Charlie A. Johnson

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Profile

MSc Computer Science student with a background in formal modelling of complex systems under uncertainty. Research interests include geometric and topological data analysis, probabilistic modelling, temporal coherence in distributed systems, and structured representations of high-dimensional processes. Comfortable working with formal definitions, threshold conditions, partial order relations, and algorithmic implementations.

Research Interests

Topological and geometric data analysis; manifold-based representations; probabilistic inference; information-theoretic modelling; temporal uncertainty propagation; partial orders in distributed systems; high-dimensional system modelling under uncertainty.

Education

- **University of Birmingham** *2025 – Present*
  MSc Computer Science (in progress) United Kingdom
  – Focus: software architecture, data systems, AI/ML foundations (taught MSc).
  – Emphasis: analytical reasoning, modelling under uncertainty, and written technical communication.

Experience

- **Independent Researcher** *2025 – Present*
  Formal modelling of temporal and coordination systems United Kingdom
  – Developed interval-based representations of event time under clock drift and intermittency; modelled temporal uncertainty as bounded intervals with preserved provenance.
  – Defined safe partial ordering conditions for events (e.g., $A^+ < B^-$) to prevent false causal inference under timestamp collapse.
  – Formalised Effective Capital Blueprint (ECB) as a set-valued mapping $ECB(C, L, \theta)$ and derived threshold exclusion conditions (non-compensability under latency).
  – Derived latency elasticity classification (Type I–III) and specified an implementable procedure for empirical threshold detection and action feasibility classification.
  – Grounded feasibility constraints in control-theoretic delay limits (e.g., stability constraints under feedback delay τ) and provided computational complexity notes for classification procedures.

- **Aurelle** *2021 – Present*
  Systems Modelling Lead — Scalable Infrastructure United States (On-site)
  – Modelled decision flows and constraint propagation in high-variance operational systems spanning finance, supply chain, and cross-functional execution.
  – Designed measurement frameworks for leading-indicator detection under incomplete information; reduced ambiguity in operational inference.
  – Implemented structured data models and automation pipelines to formalise system behaviour and preserve system invariants under change.

- **KPMG** *2018 – 2020*
  Systems Engineering Associate — Regulated Financial Systems United States (On-site)
  – Translated regulatory requirements into system/data changes across core banking environments; supported audits, dependency mapping, and change-control planning.
  – Contributed to modernisation recommendations with production safety constraints and staged rollout planning.

- **Siemens** *2016 – 2018*
  Systems Engineering Intern — Internal Tools & Automation United States (On-site)
  – Built internal tools spanning product rules, automation, and sales-support workflows; reduced configuration ambiguity via standardised nomenclature and structured data models.
  – Developed systems-thinking foundation: how design decisions propagate across hardware, software, and commercial layers.

SELECTED TECHNICAL PAPERS

- **Temporal Coherence in Long-Horizon Sensor Systems** *2026*
  Interval event-time representation and uncertainty propagation under intermittency
  - Formalised event time as a bounded interval $t \in [t - \varepsilon,\ t + \varepsilon]$ with explicit provenance; separated event/record/ingest time to preserve auditability.
  - Derived safe partial-ordering rule for temporal precedence ($A^+ < B^-$) and specified invariants for non-destructive correction.
- **Latency and the Effective Capital Blueprint (ECB)** *2026*
  Set-theoretic modelling of feasibility under coordination delay
  - Defined $ECB(C, L, \theta) \subseteq X$ as a set-valued feasibility mapping; proved capital saturation and latency-threshold exclusion for coordination-critical actions.
  - Introduced latency elasticity $\hat{\varepsilon}_x$ and an implementable algorithm for Type I–III action classification with complexity notes.
- **Phase Legibility as Infrastructure** *2026*
  Continuous gradient phase encoding and bounded testable hypotheses for coordination
  - Defined phase $\phi = \frac{t-t_0}{T-t_0}$ and proposed a bounded mediation hypothesis ($L \to E \to C$) linking gradient encoding to reduced coordination friction.
  - Specified falsifiable experimental predictions and minimal test design for discrete-state vs gradient displays in shared environments.

TECHNICAL & MATHEMATICAL SKILLS

Mathematical: set-valued mappings; threshold analysis; partial orders; interval arithmetic; probabilistic reasoning; elasticity estimation; formal invariant specification; control-theoretic delay constraints
Programming: Python (NumPy, SciPy, Pandas); algorithmic implementation; statistical modelling; data pipelines; structured data modelling
Conceptual: modelling under uncertainty; feasibility-set analysis; system-level invariants; high-dimensional constraint reasoning

ADDITIONAL INFORMATION

Languages: English (native)