

CURRICULUM VITAE - DR. PATRICK BALLANTYNE

Postdoctoral Research Associate in Geographic Data Science

Website: <https://patrickballantyne.github.io>

Email: P.Ballantyne@liverpool.ac.uk

Twitter: [@DrPatBallantyne](https://twitter.com/DrPatBallantyne)

LinkedIn: [patrickballantyne](https://www.linkedin.com/in/patrickballantyne)

GitHub: [patrickballantyne](https://github.com/patrickballantyne)



RESEARCH INTERESTS

I am a **Geographic Information Scientist** who seeks to generate new and important insights about cities and regions, with a particular emphasis on processes and dynamics related to **Transportation, Retailing, Urban Planning** and **Spatial Inequality**. My research harnesses cutting-edge methodologies, various forms of spatial and non-spatial data, and partnerships with public and private sector organisations to answer interesting and impactful research questions. I am particularly passionate about developing accessible research outputs and tools, which when underpinned by sophisticated data and models can be used to support effective decision-making in policy settings.

Spatial Analysis, Spatial Modelling, Supervised and Unsupervised Machine Learning, Statistics, Area Classifications and Geodemographics, Network and Accessibility Analysis, Spatial Optimisation, Scoring and Composite Indicators, Data Visualisation and Cartography, Urban Dashboards, Narrative Storymaps, Citizen Science, Participatory Mapping, Digital Twins.

EMPLOYMENT

- | | |
|----------------------------|---|
| June 2022 - | Postdoctoral Research Associate
Geographic Data Science Lab, University of Liverpool. |
| Mar. 2023 - | Spatial Data Consultant (Freelance)
Liverpool City Region Combined Authority. |
| Jan. 2021 -
Apr. 2022 | Data Scientist
Consumer Data Research Centre (CDRC). |
| Sept. 2017 -
Sept. 2019 | Senior Open Day Ambassador
Department of Geography and Planning, University of Liverpool. |

EDUCATION

- | | |
|---------------------------|--|
| Sept. 2018 -
Dec. 2022 | PhD, Geographic Data Science (<i>examined March 2023, no corrections</i>)
Department of Geography and Planning, University of Liverpool. |
| Sept. 2018 -
June 2020 | MSc, Data Analytics and Society (<i>distinction</i>)
Department of Geography and Planning, University of Liverpool. |
| Sept. 2015 -
July 2018 | BSc, Physical Geography (<i>1st class with honours</i>)
Department of Geography and Planning, University of Liverpool. |

RESEARCH

Peer-Reviewed Journal Articles (citations = 71, h-index = 4)

