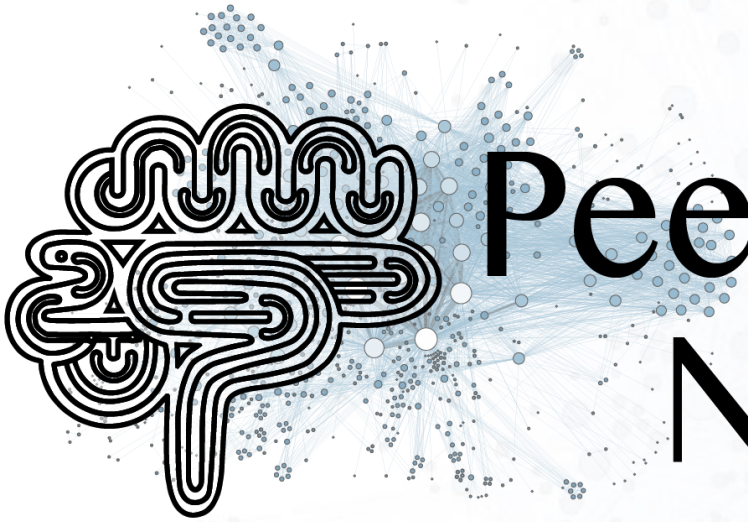


Peer Community In Neuroscience

Free and transparent preprint peer-review

@PCI_Neuro

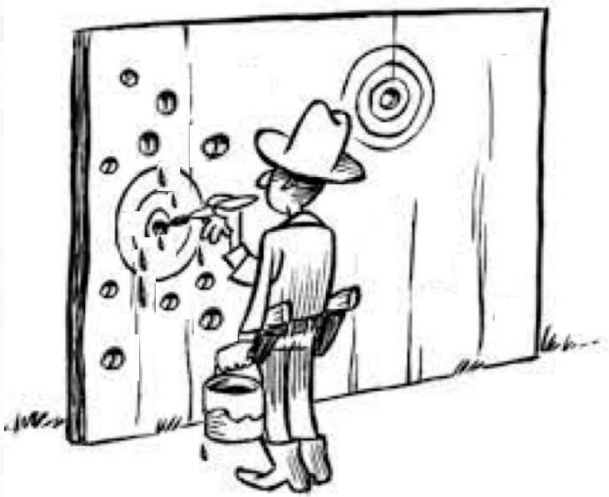
https://neuro.peercommunityin.org/

PCI

We’re facing several problems in journal publication

Science quality issues

- publication bias toward positive results
- story-telling – HARKing (Hypothesis stated After Results are Known)
- methods: not clear - not available
- data not available



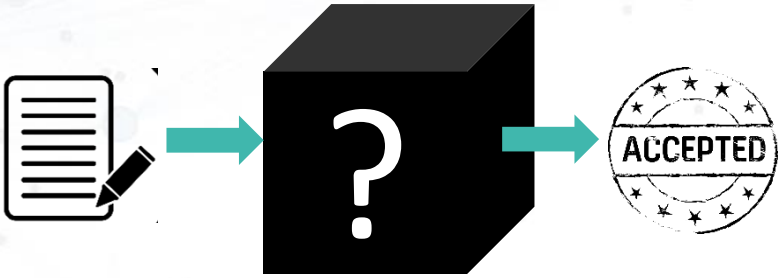
➔ 20-60% studies are non-reproducible

Begley, C. G.; Ellis, L. M. (2012). "Drug Development: Raise Standards for Preclinical Cancer Research". Nature.
Baker, M. 1,500 scientists lift the lid on reproducibility. Nature 533, 452–454 (2016). https://doi.org/10.1038/533452a
Open Science Collaboration, Estimating the reproducibility of psychological science. Science 349, aa4716 (2015).

Inefficient & non-transparent system

- submissions/rejections in cascade
- > 1-2 years to publish
- waste of evaluation

- invisible Reviews
- invisible Editorial Decisions
- unknown Editor



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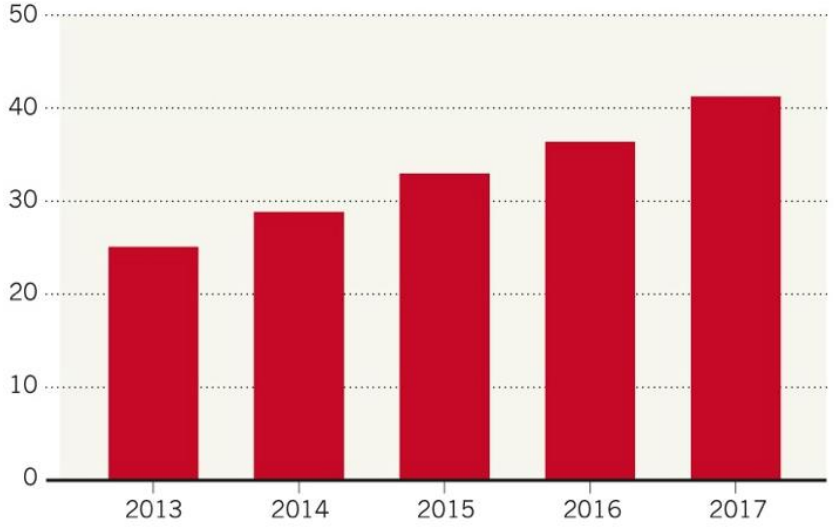
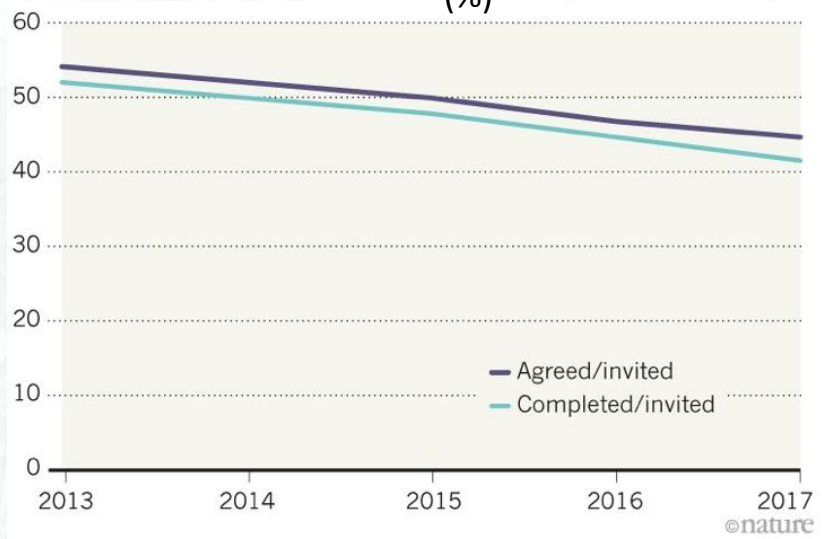
Reviewing is done by fewer people

