



Dr. Willem Bonnaffé

Postdoctoral data scientist

Big Data Institute, Old Road Campus

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WORK

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|------------------------|---|---|
| 2021-2023 | Postdoctoral Data Scientist
<i>Studying morphological evolution in prostate cancer</i>
Image analysis - Multi-instance learning - Segmentation | University of Oxford
Big Data Institute |
| 2021
4 months | Consultant in AI & Remote Sensing
Building ML tools to analyse forest canopy drone imagery
Image processing - Image recognition - Classification | University of Oxford
Department of Zoology |
| 2020-2022 | Director & Lead on AI solutions
AI solutions to predict weather disruptions in ports
Won 2020 Oxford AI impact hackathon for climate change | Eltanin Maritime Analytics
& Oxford University Innovation |
| 2016-2017
10 months | Research assistant in Mathematical Biology
<i>Modelling evolution of tropical fish communities</i>
Bayesian modelling - MCMCMH/HMC - IBMs | University of Arizona
Ecology and Evolutionary Biology Dpt. |

EDUCATION

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| 2017-2021 | DPhil in Zoology
<i>Inferring eco-evolutionary feedbacks in nature</i>
Expertise in AI analysis of time series data | University of Oxford
NERC DTP & Department of Zoology
Pr. B. Sheldon & Pr. T. Coulson |
| 2013-2017 | Diploma in Socio-Environmental Sciences
Expertise in water and fish stock management
Policy assessment - Agent-based modelling | Ecole normale supérieure Ulm
Environmental Research and
Teaching Institute |
| 2013-2016 | MSc in Evolutionary Biology
1 st /49 written exams - Highest honors
Advanced training in stat./mathematical modelling | Ecole normale supérieure Ulm
& Université Pierre et Marie Curie |
| 2009-2013 | BSc in Medical & Life Sciences
5 th /505 written exams - High honors
General training in Chemistry, Physics, Biology | Université Pierre et Marie Curie |

SKILLS

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| I.T. | Vim - \LaTeX - Beamer - Word - Excel - Powerpoint |
| Programming | R - C/C++ - Bash - Python - NetLogo - MatLab - Julia - Mathematica - PyTorch |
| Machine learning | NODEs - ResNets - RNNs - CNNs - MIL - AEs |
| Languages | French/English - German (basics) - Dutch (basics) |
| Skills | Jazz guitar, performance, and composition - Impressionist soft pastel painting |

TEACHING

2020 2 weeks	Demonstrator in doctoral course Machine learning modules	University of Oxford Doctoral Training Center
2019-2020 6 months	Tutor and demonstrator in undergrad. course Quantitative methods (2nd year BA in Biology)	University of Oxford Dpt. of Zoology
2018 6 weeks	Demonstrator in doctoral course Quantitative and computational methods	University of Oxford NERC DTP

RESEARCH

2016 5 months	Internship in System Biology <i>Trophic network topology along thermal gradients</i> Network theory - statistical modelling - bib. review	Université Pierre et Marie Curie Institute of Ecology and Environmental Sciences
2015 4 months	Internship in Computational Biology <i>Fisheries and trout meta-population dynamics</i> Agent-based modelling - numerical simulations	Ecole normale supérieure Ulm Environmental Research and Teaching Institute
2014-2015 6 months	Internship in Functional Ecology <i>Ontogeny of body colouration in lizards</i> Spectrophotometry - statistical modelling	Université Pierre et Marie Curie Institute of Ecology and Environmental Sciences
2014 5 months	Internship in Behavioural Ecology <i>Fitness consequences of sociality</i> Fieldwork - statistical modelling - network theory	University of Oxford Department of Zoology
2013 2 months	Internship in Cognitive Ethology <i>Detection of prosocial behaviour in rodents</i> Supervision of experiments - animal care	Muséum national d'histoire naturelle Laboratoire d'Ethologie Cognitive et Comparée

TALKS

2023 May	CREEM seminar Invited speaker (<i>Fast NODE fitting</i>)	CREEM St. Andrews
2022 Dec.	Human-AI interaction in healthcare Co-organizer with Dr. Yang Hu	The Alan Turing Institute Oxford
2021 Dec.	BES meeting Speaker and poster (<i>Fast NODE fitting</i>)	British Ecological Society London
2020 Dec.	BES meeting Speaker (<i>Eco-evo feedbacks in Darwin's finches</i>)	British Ecological Society London
2020 Oct.	Evol. Demogr. Society's 7th annual meeting Invited speaker (<i>Eco-evo feedbacks in Darwin's finches</i>)	Norwegian University of Sc. and Tech. Centre for Biodiversity Dynamics
2018 Dec.	NERC grand challenges seminar series Co-organizer (Science and Politics)	University of Oxford NERC DTP & Jesus College
2017 April	Uncertainty Quantification showcase Speaker (<i>Bayesian analysis of ecological data</i>)	University of Arizona Department of Mathematics

PUBLICATIONS

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|------|---|----------------------------------|
| 2023 | <i>Negative interactive effects of warming and enrichment on food-web structure in freshwater fish communities</i>
W. Bonnaffé et al. | In prep. |
| 2023 | <i>Inferring eco-evolutionary feedbacks from time series data with nonparametric Geber and Price equation</i>
W. Bonnaffé & T. Coulson | In prep. |
| 2023 | <i>Beyond attention: deriving biologically interpretable insights from trained models</i>
W. Bonnaffé et al. | In prep. |
| 2023 | <i>Fast fitting of neural ordinary differential equations by Bayesian gradient matching to infer ecological interactions from time series data</i>
W. Bonnaffé & T. Coulson | Methods in Ecology and Evolution |
| 2022 | <i>Single chain differential evolution Monte-Carlo for self-tuning Bayesian inference</i>
W. Bonnaffé | arXiv |
| 2021 | <i>Species richness and network structure jointly drive total biomass and its temporal stability in fish communities</i>
A. Danet, E. Thebault, W. Bonnaffé, M. Mouchet & O. Collin | Ecology Letters |
| 2021 | <i>Neural ordinary differential equations for ecological and evolutionary time series analysis</i>
W. Bonnaffé, B.C. Sheldon & T. Coulson | Methods in Ecology and Evolution |
| 2021 | <i>Comparison of size-structured and species-level trophic networks reveals antagonistic effects of temperature on vertical trophic diversity at the population and species-level</i>
W. Bonnaffé, S. Legendre, A. Danet, & E. Edeline | Oikos |
| 2018 | <i>Ontogenetic trajectories of body colouration reveal its function as a multicomponent non-senescent signal</i>
W. Bonnaffé et al. | Ecology and Evolution |