- 2024 **Ballantyne, P.**, Filomena, G., Rowe, F., Singleton, A. 2024. Developing two-dimensional indicators of transport demand and supply at small area levels to promote sustainable transportation equity. *Computers, Environment and Urban Systems*, 113, 102179. DOI: <https://doi.org/10.1016/j.compenvurbsys.2024.102179>.
- Ballantyne, P.**, Singleton, A. 2024. Using composite indicators and city dashboards to promote place-based policy interventions. *Cities*, 154, 105329. DOI: [10.1016/j.cities.2024.105329](https://doi.org/10.1016/j.cities.2024.105329).
- Ballantyne, P.**, Berragan, C. 2024. Overture POI data for the United Kingdom: a comprehensive, queryable open data product, validated against Geolytix supermarket data. *Environment and Planning B: Urban Data/Code Section*. DOI: [10.1177/23998083241263124](https://doi.org/10.1177/23998083241263124).
- 2023 Gibbs, H., **Ballantyne, P.**, Cheshire, J., Singleton, A., Green, M. 2023. Harnessing mobility data to examine changing work from home behaviours between censuses. *The Geographical Journal*. DOI: [10.1111/geoj.12555](https://doi.org/10.1111/geoj.12555).
- Ballantyne, P.**, Sanderson, R.K., Davies, A., Houlden, V., MacLachlan, A., Owen, G., Robinson, C., Shin, H., Wartmann, F.M., Wilkin, J. and Williams, I. 2023. 'There is no formula for life and career': A commentary on perspectives and experiences of early career quantitative human geographers. *The Geographical Journal*, 189 (1), pp.174-181. DOI: [10.1111/geoj.12499](https://doi.org/10.1111/geoj.12499).
- Ballantyne, P.**, Singleton, A., Dolega, L. and Macdonald, J. 2023. Integrating the who, what, and where of US retail center geographies. *Annals of the American Association of Geographers*, 113 (2), pp.488-510. DOI: [10.1080/24694452.2022.2098087](https://doi.org/10.1080/24694452.2022.2098087).
- 2022 **Ballantyne, P.**, Singleton, A. and Dolega, L. 2022. Using unstable data from mobile phone applications to examine recent trajectories of retail centre recovery. *Urban informatics*, 1 (1), p.21. DOI: [1007/s44212-022-00022-0](https://doi.org/10.1007/s44212-022-00022-0).
- 2021 **Ballantyne, P.**, Singleton, A. and Dolega, L. 2021. A regional exploration of retail visits during the COVID-19 pandemic. *Regional Studies, Regional Science*, 8 (1), pp.366-370. DOI: [10.1080/21681376.2021.1973548](https://doi.org/10.1080/21681376.2021.1973548).
- Ballantyne, P.**, Singleton, A., Dolega, L. and Credit, K. 2021. A framework for delineating the scale, extent and characteristics of American retail centre agglomerations. *Environment and Planning B: Urban Analytics and City Science*. DOI: [10.1177/23998083211040519](https://doi.org/10.1177/23998083211040519).
- 2019 **Ballantyne, P. 2019.** Book Review: An introduction to R for Spatial Analysis and Mapping (2nd Edition) *International Journal of Geographic Information Science (IJGIS)*. DOI: [10.1080/13658816.2019.1647541](https://doi.org/10.1080/13658816.2019.1647541).

Research Income (£145,625.58 to date)

- 2024 Maximising the Impact of Urban Digital Twins for Public Policy in Liverpool City Region, £4,896.58, *ESRC Impact Accelerator Account*, PI.
- Establishing a new cross-sector, collaborative agenda for data-driven transport planning in Liverpool City Region, £22,342.00, *Partnership Innovation Fund*, *University of Liverpool*, PI.
- A Big Data Digital Twin of Mass Transit in Liverpool City Region for Smart, Equitable Mobility, £118,387.00. *Innovate UK*, Co-I.
- Unsuccessful* The Sustainability of British Retail Centres: A New Evidence Base and Stakeholder Recommendations, £118,941.00 (average reviewer score 5 / 6), *ESRC Secondary Data Analysis Initiative*, PI.
- From Vulnerability to Viability: Designing Climate-Resilient Retail Spaces in City Centres, £234,964.00, *British Academy Knowledge Frontiers*, Co-I.

Working Papers

- Under review* Dolega, L., **Ballantyne, P.**, Singleton, A. *under review*. Transformation of British Retail Centres: Reconfiguration and Economic Performance in the Post-Pandemic Era. Target Journal: *Journal of Retailing*.
- In preparation* Kwon, H., **Ballantyne, P.**, Balog, A., Jang, J., Hwang, J., Singleton, A. *in preparation*. Purposes and Standards for Implementing Transport Network Digital Twins: A Systematic Literature Review and Stakeholder Consultation Exercise. Target Journal: *Urban Studies*.
- Ballantyne, P.**, Cabrera-Arnau, C., Garofani, G., Berragan, C., Singleton, A. *in preparation*. Optimising new pedestrian infrastructure for safer cities: a spatial optimisation approach and comparison with road safety statistics. Target Journal: *Transport Geography*.
- Flynn, M., **Ballantyne, P.**, Anderson, R., Singleton, A. *in preparation*. “Cha-Cha-Cha-Ching”: Using consumer transaction data to understand the dynamics of cities during mega events. Target Journal: *Area*.
- Dolega, L., Ye, Z., **Ballantyne, P.** *in preparation*. Exploring the drivers of high street decline across the UK. Target Journal: *Journal of Retailing and Consumer Services*.
- Ballantyne, P.**, Reed, C., Wilks, C., Singleton, A. *in preparation*. US places exhibit distinct consumer behaviour profiles: a new open data product. Target Journal: *Nature Scientific Data*.