Number of Reviewers invited (millions)



Proportion of accepted invitations (%)



https://www.nature.com/articles/d41586-018-06602-y

More and more reviewers needed

Less and less accepted invitations

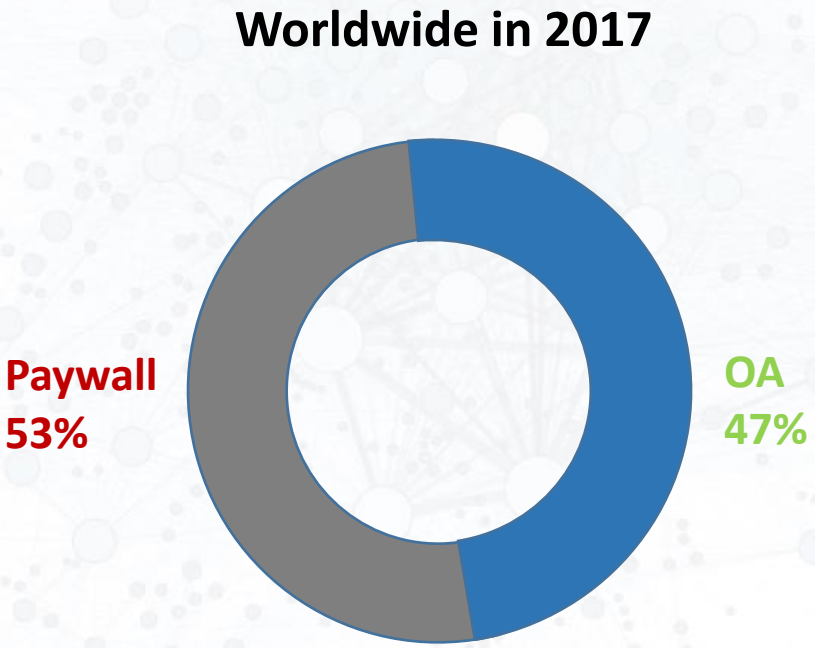
20% of scientists are performing up to 95% of all peer reviews
(10.1371/journal.pone.0166387)

Lack of visibility, lack of recognition

Closed system

-Less than 50% of publications are open access.

-This is an equality issue.



Piwowar et al. 2018 The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles. PeerJ. 2018;6:e4375.

Costly system & Fantastic margin profit

Europe: ~ €3 B/year

World: ~ €10 B/ year

for 3 millions articles published /year

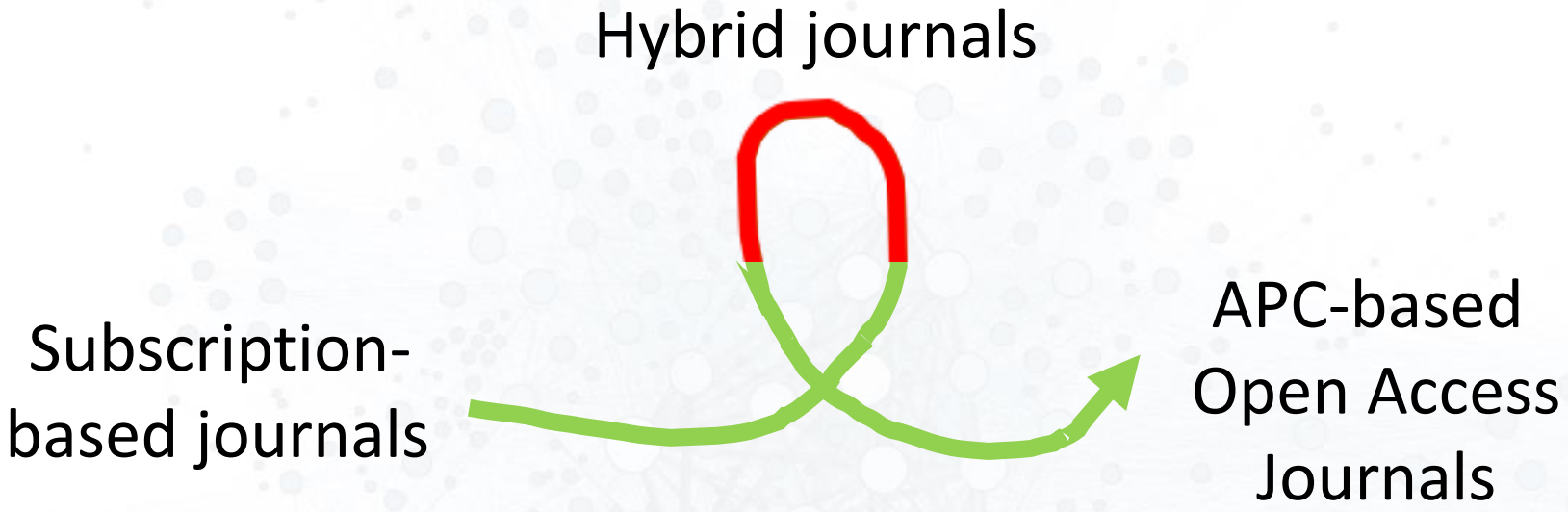
➔ cost of ~ €3000 /article

-Big equality issue!

Operating profit margin (%, 2019)

Sources: macrotrends.net, RELX annual report, bloomberg, SPARC, marketscreener.com,

Let’s pay twice … or even thrice!



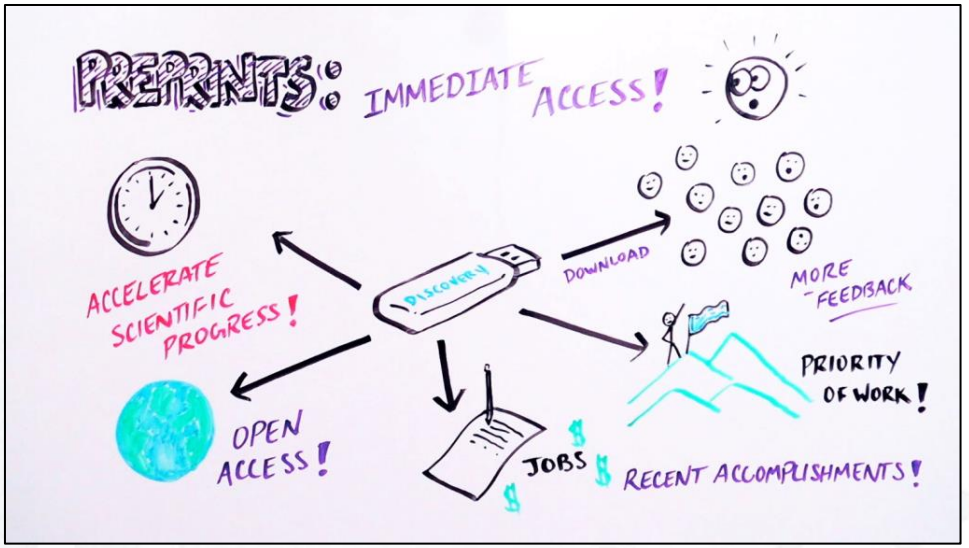
1- Libraries pay subscriptions
2- Laboratories pay APCs
3- Researchers are paid by research institutions to write, evaluate, edit, proofread, format articles

PCI

Preprints:
part of the solution

Preprints are good...

