

# Simon Carrignon

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## Professional Experience

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### Research Positions

#### MACE Lab, University College London

Research Associate

London, UK

Actual position (since Oct. 2024)

#### McDonald Institute for Archaeological Research, University of Cambridge

Research Associate

Cambridge, UK

May 2021 - June 2024

Studying spatial patterns of cultural variation during the Jomon-Yayoi transition to infer evolutionary changes in cultural interconnectivity and the presence/absence of cultural boundaries. ERC project ENCOUNTER (ERC-2018-STG 801953)

#### DySoC/NIMBioS/Anthropology/School of Information Science, UT

Postdoctoral Fellow

Knoxville, TN

Dec. 2019 – Mar. 2021

Working with DySoC faculty members to explore and test the role of social learning strategies in human cooperation and cultural change across the ages.

#### Barcelona Supercomputing Center

Predoctoral Researcher

Barcelona, Spain

Jan. 2015–Jan. 2019

Predocctoral researcher at the Barcelona Supercomputing Center (BSC) working for the ERC project EPNET (ERC-2013-ADG 34082). Main tasks: development, test and simulation of new model on supercomputing environment. Data analysis and visualisation. Test and validation of theoretical model against archaeological and historical data.

#### LUTIN-Université Paris 8

Research Engineer

Paris, France

Jan. 2010–Mar. 2012

1 week to 3 months short contracts: modeling, data processing & statistical analysis.

### Teaching Positions

#### University of Cambridge

Supervisor

Cambridge, UK

Michaelmas 2023, Lent 2024

Supervision for paper A11 - From Data to Interpretation, undergraduate students.

#### University of Cambridge

Supervisor

Cambridge, UK

Lent 2023

Supervision for paper B13 - Cultural Evolves, undergraduate students.

#### Université Paris Dauphine

Junior Lecturer (Chargé de cours)

Paris, France

Sept. 2011–Jan. 2012

Course for 2nd yr. university students. Total amount of teaching: 36hr.

Elementary notions of algorithmic and databases manipulation (w/ Foxpro).

#### Université Paris 8

Junior Lecturer (Chargé de cours)

Paris, France

Sept. 2010–Jan. 2012

Course for undergraduate students (License Students). Total amount of teaching: 144hr.

C2I course – teaching of office tools (open source version of Word, Excel, PPT) & general knowledge of computers (software/hardware/network).

### Research Stays

#### University of Trento

Visiting Scholar

Trento, Italy

January 2024

10 days visiting scholar with professor Alberto Acerbi. Design and exploration of chain experiments with Large Language Models funded by the Turing Institute.

**NIMBIOS-University of Tennessee***Visiting Scholar*

One month visiting scholar with professor Alex Bentley. Development of models of spread of information on online social media. Validation of the models against datasets using Approximate Bayesian Computation.

**Knoxville, USA***June 2018***LORIA***Visiting Student*

One week stay in the team of Olivier Simonin. Technical configuration of Khepera III robot. Learning and adapting a greyscale color floor system to guide the robot.

**Nancy, France***May 2010***Internships****Supervisor: E. Zibetti (CHArt-Univ. P8)***Human Heuristic & Autonomous Robot*

Development of a Java API to control a Khepera III robot via an autonomous controller base on heuristic strategies extracted from Human Behavior.

**Paris, France***Sept. 2009–Jan. 2011***Supervisor: A. Green (Dept. de Physio.-UdeM)***Controler for physiological experiments*

Graphic interface & communication's tools to control and synchronize experimental setup designed for physiological studies on monkey's nervous system.

**Montréal, Canada***May 2009–Aug. 2009***Supervisor: V. Daubin (LBBE-UCBL)***Phylogenetic, Bacteriaes & LGT*

C++ implementation of an algorithm used to adjust the species tree with the genetic tree including duplication and Lateral Gene Transfer.

**Lyon, France***May 2008–Aug. 2008***Organisation and Edition****Editorial Activity****Associate Editor***since June 2022*

Associate editor for Nature Portfolio's open access journal: Humanity and Social Sciences Communication.

**HSSCOMM****Guest Editor***October 2020*

Assistant Editor of the special issue "Evolution of Cultural Complexity", published as the Issue 5 of the volume 28 of journal of Adaptive Behavior.

**Adaptive Behavior****Reviewer***Since 2019*

Reviewer for various peer-reviewed journals such as: HSCOMM, JAMT, JAS, PLOS-One, PeerJ Computer Science and others.