Conference Papers

- 2024 Kwon, H., **Ballantyne, P.** 2024. Transforming Liverpool’s Bus Network with Urban Digital Twins. *Alan Turing Institute Urban Analytics Annual Meeting, Glasgow, UK*.

- Ballantyne, P.** 2024. “Cha-Cha-Cha-Ching”: Using consumer transaction data to understand the dynamics of cities during mega events. *International Geographical Congress 2024, Dublin, Ireland*.
- 2023 **Ballantyne, P.,** Singleton, A., Filomena, G., Rowe, F. 2024. Using Urban Indicators to Deliver a Sustainable and Equitable Future for Liverpool City Region. *America Association of Geographers (AAG) Annual Meeting 2024*.
- 2022 **Ballantyne, P.,** Singleton, A. 2023. Accessibility Indices for Regional Transport Equity Assessments: The Case of Liverpool City Region. *GIScience Annual Conference 2023*. Abstract available at: <https://osf.io/yhwrp>.
- Ballantyne, P.,** Singleton, A., Dolega, L. 2022. Evidence of structural, functional, and spatial inequalities in the post-pandemic recovery British retail centres. *RGS-IBG Annual Conference 2022*.
- 2021 **Ballantyne, P.,** Singleton, A., Dolega, L., Macdonald, J. 2022. Integrating the *who*, *what* and *where* of American retail centre geographies. *GIS Research UK (GISRUK) Annual Conference 2022*. Abstract available at: <https://zenodo.org/record/6410106#.ZEFYP87MK5c>.
- Ballantyne, P.,** Singleton, A., Dolega, L., Macdonald, J. 2021. American Retail Centre Geographies: Centres, Characteristics and Catchments. *American Association of Geographers (AAG) Annual Meeting 2021*.
- Ballantyne, P.,** Singleton, A., Dolega, L., Macdonald, J. 2021. American Retail Centre Geographies: Centres, Characteristics and Catchments. *RGS-IBG Annual Conference 2021*.
- 2020 **Ballantyne, P.,** Singleton, A., Dolega, A., Credit, K. 2021. A Framework for Delineating the Scale, Extent and Characteristics of American Retail Centre Agglomerations: The Case of Chicago Metropolitan Area during COVID-19. *GIS Research UK (GISRUK) Annual Conference 2021*.
- Ballantyne, P.,** Singleton, A., Dolega, A. 2020. An updated measure of the ‘e-resilience’ of retail centres. *GIS Research UK (GISRUK) Annual Conference 2020*.

Conference Sessions

- 2024 “*Geography and Data Science for Public Good: Data-Driven Evidence and Solutions to Social and Spatial Inequalities*”, AAG Annual Meeting 2024. Chair: **Dr. Patrick Ballantyne**, Co-Chairs: Prof. Rachel Franklin, Prof. Alex Singleton. Three sessions comprising 14 papers from the UK, USA & Europe.
- 2022 “*The Future of Quantitative Human Geography*”, RGS-IBG Annual Conference 2022. Co-Chairs: **Dr. Patrick Ballantyne**, Dr. Rachael Sanderson. Two sessions, sponsored by the Quantitative Methods Research Group (QMRG) comprising papers from PhD students across the UK.
- 2021 “*The Ups and Downs of a PhD and Beyond*”, RGS-IBG Postgraduate Mid-Term Conference. Co-Chairs: **Dr. Patrick Ballantyne**, Dr. Rachael Sanderson. One panel

session, sponsored by the QMRG, comprising contributions and discussions from nine early-career researchers in the field of quantitative human geography.