- Low cost
- Free for authors and readers
- Available immediately
- Versioned
- Proof of anteriority
- Searchable/Findable



But putative quality problem...

- No formal evaluation – no peer-review
- Everything can be found in open archives including preprints of very bad quality

Preprints are good...

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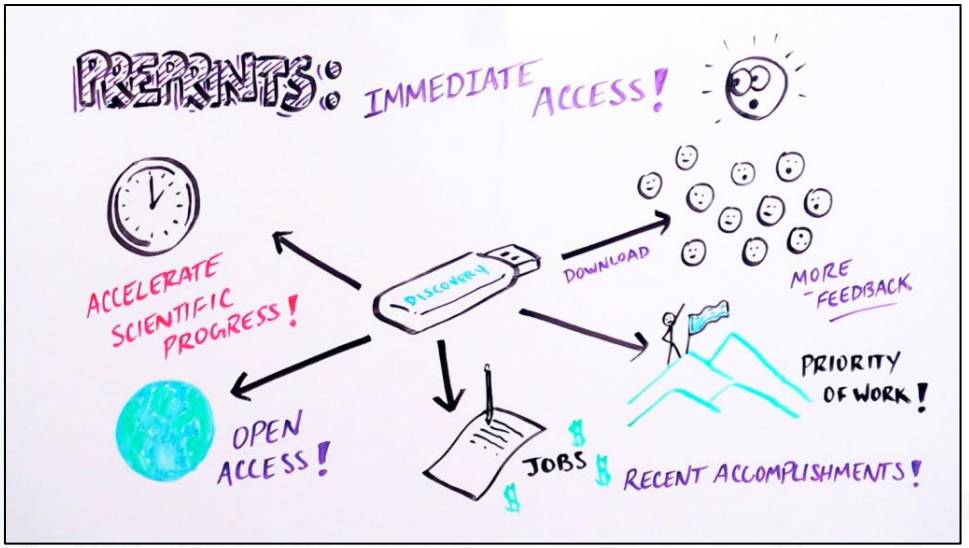


But putative quality problem...

- No formal evaluation – no peer-review
- Everything can be found in open archives including preprints of very bad quality

We therefore need preprint evaluation

The aim of PCI

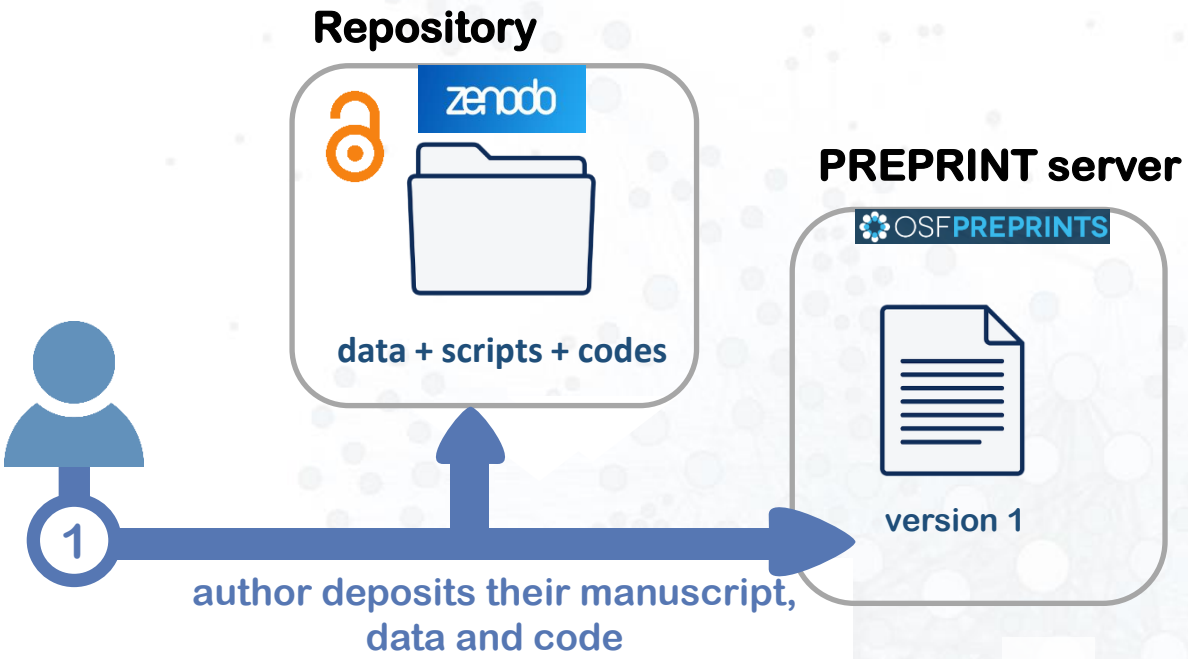
Communities of researchers evaluating (through peer review) and **recommending preprints** in their field.

etc …

PCI Ecology
PCI Evolutionary Biology
PCI Neuroscience
etc..