**Various journal****Conference & Seminar Organisation****Garrod Seminar Series "Cultural Evolution & Archaeology"***Michaelmas 2023*

Organisation of the principal Seminar Series of Cambridge's Department of Archaeology. Invited Speakers: Alex Mesoudi, Mike O'Brien, Fiona Jordan, Ruth Mace, Felix Riede, Valentine Roux & Stephan Shennan.

**Cambridge, UK****Workshop "Social Modelling & Simulation"***December 2023*

Organisation of a 2-days workshop on the use of tools from physical, mathematical, and computational sciences to understand social phenomena.

**Barcelona, Spain****Workshop: "Archaeo-Riddle: The Ultimate Challenge" @ EAA***August 2023*

Organisation of a one day workshop at the 29th Annual Meeting of the European Association of Archaeologists on the use of tactical simulations and collaborative science in Archaeology .

**Belfast, Northern Ireland****Session: "Bayesian Inference in Archaeology" @ CAA***April 2023***Amsterdam, Netherlands**

Organisation of a session at the 2023 Conference in Computer Applications and Quantitative Methods in Archaeology.

**Seminar: “Computational & Digital Archaeology Laboratory”** **Cambridge, UK**

*September 2022 to June 2023*

Organisation of 14 lectures on Computational Archaeology at Cambridge University Department of Archaeology.

**Evolution of Cultural Complexity III** **Thessaloniki, Greece**

*September 2018*

*Website: <https://simoncarrignon.github.io/ccs18/>*

Organisation and chair of the satellite “Evolution of Cultural Complexity” at the 2018 Conference on Complex System.

Invited speakers: Peter Turchin & Anne Kandler.

**Evolution of Cultural Complexity II** **Cancun, Mexico**

*September 2017*

*Website: <https://simoncarrignon.github.io/ccs17/>*

Organisation and chair of the satellite “Evolution of Cultural Complexity” at the 2017 Conference on Complex System.

Invited speakers: Sergi Valverde, Tom Froese & Alex Bentley.

**Darwin as a Conductor** **Lyon, France**

*Avril 2013*

*Website: <http://laremi.net>*

Organisation and chair of a 3-days conference on the use of Darwinian theories to understand changes in music. Invited speakers: Olivier Morin, Mathieu Charbonneau & Steven Jan.

## Education

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### Academic Curriculum

**Universitat Pompeu Fabra** **Barcelona, Spain**

*PhD Student in Biomedicine*

*2015–2019*

Co-evolution of trade and culture : theoretical study of the evolution of a decentralized economy driven by cultural dynamics.

Focus on the Roman Empire case study. Co-direction between Barcelona Supercomputing Center and Univ. Pompeu Fabra

Complex System Lab.

**Université Denis Diderot Paris 7** **Paris, France**

*Master Student in Logic, Philosophy, History and Sociology of Science*

*2011–2013*

Classes in Hist., Philo. & Socio. of Sciences. Topic of interest: Evolutionary Theory and the epistemic link btw. Evolutionary

Robotics & Evolutionary Biology.

**École Pratique des Hautes Études** **Paris, France**

*Master Student in Natural & Artificial Cognition*

*2009–2011*

Classes in Cognitive Sciences with courses of Neurosciences, Cognitive Psychology & Artificial Intelligence.

**Université de Montréal** **Montréal, Canada**

*Exchange Student*

*2008–2009*

One year exchange with courses in Neurosciences, Artificial Intelligence & Bioinformatics.

**Université Claude Bernard Lyon 1** **Lyon, France**

*License Student in Computer Science, sp. MIV*

*2007–2009*

License with courses in Biology, Computer Science & Bioinformatics.

**Université Joseph Fourier** **Grenoble, France**

*License Student in Computer Science & Biology.*

*2005–2007*

Two years to learn the fundamentals in Computer Science & Biology.

### Theses

**Supervisor: N. Bredèche** **LRI-INRIA-Paris Sud**

*Master “Natural & Artificial Cognition”, École Pratiques des Hautes Études (Paris,Fr)*

*Mars – Aug. 2011*

*Title: Self-organization in swarm of autonomous agents: evolution of specialized behaviors.*

*Abstract: The thesis investigates the emergence of speciation within a population of autonomous robotic units evolving under environment-driven adaptation. It focuses on the case of sympatric speciation (speciation occurring without geographical isolation) and demonstrates that such speciation is achievable in a robotic setting under specific constraints related to mating opportunities and resource distribution.*

**Supervisor: F. Bouchard** **CIRST-UdeM (Canada)**

*Master “Logic Philosophy History & Sociology of Sciences”, Univ. Paris 7 (Fr)*

*Apr. – Sept. 2013*

*Title:* Evolutionary Robotics as a model to study Evolutionary Biology.