Invited Presentations, Keynotes, Panels and Outreach Activities

- 2024 **Ballantyne, P.** 2024. *Transforming Urban Living with AI and Digital Twins (panel)*. Alan Turing Institute Urban Analytics Annual Meeting, Glasgow, UK.
- Ballantyne, P.**, Carrington, D., Hatchard, K., Wetherall, J., Vikhorev, K. 2024. *How Liverpool City Region is using AI and Digital Twins to address real-world challenges and create commercial opportunities (panel chair)*. Smart City Expo, Barcelona, Spain.
- Kwon, H., **Ballantyne, P.** 2024. *Transforming Liverpool's Bus Network with Urban Digital Twins*. GDSL Wednesday Lab Meeting, Liverpool, UK.
- 2023 Flynn, M., **Ballantyne, P.**, Anderson, R., Singleton A. 2024. Eurovision's economic impact in Liverpool: Insights for future large-scale events. *Heseltine Institute for Public Policy Brief*. Available at:
<https://www.liverpool.ac.uk/media/livacuk/publicpolicyamppractice/pbseries3/PB315.pdf>.
- Ballantyne, P.** 2023. *We need more spatial thinkers! Perspectives from a Postdoctoral Researcher*. University of Sheffield 'Applications of GIS' MSc lecture.
- Gibbs, H., **Ballantyne, P.** 2023. *Demographics and Working from Home Geographies*. CDRC Geodemographics Showcase and Annual Partner Event, Oxford, UK.
- Ballantyne, P.**, Singleton, A. 2023. *Generating Impact: Urban Indicators, Dashboards and Consumer Data Research*. CDRC-ESRC Showcase Event, UCL, UK.
- Ballantyne, P.** 2023. H3: *What is it? (and why should you be using it?)*. Pets at Home Data and Insights Weekly Meeting [virtual].
- Ballantyne, P.**, Singleton, A. 2023. *What if? Evaluating potential decarbonization strategies for maritime cargo flows in Liverpool City Region*. Geospatial Data Science for Future Cities and Society: Focusing on Analysis of Digital Footprint Data, University of Seoul/Korean Research Institute for Human Settlements.
- Ballantyne, P.**, Gibbs, H., Cheshire, J., Singleton, A., Dolega, L. 2023. *Mobility data: does it live up to the hype?* Quantitative Spatial Sciences (QuSS) Seminar Series, University of Bristol, UK.
- 2022 **Ballantyne, P.**, Singleton, A., Dolega, L. 2022. *Using unstable data to examine recent trajectories of retail centre recovery*. Supporting Post Pandemic Recovery and Resilience Through New Forms of Data, University of Liverpool Exchange with Korean Research Institute for Human Settlements.

Ballantyne, P. 2022. Workshop: Retail and Geodemographics: A Spatial Data Science Approach. *CARTO Spatial Data Science Conference, Google HQ, New York*. Materials available at: <https://github.com/patrickballantyne/CARTO-SDSC2022>.

Ballantyne, P. 2022. *Who, what, where and how: a quantitative investigation of retail centre geographies*. Maynooth University Social Science Institute (MUSSI) and National Centre for Geocomputation (NCG), Republic of Ireland.

Ballantyne, P. 2022. Retail Indicators I. Identifying ‘clone towns’ across the UK. *CDRC Stories*. Available at: <https://data.cdrc.ac.uk/stories/retail-indicators-i-identifying-clone-towns-across-uk>.

2021 **Ballantyne, P.,** Sanderson, R., Davies, A., Houlden, V., Maclachlan, A., Owen, G., Robinson, C., Shin, H., Wartmann, F., Williams, I., Wilkin, J. 2021. The Ups and Downs of a PhD and Beyond. *Panel Session at the RGS Postgraduate Mid-Term Conference, sponsored by the Quantitative Methods Research Group*.

2020 **Ballantyne, P.** 2020. Moving the lab home: changes to research and data resulting from COVID-19. *Resilient and Sustainable Cities Podcast*. Listen at: <https://open.spotify.com/episode/2OHngRBoOxoYMPxMzZ8N6c>.

Ballantyne, P. 2020. An approach to retail centre delineation based on graph structures and H3 geometries. *MethodsX Twitter Take-Over*.

