FisMatEcol Boletin

Marzo2024

Dr. Oliver López Corona
Dra. Elvia Ramírez Carrillo

Eventos

FisMatEcol

4°Escuela de Primavera de Física y Matemáticas Aplicadas a la Ecología

29, 30 de abril y 1 de mayo

VIRTUAL

IIMAS UNAM

CONACYT

Facultad de Psicología

Require pre-registro: https://forms.gle/UEw2rHTBPmNJC3xx5

Organiza: IIMAS, Fac de Psicología, IxM-CONACyT

Comité: Dr. Oliver López-Corona, Dra. Elvia Ramírez-Carrillo, Dr. Pablo Padilla

Sitio web: https://www.lopezoliver.otrasenda.org/fismatecol/

FisMatEcol

4°Escuela de Primavera de Física y Matemáticas Aplicadas a la Ecología

29, 30 de abril y 1 de mayo 2024

VIRTUAL

Programa:

Lunes 29 abril

9:00-10:00 **Platica inagural.** Oliver López Corona. *IxM IIMAS*
10:00-12:00 **Física y Matemáticas en las ciencias de la vida. Enseñanza formal y no formal.** David Mustri-Trejo. *Universidad Anáhuac Veracruz, campus Xalapa.*
12:00-14:00 **Antifragile feedback control for biological and technical systems.** Cristian Axenie. *Nuremberg Institute of Technology.*

Martes 30 de abril

9:00-10:00 **Mesa de discusión.** Oliver López, Pablo Padilla y Elvia Ramírez.
10:00-12:00 **A non-standard introduction to information theory.** Alessandro Bravetti. *IIMAS-UNAM.*
12:00-14:00 **A new tool in the financial market. Biodiversity Credits and how to set up the reporting.** Michael Schmidt. *Biometrio.earth GmbH (private, Germany based company).*

Miércoles 1 de mayo

9:00-10:00 **Mesa de discusión.** Oliver López, Pablo Padilla y Elvia Ramírez.
10:00-12:00 **Series de tiempo en percepción remota y salud ecosistémica.** Inder Tecuapetla. *CONABIO.*
12:00-14:00 **El marco de pensamiento de la Toma de Decisiones Robustas: Aplicaciones para sistemas de energía.** Giovanni H. Uribe. *Transition Modelling Lab .*

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Complex Systems Summer School

Study Complex Behaviors Across Systems

21
MAR

INTELIGENCIA ARTIFICIAL PARA ENTENDER, EXPLICAR Y OPTIMIZAR INTELIGENCIA ARTIFICIAL

SMB

Sociedad Mexicana de Bioquímica
Neurobiología

V Neurobiology Meeting of the Mexican Society for Biochemistry

April 13-17, 2024

Morelia, Michoacán

Centro Cultural Universitario

https://sites.google.com/view/smb-neuro24/home

Plenary lectures, symposia, oral and poster sessions

Glia, Extracellular vesicles in the pshysiology of the nervous system, Microbiota-gut-brain axis, Neurodegenerative diseases, Brain aging

Pre-Meeting Course

"Use and applications of microscopy imaging in Neuroscience"

Organizing Committee

Isaac G-santoyo Facultad de Psicología, UNAM; Laura Medina, Universidad de Guadalajara; Aurea Orozco, ENES Juriquilla, UNAM; Luis B. Tovar-y-Romo, Instituto de Fisiología Celular, UNAM; Alfredo Varela, Instituto de Neurobiología, UNAM; Carmen Vivar, CINVESTAV, Angélica Zepeda; Instituto de Investigaciones Biomédicas, UNAM

Abstract submission deadline: February 15, 2024

Information: *neurobiologia@smb.org.mx*

congresoneurobiologia.smb@gmail.com

Art by Rafael Flores Correa

ENES Juriquilla · CUCBA · CONAHCYT · Instituto de Neurobiología · OCV Michoacán · ICTI · The Company of Biologists · Instituto de Fisiología Celular