*Abstract:* To justify the use of Evolutionary Robotics as a model to study evolution, this thesis first explains the general principles and the history of Darwinian evolution, reviews current approaches to understanding evolution, underlines the pertinence of models and simulations in studying life, and concludes that ER, as an embodied artificial life experiment, combines numerous advantages that make it an ideal model to study evolution.

**Supervisors: S. Valverde & X. Rubio-Campillo**

*PhD School of Biomedicine, Universitat Pompeu Fabra (Barcelona, Spain)*

**BCS-Complex Systems Lab-UPF**

*Sept. 2015 – Sept. 2019*

*Title:* Content-dependent biases in social learning strategies: a multiscale approach.

*Abstract:* The content of what we learn shapes the evolution of human culture and society. This thesis quantifies the influence of content-dependent biases in social learning strategies. It first lay the base of a theoretical framework combining agent-based models and Bayesian inference to measure content-dependent biases in large-scale social learning strategies. A first empirical study then measures the impact of social transmission biases in Twitter. The novelty of the second case study is two-fold: it is one of the rare uses of computational modelling in historical Roman Studies and one of the first tests of the impact of success bias across large spatial and temporal scales.

## **Summer School & Workshop**

### **2018 DySoC Critical Workshop**

*Modeling Complex Systems in Archaeology*

Workshop to discuss, evaluate and increase awareness about Complex System techniques in Archaeology

**Knoxville, USA**

*June 2018*

### **2018 NECSI Winter School**

*New England Complex System Institute Winter School*

Intensive week-long courses on complexity science: modeling, networks, and data analytics.

**Cambridge, USA**

*January 2018*

### **2017 UrbNet**

*UrbNet, Aarhus University*

Specialist workshop for the Danish-German Jerash Northwest Quarter Project.

**Aarhus, Denmark**

*October 2017*

### **2016 SFI CSSS**

*Santa Fe Institute Complex System Summer School*

4 weeks series of lectures, labs, and discussion on foundational concepts, tools, and current topics in Complexity Science.

**Santa Fe, USA**

*June 2016*

### **1st DACAS International Workshop**

*Data And Cities As Complex Adaptive Systems*

Development of an innovative and cross-disciplinary set of tools to study cities as Complex Adaptive Systems.

**Manchester, England**

*Feb 2016*

### **Scientific World Conception Summer School**

*The Computational turn: Simulation in Science.*

Discussions & lectures on the epistemological consequences of the use of computational methods and simulation in science.

**Vienna, Austria**

*July 2015*

### **Summer Institute in Cognitive Sciences**

*The Evolution and Function of Consciousness.*

Week of lectures on the Evolution and Function of consciousness.

**Montreal, Canada**

*September 2012*

## **Grant & Fundings**

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<b>UK-Italy Trustworthy AI Visiting Researcher (2024):</b> Exploring LLM & cultural evolution	<i>£3 540</i>
<b>Garrod Seminar (2023):</b> Fund from University of Cambridge to organise Michaelmas Garrod Seminar Series	<i>£2 000</i>
<b>C2D3 ECR Seed Fund (2023):</b> Exploring socio-economic processes behind sustainable food system adoption	<i>£3 425</i>
<b>BA/Leverhulme Small Grant (2023):</b> A collaborative game to improve archaeological inference	<i>£9 644</i>
<b>Severo Ochoa Mobility Grant (2018):</b> Accommodation & travel for 1-month visiting research	<i>2 000€</i>
<b>NECSI Winter School Scholarship (2018):</b> Inscription fees for NECSI winter school	<i>\$1 300</i>
<b>DACAS Early Career Bursary (2016):</b> Accommodation & travel for DACAS Workshop	<i>£350</i>
<b>ENS Lyon - Junior Lab (2011-2013):</b> Funding for meetings, experiments and conferences	<i>3 000€</i>

## Languages

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**French:** Mother Tongue

**English:** Good

*Written & spoken academic English*

**Spanish:** Good

*Fluent daily use*

## Technical skills

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**OS:** Linux (Ubuntu/Debian/rasbian end & admin user), FreeBSD, Windows XP, Seven, Vista. Grid/Supercomputer usage.