Awards and Prizes

2024 Outstanding Contribution to Research (nomination), *School of Environmental Sciences Staff Awards 2024*. Nomination: “Patrick Ballantyne continues to output at an incredible rate for an early career researcher. This includes submission and awardence of UKRI research grants, numerous papers and significant local impact. I have been really impressed with the range and quality of their research which is making a significant contribution to their field. All from someone less than 2 years post PhD”.

2021 Robin Flowerdew Prize, 2021. *Best postgraduate paper in the “Future of Quantitative Geography” sessions at the RGS-IBG Annual Conference 2021*. <https://qmrg.github.io/blog/2021/10/12/Ballantyne-bio>.

PROFESSIONAL RESPONSIBILITIES

Journal Peer Review

Annals of the American Association of Geographers

Applied Geography

Cities

Computers Environment and Urban Systems

Environment and Planning B: Urban Analytics and City Science

International Journal of Geographic Information Science
 Journal of Infrastructure, Policy and Development
 Journal of Maps
 Journal of Place Management and Development
 Journal of Retailing and Consumer Services
 Journal of the Royal Statistical Society Series A: Statistics in Society
 Journal of Urban Design
 Nature Scientific Data
 Regional Studies, Regional Science
 Urban Studies

Organisational Roles and Membership within Professional Societies

2023	Strategic delivery manager <i>CDRC 2023 LinkedIn marketing strategy, ongoing.</i>
	Seminar Coordinator <i>Geographic Data Science Lab 'Brown Bag' Seminar Series, ongoing.</i>
	UK Coordinator <i>Geospatial Data Science for Future Cities and Society research exchange, held at the Korean Research Institute for Human Settlements, June 2023.</i>
2022	UK Coordinator <i>Supporting Post Pandemic Recovery and Resilience Through New Forms of Data research exchange, held at the University of Liverpool, November 2022.</i>
	Postdoctoral Representative <i>School of Environmental Sciences Research Strategy Group, ongoing.</i>
	Early-career committee <i>GISRUUK Annual Conference, April 2022.</i>
2020 (- 2022)	Postgraduate Representative <i>Quantitative Methods Research Group, Royal Geographical Society.</i>
2019 (- 2022)	Social Media Coordinator <i>Geographic Data Science Lab Twitter and LinkedIn</i>
	University of Liverpool Representative <i>Centre for Doctoral Training 'Buddy' Scheme for incoming students.</i>

Research Assistants

2024 - Ákos Balog (9 months)

Role: Supporting the InnovateUK-funded project “A Big Data Digital Twin of Mass Transit in Liverpool City Region for Smart, Equitable Mobility”.

Responsibilities: Data collection & analysis, facilitating communication between UK and South Korean partners, workshop coordination, outreach and engagement.

Giada Garofani (8 months)

Role: Supporting the PIF-funded project “Establishing a collaborative, cross-sector agenda for data-driven transport planning in Liverpool City Region”.

Responsibilities: Dashboard building, reviewing relevant literature, paper writing, workshop coordination, collating evidence of impact.

Ruth Neville (3 months)

Role: Supporting the IAA-funded project “Maximising the Impact of Urban Digital Twins for Public Policy in Liverpool City Region”.

Responsibilities: Preparing workshop materials and programme, supporting delivery of a full-day workshop (photography, registration), coordinating speakers and guests from public, private and academic sectors, developing post-event report and materials.

Rodgers Iradukunda (3 months)

Role: Supporting the IAA-funded project “Maximising the Impact of Urban Digital Twins for Public Policy in Liverpool City Region”.

Responsibilities: Preparing workshop materials and programme, supporting delivery of a full-day workshop (photography, registration), coordinating speakers and guests from public, private and academic sectors, developing post-event report and materials.

PhD Students

2023 - Vyacheslav Wilks
Funder: ESRC Centre for Doctoral Training.
PhD Title: Pet Ownership and Health.

2019 - Cillian Berragan
2024 **Funder:** ESRC Centre for Doctoral Training.
PhD Title: Exploring Place from the Perspective of Informal Social Media Text.

TEACHING

2024 Instructor, Liverpool City Region Combined Authority (LCRCA)
Delivery of a four-day short course covering introduction to R, data visualisation, APIs, dashboards and time-series modelling. Course was taught to 10 policy analysts with differing levels of programming competency. Co-taught with Prof. Francisco Rowe.