PCI

How does it work?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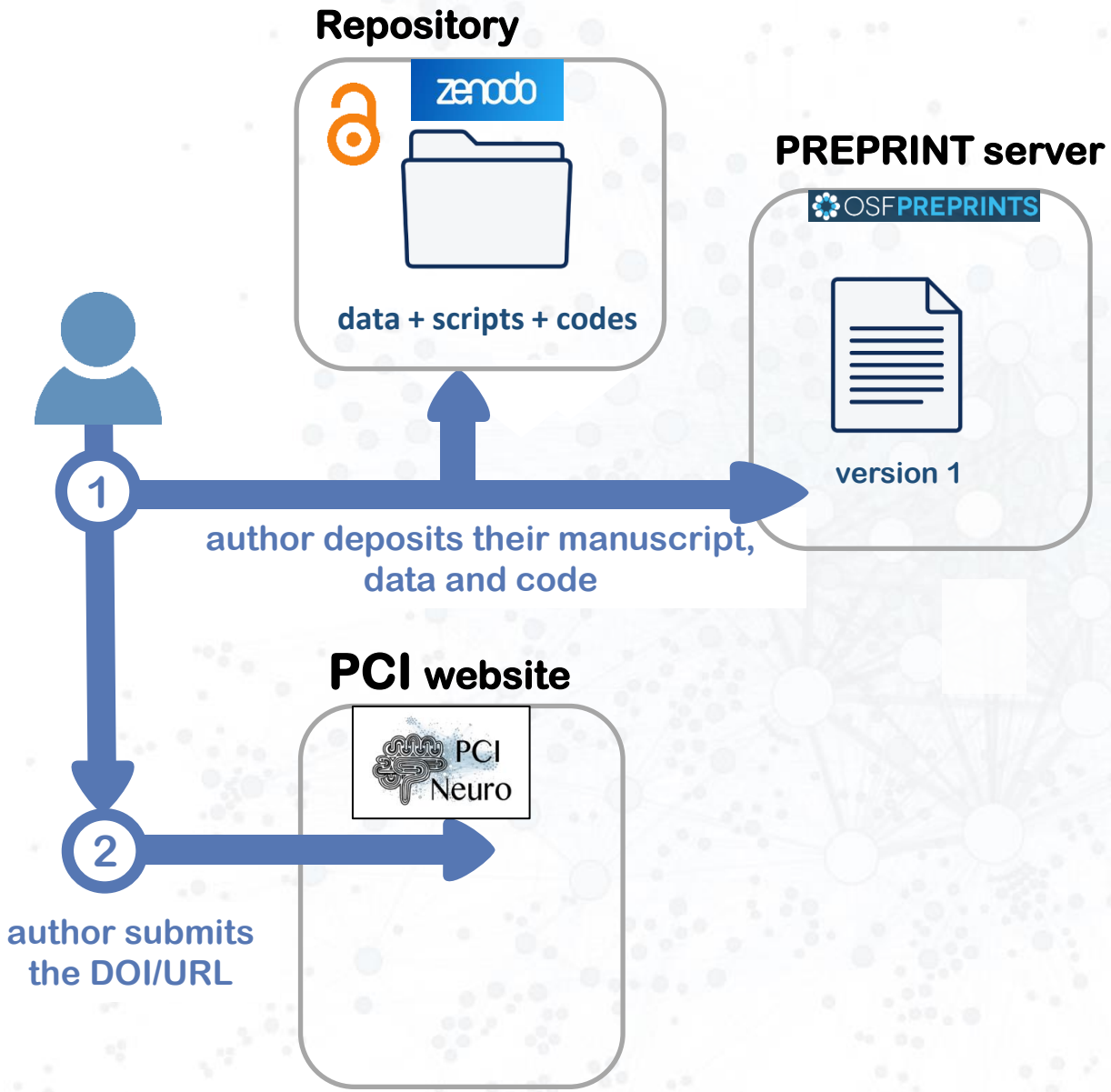
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PCI Neuro
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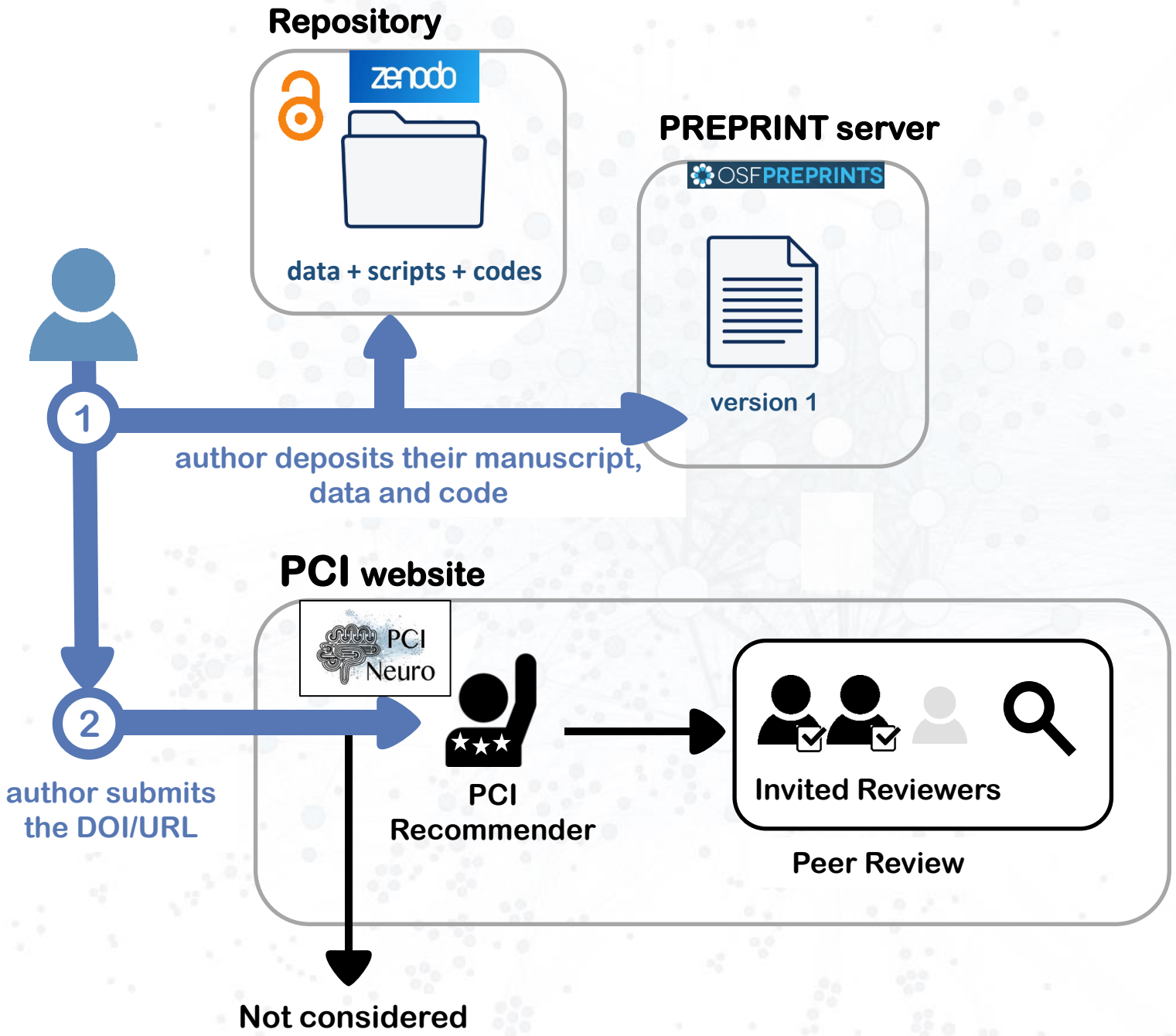
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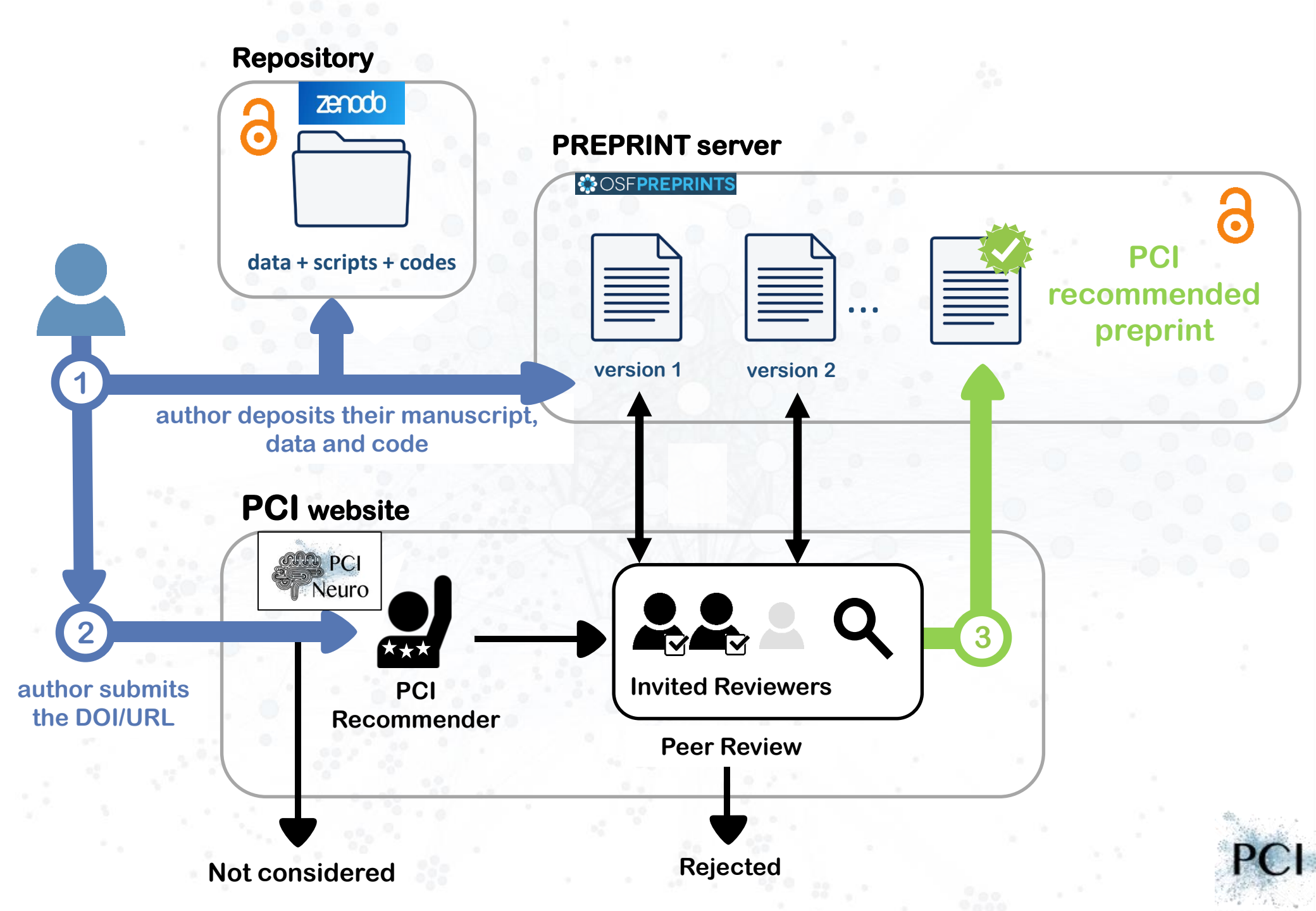
PCI Recommender
Invited Reviewers
Peer Review
Not considered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PCI recommended preprint