**Publishing:** L<sup>A</sup>T<sub>E</sub>X/ Lua<sub>T</sub>E<sub>X</sub>, Open Office & Microsoft Office Writers.

**Programming:** C/C++, R, Bash, Python, (Java, Php).

**Parallel Computing:** MPI (R/C/C++/Python), SLURM, LSF.

**Statistical analysis/Visualisation:** R.

**Git repositories:** [@github.com](#) | [@framagit \(gitlab\)](#) | [@cambridge \(gitlab\)](#)

## Interests

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Among other things, I used to have a lot of associative activities mostly revolving around music and sciences communication & popularisation. I like reading, walking in the hills of my childhood and dive into the Linux CLI.

## Publications & Conference

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### Peer reviewed paper in journal or proceedings.....

A. Bentley, S. Carrignon, and D. Ruck. Modelling drift and selection in cultural evolution. In J. J. Tehrani, J. Kendal, and R. Kendal, editors, *The Oxford Handbook of Cultural Evolution*. Oxford University Press, 2023.

R. A. Bentley, J. Borycz, S. Carrignon, D. J. Ruck, and M. J. O'Brien. Machine learning for rediscovering revolutionary ideas of the past. *Adaptive Behavior*, 2021.

R. A. Bentley, S. Carrignon, B. Gaydarska, J. Chapman, B. Buchanan, and M. J. O'Brien. Modelling cultural responses to disease spread in neolithic trypanosoma mega-settlements. *Journal of The Royal Society Interface*, 21(219):20240313, 2024.

R. A. Bentley, S. Carrignon, D. J. Ruck, S. Valverde, and M. J. O'Brien. Neutral models are a tool, not a syndrome. *Nature Human Behaviour*, 5(7):807–808, 2021.

R. A. Bentley, B. Horne, J. Borycz, S. Carrignon, G. Shteynberg, B. Vidiella, S. Valverde, and M. J. O'Brien. Cultural evolution, disinformation, and social division. *Adaptive Behavior*, 0(0):10597123231186432, 2023.

N. Bredeche, J.-M. Montanier, and S. Carrignon. Evolutionary adaptation of a population of robots: benefits and issues of the evo-devo approach. An answer to Y. Jin and Y. Meng: *Evolutionary Developmental Robotics – The Next Step to Go*. *Newsletter of the Autonomous Mental Development Technical Committee*, 8(2):8–9, 2011.

N. Bredeche, J.-M. Montanier, and S. Carrignon. Benefits of Proportionate Selection in Embodied Evolution: A Case Study with Behavioural Specialization. In *Proceedings of the Genetic and Evolutionary Computation Conference Companion*, GECCO '17, pages 1683–1684, New York, NY, USA, 2017. ACM.

T. Brughmans, S. Carrignon, and I. Romanowska. Artificial economies: Computational simulation of product preference theories for explaining jerash ceramic assemblages. In *Ceramics in Context Status Report 2015-2018*, pages 56–57. 2018.