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Conceptos

What can we learn from charlatans and the different ways to model reality

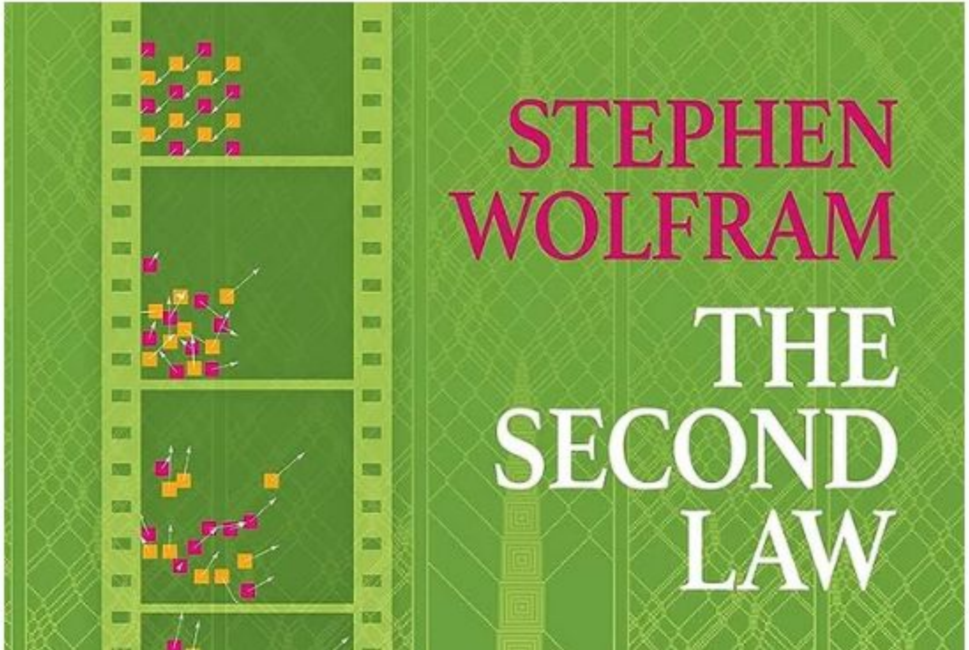
Oliver López Corona
6 min read · Mar 4, 2024

3

Some (not so) random conversation on “Entropy” by Wolfram

Oliver López Corona

7 min read · Aug 22, 2023



Science
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EXPERT VOICES

How do we know how smart AI systems are?

