Daniel Bennett

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RESEARCH THEMES

Embodied Interaction
Computational Interaction
Phenomenology
Eudaimonic UX
Complexity in HCI

EDUCATION

University of Bristol
PhD Human Computer Interaction
Expected Completion Nov. 2021
MSc Computer Science (Distinction)

University of Southampton
MA Philosophy
BA Philosophy

SKILLS

Multifractal Analysis
Research Statistics
Data Science
User Study Design
Thematic Analysis
Explicitation Interview
Prototyping

C, C++, C#, Python, SQL,
Neo4J, MAX/MSP, PureData
OpenFrameworks, Unity, Arduino

THEORY

4E Cognitive Science
Phenomenology
Complex Systems
Self Determination Theory
Positive Psychology

SELECTED PROJECTS

Multifractal Analysis of Interaction Behaviour
Cognitive Science, User experience
In multifractal analysis of behaviour we gain understanding into the adaptive, embodied, dynamics in cognition and behaviour, by analysing body movement during tasks. My PhD thesis work evaluates this technique from cognitive science, for understanding interactions with technology, via user-studies and analysis of open data sets. We have found that multifractality, measured from mouse use correlates with task-engagement and locus-of-attention, now we are conducting experiments on keyboard use. Multifractal Analysis is a hugely promising and convenient technique for inferring user behaviour and experience.

Understanding autonomy in HCI
Literature review, thematic analysis, wellbeing, theory
We conducted a thematic analysis of 10 years of CHI papers dealing with issues of autonomy. We found a range of approaches, across a wide range of domains, and often complex scenarios, but only a small proportion of this work was significantly grounded in theories of autonomy, from either psychology or elsewhere. We pointed to opportunities to improve understanding via more nuanced application of the popular positive psychology framework Self Determination Theory.

Neurythmic - a neural drum machine
Prototype development, expert user studies
Central Pattern Generators (CPGs) are simulations of oscillating neural networks which control adaptive rhythmic behaviours in animals. They both generate rhythms and synchronise flexibly to input. I investigated CPGs for use in digital musical tools, including a neural drum machine Neurythmics. To understand the experience of interaction with such complex, dynamical musical interfaces, I recruited expert musicians, and ran structured tasks, comparing Neurythmic, with their preferred instruments. I used the explicitation interview technique to elicit detailed reports of experience and implicit understanding, alongside thematic analysis. I also developed a library for developing interactive applications with CPGs.

EXPERIENCE

Bristol University Feb 2018 – present

Lecturing, Thesis Supervision, Teaching Assistance, various modules Bristol UK

Lecturing:

- Developed and delivered lectures for *Programming in C* , 2 years running.
- Guest lecture for *Human Computer Interaction* on Heuristics and Biases
- I am currently helping to prepare modules on *Human Computer Interaction and Society* , and *Theories of HCI* for 2021

Supervision:

- MSc Thesis supervision for 4 students 2018-2020.
- Supervised three undergraduate Software Engineering teams on NHS-specific projects (2020).
- Supervised projects for for *Interaction Design* module - I worked with two teams, both of which successfully submitted CHI Extended Abstracts

Teaching assistance

- *Databases* , *Interaction Design* , *Introduction to Computer Science*

Admin and Organisation

- Organiser: Bristol Interaction Group Visiting Speaker Program 2018-2020 including internal funding applications
- Organiser: Bristol Interaction Group Reading Group 2018-2019

University Hospitals Bristol Healthcare Trust Feb 2018 – present

Information Systems Contractor Bristol UK

- Various short engagements, advising and developing on projects to upgrade systems and develop new ETL processes.

University Hospitals Bristol Healthcare Trust Nov 2007 – Feb 2018

Information Systems Manager Bristol UK

- Managed a team developing and maintaining BI processes for reporting to government and finance
- Provided support and training for a team of 15 healthcare information analysts
- Drove efforts to improve standards and modernize practices in the department. I worked to improve documentation practices and built up a unified set of best-practice guidelines.
- Technologies: Microsoft SQL Server, SSIS, SSRS, C#, PowerBI,

PUBLICATIONS

Emergent Interaction: Complexity, Dynamics, and Enaction in HCI Workshop at CHI 2021

Daniel Bennett, Alan Dix, Parisa Eslambolchilar, Feng Feng, Tom Froese, Vassilis Kostakos, Sebastien Lerique, Niels van Berkel

There is a long tradition of work in Human Computer Interaction which emphasises the way behaviour arises from ongoing adaptation, and the dynamically varying relationships between human(s), technology(s), and their context(s). Recent work has framed this well established approach in a new way - arguing that interaction is well modelled as a complex dynamical system. This workshop investigates the opportunities and challenges raised by this approach, drawing on recent work from enactivist cognitive science, social science, philosophy and control theory.

Small-‘p’ philosophy in HCI CHI 2019 Workshop on Philosophy in HCI

Daniel Bennett, Oussama Metatla, Anne Roudaut

Cognitive Science’s engagement with philosophy has often resulted in defensive gatekeeping, with research programs dismissed on a priori grounds divorced from empirical practice. Can HCI avoid this, and learn from recent more constructive, practice-engaged approaches to the philosophy of cognitive science?

Neurythmic: A Rhythm Creation Tool Based on Central Pattern Generators NIME 2018

Dan Bennett, Anne Roudaut, Peter Bennett

Neurythmic is an interactive tool for creating and performing fluid, expressive musical rhythms. It lets the musician interact with Central Pattern Generators (CPGs) - dynamical neural networks based on adaptive rhythm generating circuits in animals, which control behaviour including heartbeat, gut peristalsis and gait.

Disruptabottle: Encouraging Hydration with an Overflowing Bottle CHI 2020 Extended Abstracts

Adam Beddoe, Ro Burgess, Lucian Carp, James Foster, Adam Fox, Leechay Moran, Peter Bennett, Daniel Bennett

What happens when a 'nudge' becomes a'shove'?! Drink enough water, or this water bottle will overflow and spill, aggressively nudging you to drink in an attempt to draw attention to drinking habits and motivate conscious decision making.

PauseBoard: A Force-Feedback Keyboard for Unintrusively Encouraging Regular Typing Breaks CHI 2020 Extended Abstracts

Lewis Bell, Jay Lees, Will Smith, Charlie Harding, Ben Lee, Daniel Bennett

A computer keyboard designed to unintrusively encourage users to take regular breaks. Through the use of motorised linear potentiometers, the force required to activate each key is increased towards the end of a set work period, until a maximum level of resistance is reached.

INVITED TALKS

Max Planck Institute for Empirical Aesthetics Frankfurt
Complex, Non-linear Approaches to Rhythm and Interaction Jan 2021

Complex Systems Research Group University of Cardiff
Multifractality and Adaptation in Human Computer Interaction Dec 2020

Centre for Interdisciplinary Studies in Rhythm, Time and Motion University of Oslo
Multifractality and Adaptation in Human Computer Interaction Nov 2020

Computational Neuroscience Research Group University of Bristol
Multifractal Patterns in Ready-to-hand Tool Use July 2019