- T. Brughmans, J. W. Hanson, M. J. Mandich, I. Romanowska, X. Rubio-Campillo, S. Carrignon, S. Collins-Elliott, K. Crawford, D. Daems, F. Fulminante, et al. Formal Modelling Approaches to Complexity Science in Roman Studies: A Manifesto. *Theoretical Roman Archaeology Journal*, 2(1):19, 2019.
- S. Carrignon, R. Alexander Bentley, and M. J. O'Brien. Estimating two key dimensions of cultural transmission from archaeological data. *Journal of Anthropological Archaeology*, 72:101545, 2023.
- S. Carrignon, R. A. Bentley, and D. Ruck. Modelling rapid online cultural transmission: Evaluating neutral models on Twitter data with Approximate Bayesian Computation. *Palgrave Communication*, 2019.
- S. Carrignon, R. A. Bentley, M. Silk, and N. H. Fefferman. How social learning shapes the efficacy of preventative health behaviors in an outbreak. *PLOS ONE*, 17(1):1–17, 01 2022.
- S. Carrignon, T. Brughmans, and I. Romanowska. Tableware trade in the roman east: Exploring cultural and economic transmission with agent-based modelling and approximate bayesian computation. *PLOS ONE*, 15(11):1–23, 11 2020.
- S. Carrignon, T. Brughmans, and I. Romanowska. Copying of economic strategies in eastern mediterranean inter-regional tableware trade. In T. Brughmans and A. Wilson, editors, *Simulating Roman Economies: Theories, Methods, and Computational Models*, page 144. Oxford University Press, 2022.
- S. Carrignon, M. Coto-Sarmiento, R. A. Bentley, and M. J. O'Brien. An introduction to papers from workshops on the evolution of cultural complexity. *Adaptive Behavior*, 28(5):317–322, 2020.
- S. Carrignon, E. R. Crema, A. Kandler, and S. Shennan. Postmarital residence rules and transmission pathways in cultural hitchhiking. *Proceedings of the National Academy of Sciences*, 121(48):e2322888121, 2024.
- S. Carrignon, J.-M. Montanier, and X. Rubio-Campillo. Modeling the Co-evolution of Trade and Culture in Past Societies. In L. Yilmaz, M. Chan, I. Moon, T. M. K. Roeder, C. Macal, and M. Rossetti, editors, *2015 Winter Simulation Conference*, pages 3949–3960, Huntington Beach, United States, Dec. 2015.
- E. R. Crema, S. Carrignon, S. Shoda, and C. J. Stevens. Regional variations in the demographic response to the arrival of rice farming in prehistoric japan. *Antiquity*, 98(401):1290–1305, 2024.
- I. Gaudiello, E. Zibetti, and S. Carrignon. Representations to go: learning robotics, learning by robotics. In *Workshop Proceedings of Intl. Conf. on Simulation, Modeling and Programming for Autonomous Robots (SIMPAR 2010)*, pages 484–493, 2010.
- D. Medernach, S. Carrignon, R. Doursat, T. Kowaliw, J. Fitzgerald, and C. Ryan. Evolution of heterogeneous cellular automata in fluctuating environments. In *Proceedings of the Artificial Life Conference 2016*, pages 216–223. MIT Press, 2016.
- D. Medernach, J. Fitzgerald, S. Carrignon, and C. Ryan. Evolutionary Progress in Heterogenous Cellular Automata (HetCA). In *Proceedings of the European Conference on Artificial Life 2015*, pages 512–519. MIT Press, 2015.
- J.-M. Montanier, S. Carrignon, and N. Bredeche. Behavioral Specialization in Embodied Evolutionary Robotics: Why So Difficult? *Frontiers in Robotics and AI*, 3:38, 2016.
- A. J. Pritchard, M. J. Silk, S. Carrignon, R. A. Bentley, and N. H. Fefferman. Balancing timeliness of reporting with increasing testing probability for epidemic data. *Infectious Disease Modelling*, 7(2):106–116, 2022.
- T. Pryce, S. Carrignon, M. Cadet, K. T. Oo, S. N. Oo, T. T. Win, A. Aye, B. Pradier, B. Bellina, C. L. Meur, and et al. A partial prehistory of the southwest silk road: Archaeometallurgical networks along the sub-himalayan corridor. *Cambridge Archaeological Journal*, page 1–40, 2023.
- I. Romanowska, T. Brughmans, P. Bes, S. Carrignon, L. Egelund, A. Lichtenberger, and R. Raja. A study of the centuries-long reliance on local ceramics in jerash through full quantification and simulation. *Journal of Archaeological Method and Theory*, 29(1):31–49, 2022.

M. J. Silk, S. Carrignon, R. A. Bentley, and N. H. Fefferman. Improving pandemic mitigation policies across communities through coupled dynamics of risk perception and infection. *Proceedings of the Royal Society B*, 288(1955):20210834, 2021.

M. J. Silk, S. Carrignon, R. A. Bentley, and N. H. Fefferman. Observations and conversations: how communities learn about infection risk can impact the success of non-pharmaceutical interventions against epidemics. *BMC public health*, 22(1):1–12, 2022.

### **Posters in conferences** .....

S. Carrignon. Why apply evolutionary theory to melodies. In *poster at: 3-Day International Conference on Evolutionary Patterns, Calouste Gulbenkian Foundation, Lisbon, Portugal*, 2013.

S. Carrignon and M. Coto-Sarmiento. Exploring the dynamic of changes: An Agent Based Model to understand the amphorae production patterns in the Roman Empire. In *Culture Conference*, June 2016.

S. Carrignon and L. Mesalles. Drivers of cultural diversification in precipitous terrains: can morphological characteristics explain language diversity in the Taiwan mountain belt? In *AGU Fall Meeting 2019*. AGU, 2019.