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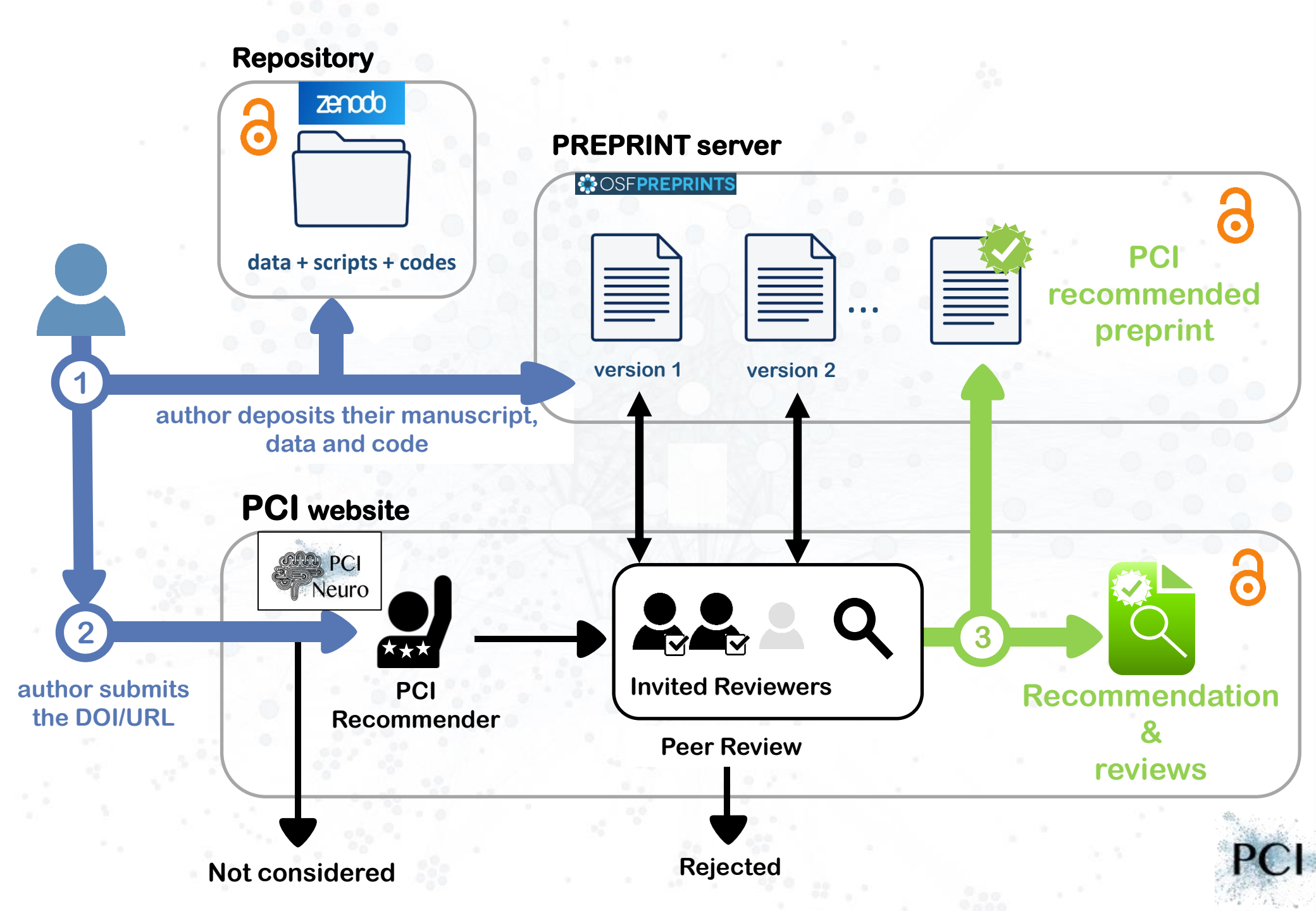
author submits the DOI/URL
PCI Recommender
Invited Reviewers
3
Peer Review
Not considered
Rejected
PCI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version 2
PCI recommended preprint
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2
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PCI Recommender
Invited Reviewers
Peer Review
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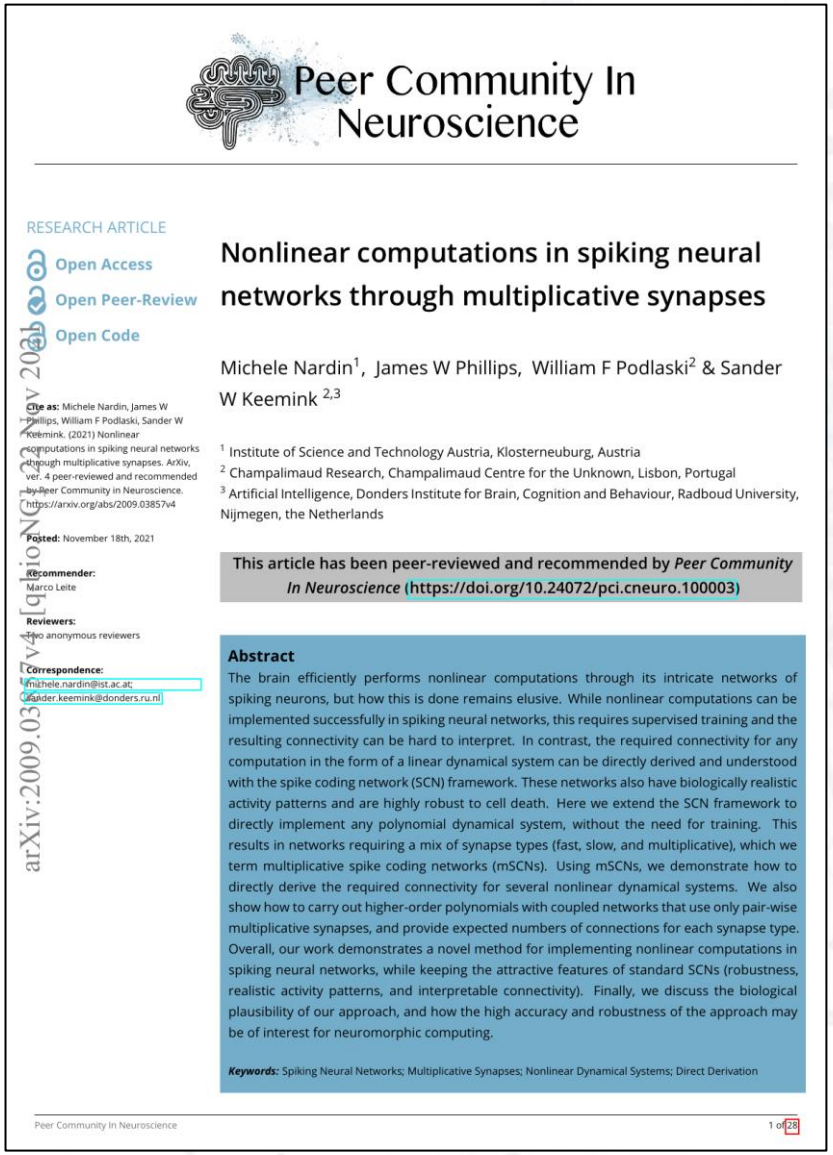
Recommendation & reviews
Not considered
Rejected
PCI