2022 Teaching Assistant, Ritsumeikan University, Kyoto, Japan
Delivery of ‘Geographic Data Science for Urban Analytics’ to masters-level students at Ritsumeikan University. Co-taught with Prof. Alex Singleton.

2018 - 2022	Teaching Assistant, Department of Geography and Planning, University of Liverpool <i>Modules include Geographic Information Systems, Statistics for Social Scientists, Population Dynamics, Geographic Data Science, Study Skills and GIS, Research Skills, GIS for Human Geography and Human Geography Dissertation.</i>
2021	Data Scientist, Consumer Data Research Centre (CDRC) <i>Developed an online tutorial for the CDRC – “Advanced GIS methods training: retail centres and catchment areas”, comprising interactive workbooks and short videos.</i>
2019	Teaching Assistant, Geospatial Training Solutions <i>Supported delivery of “Introduction to spatial data and using R as a GIS” – a one-day workshop, held at the University of Liverpool.</i>

TECHNICAL SKILLS

R ***

Data cleaning and manipulation, data exploration and visualisation, spatial analysis and modelling, machine learning, statistics, network analysis, GIS, cartography, dashboards, big data management, cloud computing, package development.

QGIS ***

GIS, cartography.

Python **

Data cleaning and manipulation, data exploration and visualisation, GIS, network analysis, big data management, cloud computing.

GitHub **

Project management, version control, website design, collaborative research, open-source tools, and packages.

CARTO **

Dashboard creation, design and modification, data storage and querying.

ArcGIS **

GIS, cartography, dashboards, experience builder.

SQL *

Database management, data manipulation and exploration.

Other Technical Skills

Microsoft Office Suite**, SPSS**, Mendeley**, Docker*, JavaScript*, Davinci Resolve Video Editing Software*.

*** Advanced, ** Intermediate, * Novice

SCIENTIFIC SOFTWARE, DATA AND TEACHING MATERIALS

2024	Point of interest data for the United Kingdom. <i>Data product to accompany paper on Overture POI data</i>
------	---

Data products available at: <https://data.cdrc.ac.uk/dataset/point-interest-data-united-kingdom>.

DagsHub repository available at: <https://dagshub.com/cjber/overture-uk>.

R Training: Liverpool City Region.

Bespoke four-day training course developed with Prof. Francisco Rowe for LCRCA policy analyst team.

Materials available at: <https://fcorowe.github.io/lcr-training/>.

GitHub repository available at: <https://github.com/fcorowe/lcr-training>.

2022 US Retail Centre Boundaries and Classification

Data products to accompany paper on US retail centres.

Data products available at: <https://data.cdrc.ac.uk/dataset/us-retail-centre-boundaries-and-classification>.

GitHub repository available at: <https://github.com/patrickballantyne/USRetailCentres>.

2021 Advanced GIS Methods Training: Retail Centres and Catchment Areas

Training course developed for the CDRC.

Materials available at: <https://data.cdrc.ac.uk/dataset/advanced-gis-methods-training-retail-centres-and-catchment-areas>.

GitHub repository available at: <https://github.com/patrickballantyne/CDRC-Retail-Catchment-Training>.

Retail Centre Indicators

Indicators and catchments to accompany the latest iteration of the CDRC retail centre boundaries data product.

Data products available at: <https://data.cdrc.ac.uk/dataset/retail-centre-indicators>.

GitHub repository available at: <https://github.com/patrickballantyne/CDRC-Retail-Indicators>.

2020 “Tidylodes”: An R package for extracting, processing and ‘spatialising’ data from the US Census Bureau’s LODES database.

GitHub repository available at: <https://github.com/patrickballantyne/tidylodes>.

PERSONAL

Citizenship

United Kingdom / Republic of Ireland [Dual Citizenship]

Location

Liverpool, England.

Other Details

Full UK Drivers Licence.

GCSE's: 10 A - C (including English and Maths).*

A-levels: ABB (Geography, Music, Biology).

(Updated 13/11/2024)