S. Carrignon and X. Rubio-Campillo. Impact of different social learning mechanisms on the emergence of a Walrasian Equilibrium. In *European Human Behavior Evolution Association conference (EHBEA)*, Avril 2017.

S. Carrignon and X. Rubio-Campillo. Innovation Process and Economic Equilibrium . In *Early-career Social Learning Researchers Winter Worskshop*, Janvier 2017.

I. Morer, S. Carrignon, and X. Rubio-Campillo. Influence of the topology of cultural networks on the equilibrium of an exchange-based economy. In *7th Workshop on Complex Networks (CompleNet 2016)*, Avril 2016.

### **Talks in conferences** .....

J. Adams, S. Carrignon, A. Olle, and S. Duran. Modeling the co-evolutionary dynamics of the Lobaria pulmonaria lichen symbiosis . In *Conference on Complex System*, September 2016.

S. Carrignon. Agent Based Modeling and Bayes Inference to learn about the past: the need for High Performance Computing. In *Conference on Complex System*, September 2018.

S. Carrignon, A. Bentley, D. Ruck, and M. Gilchrist. How the intrinsic value of information can change the spread of news in social media . In *2nd Conference of the Cultural Evolution Society*. Arizona State University, Oct. 2018.

S. Carrignon, R. A. Bentley, and M. J. O'Brien. Characterizing stylistic evolution via Approximate Bayesian Computation and Random Forest Adjustment. In *50 Computer Applications and Quantitative Methods in Archaeology Conference (CAA 2023)*, Avril 2023.

S. Carrignon, A. Cortell-Nicolau, E. Crema, and X. Rubio-Castillo. Archaeo-riddle: The ultimate challenge. In *29th Annual Meeting of the European Association of Archaeologists*. European Association of Archaeologists, 2023.

S. Carrignon and M. Coto-Sarmiento. All roads lead to Rome: Using least cost path to explore cultural transmission during Roman Empire. In *49 Computer Applications and Quantitative Methods in Archaeology Conference (CAA 2022)*, Avril 2022.

S. Carrignon and L. Mesalles. Exploring Taiwan's first settlement using models of cultural transmission. In *27th Annual Meeting of the European Association of Archaeologist*. European Association of Archaeologists, 2021.

S. Carrignon, J.-M. Montanier, J. Michaud, and X. Rubio-Campillo. Co-evolution of culture and trade : impact of cultural network topology on economic dynamics. In *44th Computer Applications and Quantitative Methods in Archaeology Conference (CAA 2016)*, Avril 2016.

S. Carrignon, A. Mosca, B. Rondelli, and J. Remesal. Computer modelling and simulation as heuristic tool to understand the past: the case of the EPNEt project. In *Model and Simulation 7*, May 2016.

S. Carrignon, I. Romanowska, and T. Brughmans. An Agent-Based Model of Trade in the Roman East (25 BC – AD 150). In *28th Theoretical Roman Archaeology Conference (TRAC)*, April 2018.

S. Carrignon, S. Shoda, L. Brainerd, C. Stevens, and E. Crema. Detecting cultural boundaries during the Jomon/Yayoi transition All roads lead to Rome: Using least cost path to explore cultural transmission during Roman Empire. In *9th worldwide conference of the Society for East Asian Archaeology*, July 2022.

S. Carrignon, S. Shoda, G. Maynard, and E. Crema. Investigating lithic toolkit spatial distribution during the jomon-yayoi transition in japan. In *29th Annual Meeting of the European Association of Archaeologist*. European Association of Archaeologists, 2023.

M. Coto-Sarmiento and S. Carrignon. Agent Based Model to detect variations in the transmission of potters from Baetica province. In H. Propylaeum, editor, *19th International Congress of Classical Archaeology*, pages 73–76, May 2023.

G. Dato, S. Carrignon, B. Zhu, A. Tarun, E. Strombom, R. Minxha, B. Ferguson, T. Eli, and P. Pika. Patterns In Globalization - Viewed through the lens of Trieste . In *Conference on Complex System*, September 2016.

**Pre-prints/Non-peer reviewed papers** .....

S. Carrignon, A. Ollé-Vila, S. Duran-Nebreda, and J. N. Adams. Modeling the coevolutionary dynamics in the lobaria pulmonaria lichen symbiosis. *Santa Fe CSSS Proceedings*, 2016.