PCI-recommended preprint



Peer Community In Neuroscience

RESEARCH ARTICLE

Open Access
Open Peer-Review
Open Code

Nonlinear computations in spiking neural networks through multiplicative synapses

Michele Nardin[1], James W Phillips, William F Podlaski[2] & Sander W Keemink [2,3]

[1] Institute of Science and Technology Austria, Klosterneuburg, Austria
[2] Champalimaud Research, Champalimaud Centre for the Unknown, Lisbon, Portugal
[3] Artificial Intelligence, Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, the Netherlands

Cite as: Michele Nardin, James W Phillips, William F Podlaski, Sander W Keemink. (2021) Nonlinear computations in spiking neural networks through multiplicative synapses. ArXiv, ver. 4 peer-reviewed and recommended by Peer Community in Neuroscience. https://arxiv.org/abs/2009.03857v4

Posted: November 18th, 2021

Recommender: Marco Leite

Reviewers: Two anonymous reviewers

Correspondence: michele.nardin@ist.ac.at; sander.keemink@donders.ru.nl

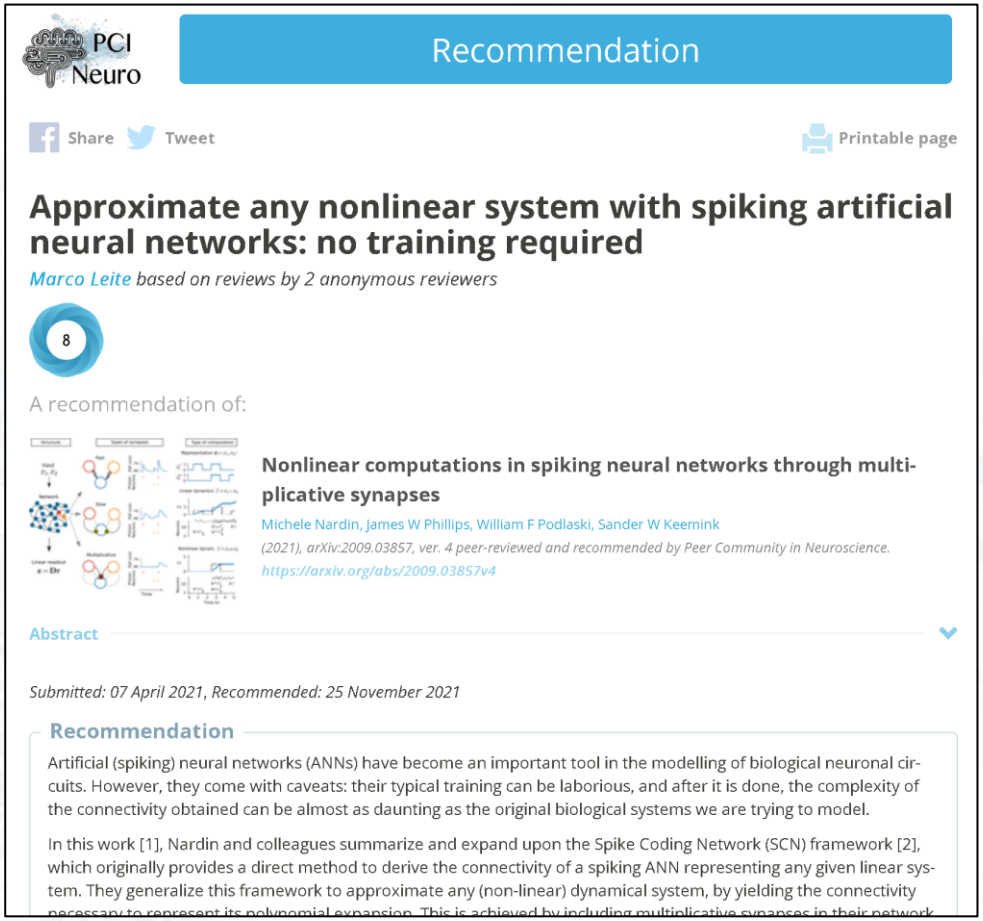
This article has been peer-reviewed and recommended by *Peer Community In Neuroscience* (https://doi.org/10.24072/pci.cneuro.100003)