MELANIE MITCHELL Authors Info & Affiliations

SCIENCE · 13 Jul 2023 · Vol 381, Issue 6654 · DOI: 10.1126/science.adj5957

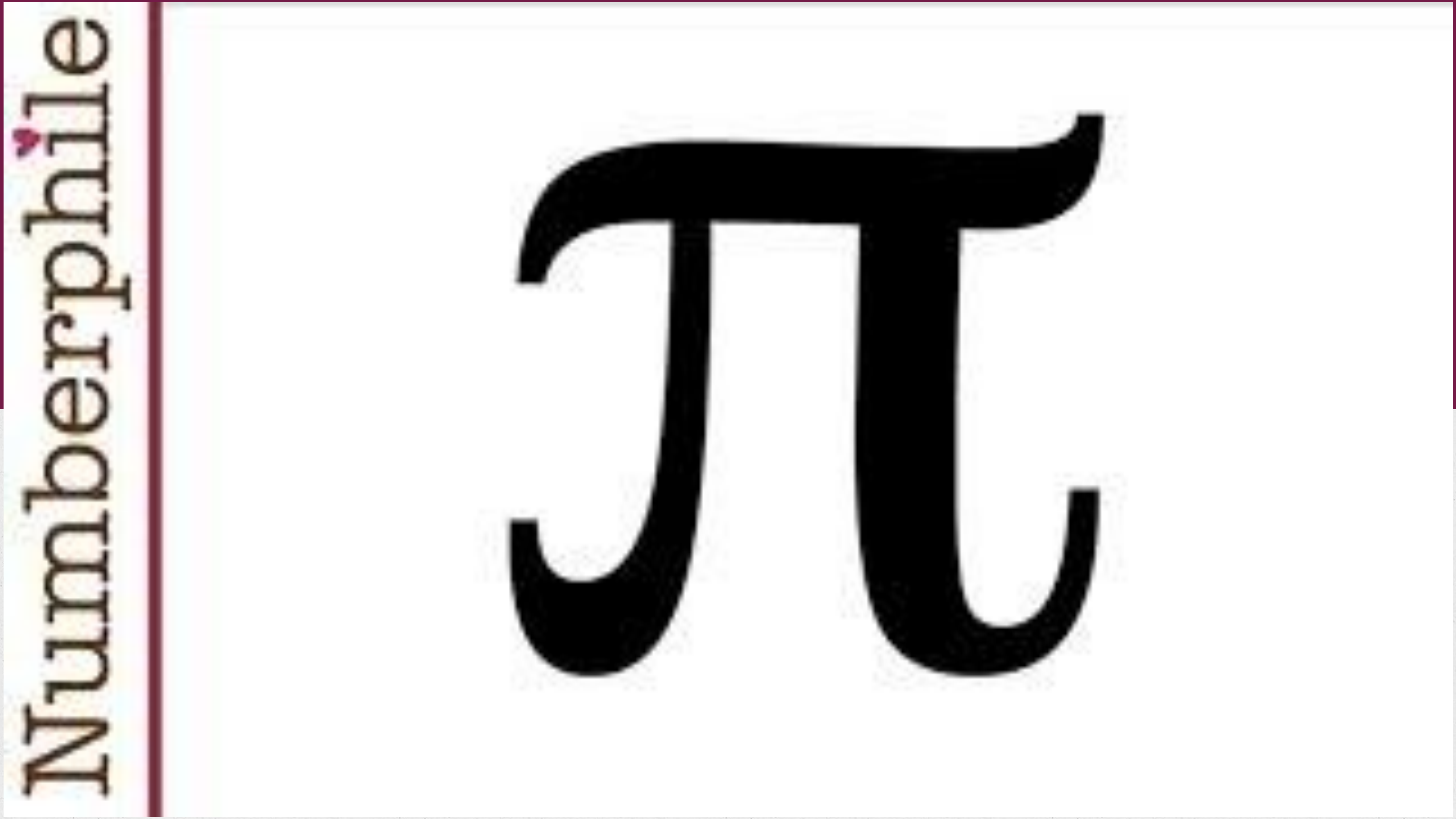
RELATED INTRODUCTION TO SPECIAL ISSUE

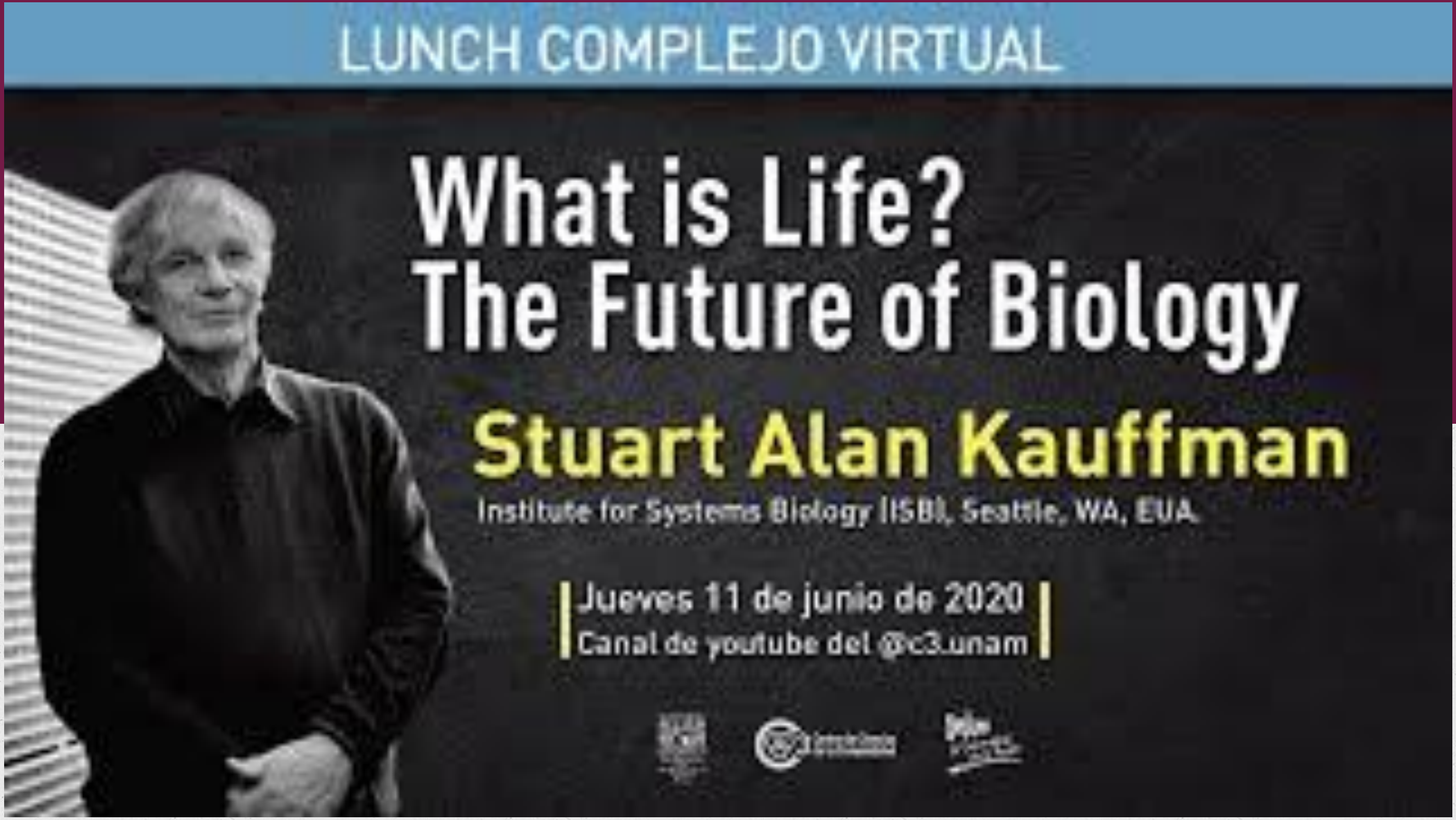
A machine-intelligent world

SCIENCE • 14 JUL 2023

In 1967, Marvin Minksy, a founder of the field of artificial intelligence (AI), made a bold prediction: "Within a generation…the problem of creating 'artificial intelligence' will be substantially solved." Assuming that a generation is about 30 years, Minsky was clearly overoptimistic. But now, nearly two generations later, how close are we to the original goal of human-level (or greater) intelligence in machines?

Some leading AI researchers would answer that we are quite close. Earlier this year, deep-learning pioneer and Turing Award winner Geoffrey Hinton told. *Technology Review*, "I have suddenly switched my views on whether these things are going to be more intelligent than us. I think they're very close to it now and they will be much more intelligent than us in the future." His fellow Turing Award winner Yoshua Bengio voiced a similar opinion in a recent blog post: "The recent advances suggest that even the future where we know how to build superintelligent AIs (smarter than humans across the board) is closer than most people expected just a year ago."


Numberphile


LUNCH COMPLEJO VIRTUAL
What is Life?
The Future of Biology
Stuart Alan Kauffman
Institute for Systems Biology (ISB), Seattle, WA, EUA.
Jueves 11 de junio de 2020
Canal de youtube del @c3.unam

