 May. 2022

Individual heterogeneity in collective behavior across time and species. (Poster presentation)

Numerous Numerosity ECR Workshop

Online

PAPADOPOULOU M.

31 May - 2 Jun. 2021

Self-organization & numerical cognition in animal collective behavior. (Oral presentation)

Dutch Society for Theoretical Biology (NVTB) Annual Meeting

Online, Netherlands

PAPADOPOULOU M., HILDENBRANDT H., SANKEY D.W.E., PORTUGAL S.J., HEMELRIJK C.K.

14 May 2021

Self-organization and patterns of collective escape in pigeon flocks. (Oral presentation)

Association for the Study of Animal Behaviour (ASAB) Easter Virtual Meeting

Online (Bristol), UK

PAPADOPOULOU M., HILDENBRANDT H., SANKEY D.W.E., PORTUGAL S.J., HEMELRIJK C.K.

15 Apr. 2021

Patterns of collective escape in pigeon flocks: insight from a computational model. (Oral presentation)

European Society for Evolutionary Biology (ESEB) Annual Meeting

Turku, Finland

PAPADOPOULOU M.

23 Aug. 2019

The scientific impact of gender in ecology and evolutionary biology. (Poster presentation)

PyGrunn 2019: 'Python and friends' developer conference

Groningen, Netherlands

PAPADOPOULOU M.

5 May 2019

Disentangling scientific fields with topic analysis in Python. (Oral presentation)

37th Congress of the Greek Society of Biological Sciences

Kavala, Greece

PAPADOPOULOU M., ALMPANIDOU V., GKAZINO C., MAZARIS D. A.

26 May 2016

Challenging the performance of species distribution models: climate and population trends of sea turtles. (Oral and Poster presentation)

35th Annual Symposium on Sea Turtle Biology and Conservation

Dalaman, Turkey

PAPADOPOULOU M., GKAZINO C., VOKOU D., PSARALEXI M., SGARDELIS P. S., ALMPANIDOU V., MAZARIS D. A.

18 Apr. 2015

Evidence on a low climatic niche conservatism of distinct sea turtles populations- Implications for the use of species distribution models. (Poster presentation)

Professional Training

Investigative Workshop by NIMBioS (National Institute for Mathematical and Biological Synthesis) & SCMB (Southeast Center for Mathematics and Biology)

QUANTITATIVE EDUCATION IN LIFE SCIENCE GRADUATE PROGRAMS.

Online, U.S.A.

1 -3 Dec. 2020

ASAB 2019 Summer Conference Workshops

'MACHINE LEARNING IN THE BEHAVIOURAL SCIENCES' & 'QUANTIFYING BEHAVIOR WITH MACHINE-LEARNING' (in Python)

Konstanz, GE

26 Aug. 2019

23rd Summer School of the Greek Complex Systems Society

DYNAMICAL SYSTEMS AND COMPLEXITY

Chalkidiki, GR

27 Aug. - 3 Sep. 2016

International Summer School in Ecological Data Analysis (EcoDAR)

ECOLOGICAL DATA ANALYSIS IN R

Lesvos, GR

6 - 11 Jul. 2015

Lifelong Learning Erasmus+ Program

NATURE CONSERVATION IN DIFFERENT EUROPEAN LANDSCAPES

Daugavpils, LV

11 - 224 Apr. 2014

Honors & Awards

2021 **Best Oral Presentation Award**, Dutch Society for Theoretical Biology

Netherlands

2011 **1st Place**, National Admission Exams for the School of Biology of Aristotle University of Thessaloniki

Greece

2010 **Honor of Excellence**, National Mathematical Contest of the Greek Mathematical Society

Greece

Computer Skills

- **Programming languages:** C++, R, Python, NetLogo, Bash, Lua, C (familiar), MATLAB (familiar), Octave (familiar)
- **Software:** EthoVision XT (video tracking), Adobe Premiere Pro (video-editing), Git (version control), \LaTeX , Microsoft Office, Adobe Illustrator (Graphic design), ArcGIS, MaxEnt, OpenGL (computer graphics).
- Other: Machine learning, Natural language processing, High performance computing, Metaprogramming

Languages

English (Excellent), **French** (Good, DELF B2), **Italian** (Good, B1), **Dutch** (Basic, A1), **Greek** (Native)

Volunteering & Extracurricular Activity

'Action for Wildlife': Association for Study, Treatment and Rehabilitation of Wildlife

WILDLIFE REHABILITATION, WEEKLY VOLUNTEER

Thessaloniki, Greece

2012 - 2016

Fencing - Epee

ATHLETE, GREEK NATIONAL CHAMPION, ASSISTANT COACH, REFEREE

Greece | UK | Netherlands | Italy

2006 - Present

Photography and Cinema

WORKING EXPERIENCE AS PHOTOGRAPHER, CINEMATOGRAPHER AND CO-PRODUCER (WWW.BANANAGEDDONFILM.COM)

International

2013 - Present

Music

STUDIES ON PIANO AND MUSIC THEORY AT THE CONTEMPORARY CONSERVATORY OF THESSALONIKI

Greece

2003 - 2013