Abstract

The brain efficiently performs nonlinear computations through its intricate networks of spiking neurons, but how this is done remains elusive. While nonlinear computations can be implemented successfully in spiking neural networks, this requires supervised training and the resulting connectivity can be hard to interpret. In contrast, the required connectivity for any computation in the form of a linear dynamical system can be directly derived and understood with the spike coding network (SCN) framework. These networks also have biologically realistic activity patterns and are highly robust to cell death. Here we extend the SCN framework to directly implement any polynomial dynamical system, without the need for training. This results in networks requiring a mix of synapse types (fast, slow, and multiplicative), which we term multiplicative spike coding networks (mSCNs). Using mSCNs, we demonstrate how to directly derive the required connectivity for several nonlinear dynamical systems. We also show how to carry out higher-order polynomials with coupled networks that use only pair-wise multiplicative synapses, and provide expected numbers of connections for each synapse type. Overall, our work demonstrates a novel method for implementing nonlinear computations in spiking neural networks, while keeping the attractive features of standard SCNs (robustness, realistic activity patterns, and interpretable connectivity). Finally, we discuss the biological plausibility of our approach, and how the high accuracy and robustness of the approach may be of interest for neuromorphic computing.

Keywords: Spiking Neural Networks; Multiplicative Synapses; Nonlinear Dynamical Systems; Direct Derivation

Recommendation text



PCI Neuro

Recommendation

Share Tweet Printable page

Approximate any nonlinear system with spiking artificial neural networks: no training required

Marco Leite based on reviews by 2 anonymous reviewers

8

A recommendation of:

Nonlinear computations in spiking neural networks through multiplicative synapses

Michele Nardin, James W Phillips, William F Podlaski, Sander W Keemink

(2021), arXiv:2009.03857, ver. 4 peer-reviewed and recommended by Peer Community in Neuroscience.
https://arxiv.org/abs/2009.03857v4

Abstract

Submitted: 07 April 2021, Recommended: 25 November 2021

Recommendation

Artificial (spiking) neural networks (ANNs) have become an important tool in the modelling of biological neuronal circuits. However, they come with caveats: their typical training can be laborious, and after it is done, the complexity of the connectivity obtained can be almost as daunting as the original biological systems we are trying to model.

In this work [1], Nardin and colleagues summarize and expand upon the Spike Coding Network (SCN) framework [2], which originally provides a direct method to derive the connectivity of a spiking ANN representing any given linear system. They generalize this framework to approximate any (non-linear) dynamical system, by yielding the connectivity necessary to represent its polynomial expansion. This is achieved by including multiplicative synapses in their network

Open Access Open Peer-Review

Open Data Open Code

PCI

Fate of PCI-recommended preprints

PCI-recommended preprint

Peer Community Journal

Direct publication in diamond open access

OR

PCI-friendly journals

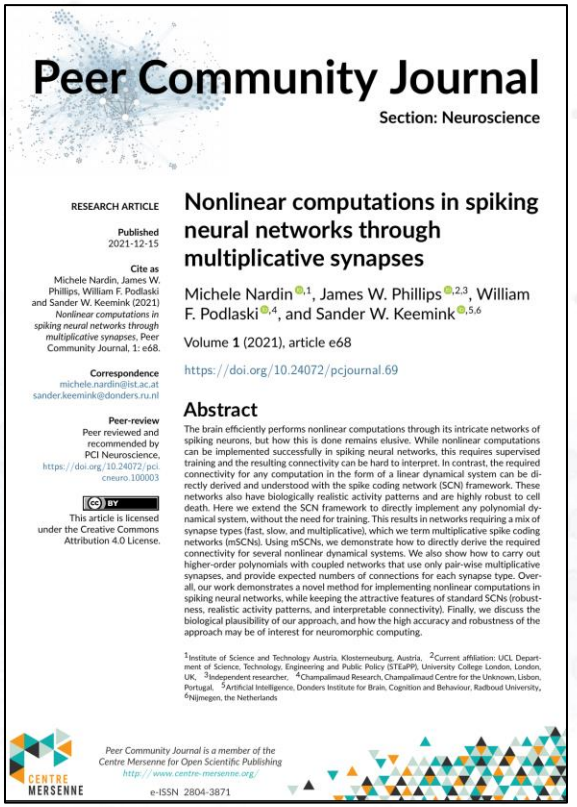
OR

Other journals

PCI

Peer Community Journal

https://peercommunityjournal.org/



- Launched November 2021
- Accepts **as is** all articles recommended by a PCI
- **Free for readers** (Open Access)
- **Free for authors** (no APC)

Consequences

- **Big savings for research** agencies (150 €/paper instead of 3000 € on average)
- **Results accessible** to all and right away because of preprints
- **Transparency** of data, methods, code
- **Transparency** of evaluations, discussion
- The editorial policy of a journal is replaced by a **clear and argued recommendation** text
- **Portable evaluation** can be taken to many journals
- Re-distributing responsibility to the **community** rather than for-profit publishers.

PCI in figures

14 PEER COMMUNITIES

477 SUBMITTED ARTICLES

290 RECOMMENDED ARTICLES

47 MEDIAN TIME TO 1ST DECISION (DAYS)

>9200 TWITTER FOLLOWERS

>5600 REGISTERED USERS

>1700 RECOMMENDERS

120 MANAGING BOARD MEMBERS

797 REVIEWERS

90 FRIENDLY JOURNALS

>12000 VISITORS TO PCI WEBSITES

103 SUPPORTING ORGANISATIONS

Supporting institutions awards and recognition

Grants, awards and projects

PCI is one of the winners of the first call for projects of the French National Open Science Fund (2020)

OUVRIR LA SCIENCE !

Pilot project in « Notify » with COAR, Harvard Library, Los Alamos Lab, HAL, etc...