Cursos

ILLINOIS

Introducción a la sostenibilidad

American Museum of Natural History

Ecología: Dinámica y conservación de los ecosistemas

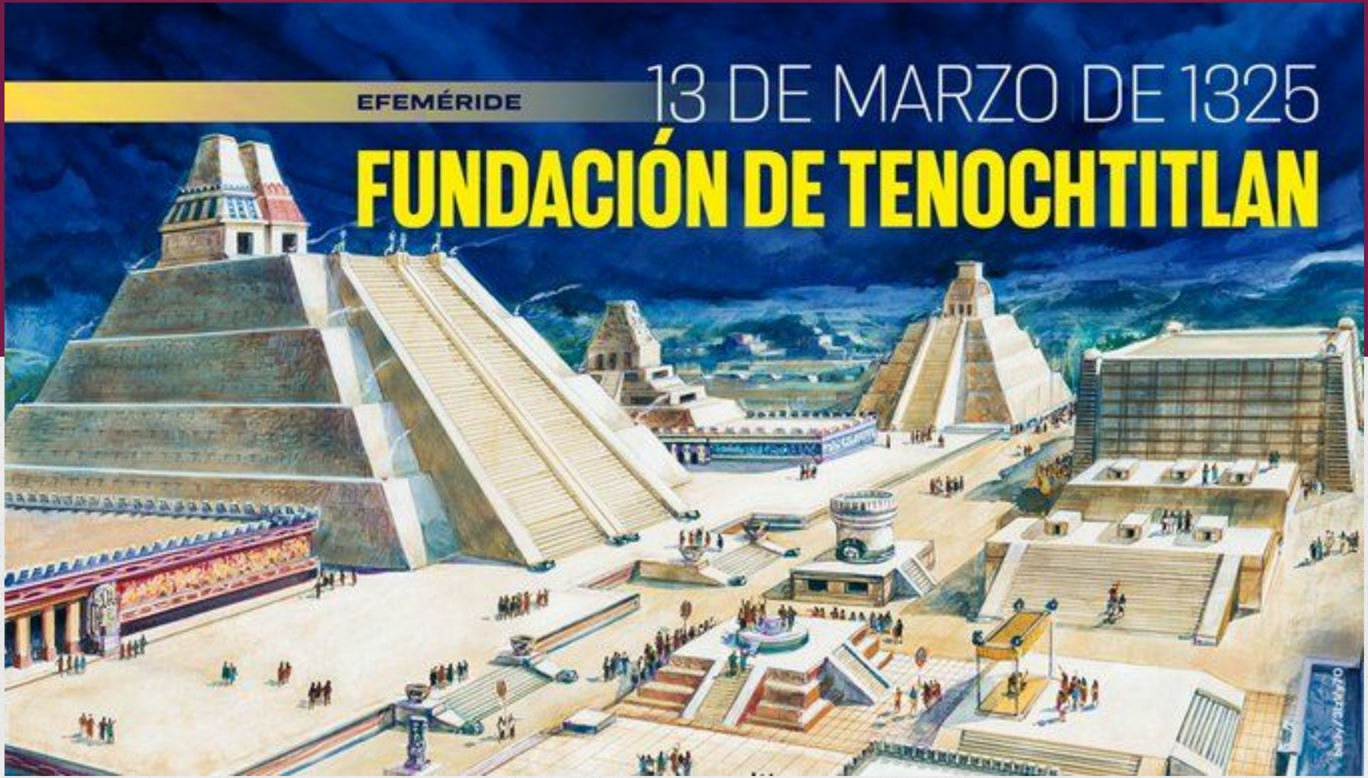

FOR THE
LOVE OF

MEMORIA DE LA ESCUELA


Game Theory
Collective Behavior
Nonlinear Dynamics
Emergence
Networks
Complex Systems
Self-Organization
Systems Theory
Evolution & Adaptation
Pattern Formation

Mi propuesta de que es lo que debería enseñarse y cómo.

Cultura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TENOCHTITLAN
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3 de marzo 2021
CULTURA
INAH


LOS ANIMALES
Y EL RECINTO SAGRADO
DE TENOCHTITLAN
EL COLEGIO NACIONAL

Artículo

Diversity begets stability: Sublinear growth and competitive coexistence across ecosystems

IAN A. HATTON, ONOFRIO MAZZARISI, ADA ALTIERI, AND MATTEO SMERLAK Authors Info & Affiliations

SCIENCE - 15 Mar 2024 - Vol 383, Issue 6688 - DOI: 10.1126/science.adg8488

CHECK ACC

Editor's summary

Some of Earth's most biodiverse ecosystems are also its most stable over time, yet ecological theory predicts that communities become less stable when more species co-occur. The most commonly used models of species coexistence are derived from the Lotka-Volterra model, which assumes that populations follow logistic growth patterns and that self-regulation is required to allow multiple species to stably co-exist. Hatton *et al*. show that an alternative model with sublinear population growth provides nearly identical predictions to generalized Lotka-Volterra models at the population level but very different predictions for communities. Under the sublinear model, diversity promotes stability. This model is consistent with published population time series and macroecological scaling relationships. —Bianca Lopez

Systematic Map | Open access | Published: 15 February 2024

Existing evidence on the use of environmental DNA as an operational method for studying rivers: a systematic map and thematic synthesis

R. Cruz-Cano, M. Kolb, R. A. Saldaña-Vázquez, L. Bretón-Deval, N. Cruz-Cano & A. Aldama-Cervantes

Environmental Evidence **13**, Article number: 2 (2024) | Cite this article

Abstract

Background

Environmental DNA (eDNA) is the DNA that can be extracted from an environmental sample, enabling the monitoring of whole biological communities across a large number of samples, at a potentially lower cost, which can significantly benefit river conservation. A systematic mapping protocol was designed to investigate the use of eDNA in rivers, specifically in terms of research topics, geographic and taxonomic biases, as well as information gaps. Furthermore, the potential research opportunities of eDNA in rivers and possible paths to find this kind of information on available platforms are identified.

Numerosity Categorization by Parity in an Insect and Simple Neural Network

Scarlett R. Howard[1,2*] Julian Greentree[3] Aurore Avarguès-Weber[4] Jair E. Garcia[5]
Andrew D. Greentree[6] Adrian G. Dyer[5,7]

[1] Centre for Integrative Ecology, School of Life and Environmental Sciences, Deakin University, Burwood, VIC, Australia
[2] School of Biological Sciences, Monash University, Clayton, VIC, Australia
[3] School of Science, Royal Melbourne Institute of Technology (RMIT) University, Melbourne, VIC, Australia
[4] Centre de Recherches sur la Cognition Animale (CRCA), Centre de Biologie Intégrative (CBI), Université de Toulouse, CNRS, UPS, Toulouse, France
[5] Bio-Inspired Digital Sensing Lab, School of Media and Communication, Royal Melbourne Institute of Technology (RMIT) University, Melbourne, VIC, Australia
[6] Australian Research Council (ARC) Centre of Excellence for Nanoscale BioPhotonics, School of Science, Royal Melbourne Institute of Technology (RMIT) University, Melbourne, VIC, Australia
[7] Department of Physiology, Monash University, Clayton, VIC, Australia

A frequent question as technology improves and becomes increasingly complex, is how we enable technological solutions and models inspired by biological systems. Creating technology based on humans is challenging and costly as human brains and cognition are complex. The honeybee has emerged as a valuable comparative model which exhibits some cognitive-like behaviors. The relative simplicity of the bee brain compared to large mammalian brains enables learning tasks, such as categorization, that can be mimicked by simple neural networks. Categorization of abstract concepts can be essential to how we understand complex information. Odd and even numerical processing is known as a parity task in human mathematical representations, but there appears to be a complete absence of research exploring parity processing in non-human animals. We show that free-flying honeybees can visually acquire the capacity to differentiate between odd and even quantities of 1–10 geometric elements and extrapolate this categorization to the novel numerosities of 11 and 12, revealing that such categorization is accessible to a comparatively simple system. We use this information to

Connectivity conservation planning through deep reinforcement learning

Julián Equihua[1] | Michael Beckmann[1] | Ralf Seppelt[1,2,3]

[1]Department of Computational Landscape Ecology, Helmholtz Centre for Environmental Research (UFZ), Leipzig, Germany

[2]Institute of Geoscience and Geography, Martin-Luther-University Halle-Wittenberg, Halle (Saale), Germany

[3]German Centre for Integrative Biodiversity Research (iDiv), Leipzig, Germany

Correspondence
Julián Equihua
Email: julian.equihua@ufz.de

Funding information
Deutscher Akademischer Austauschdienst, Grant/Award Number: 91713889