2020 LIBER Award for Library Innovation

COAR
Confederation of Open Access Repositories

PCI

Scientific societies

Institutions and universities

Max Planck Institute
for Evolutionary Anthropology

Libraries and other supporters

PCI

Recognition by Doctoral Schools

Doctoral Programme in Biodiversity, Genetics and Evolution (BIODIV) – Univ. Porto & Univ Lisbon, Portugal

Programa de Doctorado en Biología Integrada – Univ. de Sevilla, Spain

ED Sciences de la Vie et de la Santé – Univ. Nice, France
ED SEVAB – Univ. Toulouse, France
ED Science de l'Environnement – Univ Aix Marseille, France
ED Gaïa – Univ Montpellier, France
ED Sciences, Technologies et Santé – Univ. La Réunion, France
ED Écologie, Géosciences, Agronomie, ALimentation – Univ. Rennes, France
ED Energie et Environnement – Univ. Perpignan, France
ED Sciences de la Mer et du Littoral – Univ. Brest, Nantes, , France
ED Theodore Monod – Univ Poitiers, France
ED ABIES – Univ. Saclay, France
ED Environnements-Santé – Univ. Bourgogne Franche-Comté, France
ED E2M2 – Univ Lyon, France
ED Sciences de la Nature et de l'Homme : écologie & évolution – MNHN, France
ED Sciences du végétal : du gène à l'écosystème – Univ. Orsay, France
ED SMRE – Univ. Lille, France
ED Structure et Dynamique des Systèmes Vivants – Univ. Saclay, France

ED Sciences Exactes et Applications – Univ. Pau et Pays de l'Adour, France

ED SVSAE – Univ. Clermont Auvergne, France

Recognition by evaluation committees

Finland: recognition of PCI Evol Biol

Julkaisufoorumi

France:

Sections 29, 30 and 52 of the National Committee for Scientific Research

CNU Conseil National des Universités

Section 67 of the Conseil National des Universités

évaluation et qualité Hcéres

INRAE

CSS BPE of the French National Institute for Agricultural Research

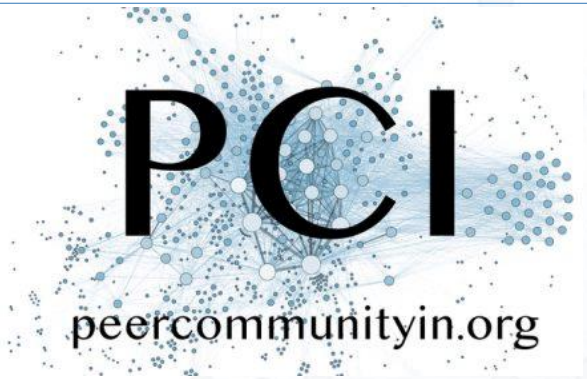
IRD Institut de Recherche pour le Développement FRANCE

CSS3 of the French National Research Institute for Development

Consider the articles recommended by PCI Evol Biol, PCI Ecology and PCI Paleo… in the same way as an article published in an indexed scientific journal

PCI

How to participate?



- **Submit your articles to a PCI**
- **Spread the word**
- **Give us contacts to obtain support and recognition**
- **Register on the PCI websites (to be a reviewer)**
- **Consider becoming a recommender or starting a new PCI if one does not exist in your field**

PCI

Thanks!

@PeerCommunityIn

https://peercommunityin.org

Current PCIs

2017
PCI Evolutionary Biology

2018
PCI Ecology
PCI Paleontology

2019
PCI Circuit Neuroscience
→ PCI Neuroscience
PCI Animal -Science
PCI Zoology

2020
PCI Mathematical and Computational Biology
PCI Forest and Wood Science
PCI Network Science
PCI Genomics
PCI Archaeology

2021
PCI Registered Reports
PCI Ecotoxicology and Environmental Chemistry
PCI Infections

PCI-friendly journals

3 categories

1. Accept without further reviews

- Peer Community Journal
- Frontiers of Biogeography
- Rethinking Ecology
- Acarologia
- Belgium J of Zool
- J Lithic Studies
- OCL
- Theoretical Roman Archaeology Journal

PCI Registered Reports

- Addiction Research & Theory
- Advances in Cognitive Psychology
- BMJ Open Science
- Brain and Neuroscience Advances
- Cambridge Educational Research e-Journal
- Cortex
- Experimental Psychology
- F1000Research
- Infant and Child Development
- Journal for Reproducibility in Neuroscience
- Journal of Cognition
- Meta-Psychology
- NeuroImage: Reports
- Peer Community Journal
- PeerJ
- PeerJ Computer Science
- PeerJ Physical Chemistry
- PeerJ Organic Chemistry
- PeerJ Inorganic Chemistry
- PeerJ Analytical Chemistry
- PeerJ Materials Science
- Royal Society Open Science
- Swiss Psychology Open

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PCI-friendly journals

3 categories

1. Accept without further reviews

2. Fast response (≤ 5 days) to presubmission enquiry

- Accept without further reviews
  OR
- Need further reviews
  OR
- Not interested

- Ecology Letters
- PLOS Biology
- Evolution
- OIKOS
- Journal of Evolutionary Biology
- Evolution Letters
- Journal of Biogeography
- GigaByte
- GigaScience
- Ecology and Evolution
- Animal Welfare
- Annals of Forest Science
- Bulletin of the History of Archaeology
- Bulletins et Mémoires de la Société d'Anthropologie de Paris (BMSAP)
- Collabra: Psychology
- European zoological journal
- Evolutionary Applications
- Evolutionary Ecology
- Heritage
- Journal of Applied Entomology
- Journal of Avian Biology
- Journal of Computer Applications in Archaeology
- Journal of Neolithic Archaeology
- Journal of Open Archaeology Data
- Journal of the Israel Prehistoric Society
- Molecular Ecology
- Veterinary Research

PCI

PCI-friendly journals

3 categories

1. Accept without further reviews

2. Fast response (≤ 5 days) to presubmission enquiry

   - Accept without further reviews
   - OR
   - Need further reviews
   - OR
   - Not interested

3. May use the evaluations of PCI if adequate

- Adansonia
- Agronomy for Sustainable Development
- Anthropozoologica
- Archäologische Informationen
- Comptes Rendus Palevol
- Cryptogamie, Algologie
- Cryptogamie, Bryologie
- Cryptogamie, Mycologie
- eLife
- European Journal of Taxonomy
- EXARC Journal
- G3: Genes, Genomes, Genetics
- Genetics
- Geodiversitas
- Global Ecology and Biogeography
- Internet Archaeology
- Journal of Pollination Ecology
- Naturae
- Neuroanatomy and Behaviour
- Zoosystema
- Animal
- Animal microbiome
- Anthropologica et Praehistorica
- Arqueologia
- BMC Ecology and Evolution
- Botany Letters
- Genetica
- Integrative Organismal Biology
- Molecular Ecology Resources
- Nordic Journal of Botany
- Open Quaternary
- PLOS One
- Quaternary
- Trends in Plant Science

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