Handling Editor: Lorna Hernandez-Santin

Abstract

1. The United Nations has declared 2021–2030 the decade on ecosystem restoration with the aim of preventing, stopping and reversing the degradation of the ecosystems of the world, often caused by the fragmentation of natural landscapes. Human activities separate and surround habitats, making them too small to sustain viable animal populations or too far apart to enable foraging and gene flow. Despite the need for strategies to solve fragmentation, it remains unclear how to efficiently reconnect nature. In this paper, we illustrate the potential of deep reinforcement learning (DRL) to tackle the spatial optimisation aspect of connectivity conservation planning.
2. The propensity of spatial optimisation problems to explode in complexity depending on the number of input variables and their states is and will continue to be one of its most serious obstacles. DRL is an emerging class of methods focused on training deep neural networks to solve decision-making tasks and has been used to learn good heuristics for complex optimisation problems. While the potential of DRL to optimise conservation decisions seems huge, only few examples of its application exist.
3. We applied DRL to two real-world raster datasets in a connectivity planning setting, targeting graph-based connectivity indices for optimisation. We show that DRL converges to the known optimums in a small example where the objective is the overall improvement of the Integral Index of Connectivity and the only constraint is the budget. We also show that DRL approximates high-quality solutions on a large example with additional cost and spatial configuration constraints where the more complex Probability of Connectivity Index is targeted. To the best of our knowledge, there is no software that can target this index for optimisation on raster data of this size.

Antifragility as a complex system's response to perturbations, volatility, and time

Cristian Axenie[1], **Oliver López-Corona**[2], **Michail A. Makridis**[3], **Meisam Akbarzadeh**[4], **Matteo Saveriano**[5], **Alexandru Stancu**[6], **and Jeffrey West**[7,*]

[1]Department of Computer Science and Center for Artificial Intelligence, Nuremberg Institute of Technology Georg Simon Ohm, Nuremberg, Germany
[2]Investigadores por México (IxM) at Instituto de Investigaciones en Matemáticas Aplicadas y Sistemas (IIMAS), Universidad Nacional Autónoma de México (UNAM), Ciudad Universitaria, CDMX, México
[3]IVT, Civil Environmental and Geomatic Engineering, ETH Zurich, Switzerland
[4]Department of Transportation Engineering, Isfahan University of Technology, Isfahan, Iran
[5]Department of Industrial Engineering, University of Trento, Trento, Italy
[6]Department of Electrical and Electronic Engineering, The University of Manchester, Manchester, UK
[7]Department of Integrated Mathematical Oncology, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL, USA

*jeffrey.west@moffitt.org

ABSTRACT

Antifragility characterizes the benefit of a dynamical system derived from the variability in environmental perturbations. Antifragility carries a precise definition that quantifies a system's output response to input variability. Systems may respond poorly to perturbations (fragile) or benefit from perturbations (antifragile). In this manuscript, we review a range of applications of antifragility theory in technical systems (e.g., traffic control, robotics) and natural systems (e.g., cancer therapy, antibiotics). While there is a broad overlap in methods used to quantify and apply antifragility across disciplines, there is a need for precisely defining the scales at which antifragility operates. Thus, we provide a brief general introduction to the properties of antifragility in applied systems and review relevant literature for both natural and technical systems' antifragility. We frame this review within three scales common to technical systems: intrinsic (input-output nonlinearity), inherited (extrinsic environmental signals), and interventional (feedback control), with associated counterparts in biological systems: ecological (homogeneous systems), evolutionary (heterogeneous systems), and interventional (control). We use the common noun in designing systems that exhibit antifragile behavior across scales and guide the reader along the spectrum of fragility–adaptiveness–resilience–robustness–antifragility, the principles behind it, and its practical implications.

1 Introduction

ANTIFRAGILE is a term coined to describe the opposite of fragile, as defined in a recent book that generated significant interest in both the public and scientific domain[1]. Although the term has a wide range of applications, it contains a precise and mathematical definition. Systems or organisms can be defined as antifragile if they derive benefit from systemic variability,

Videos


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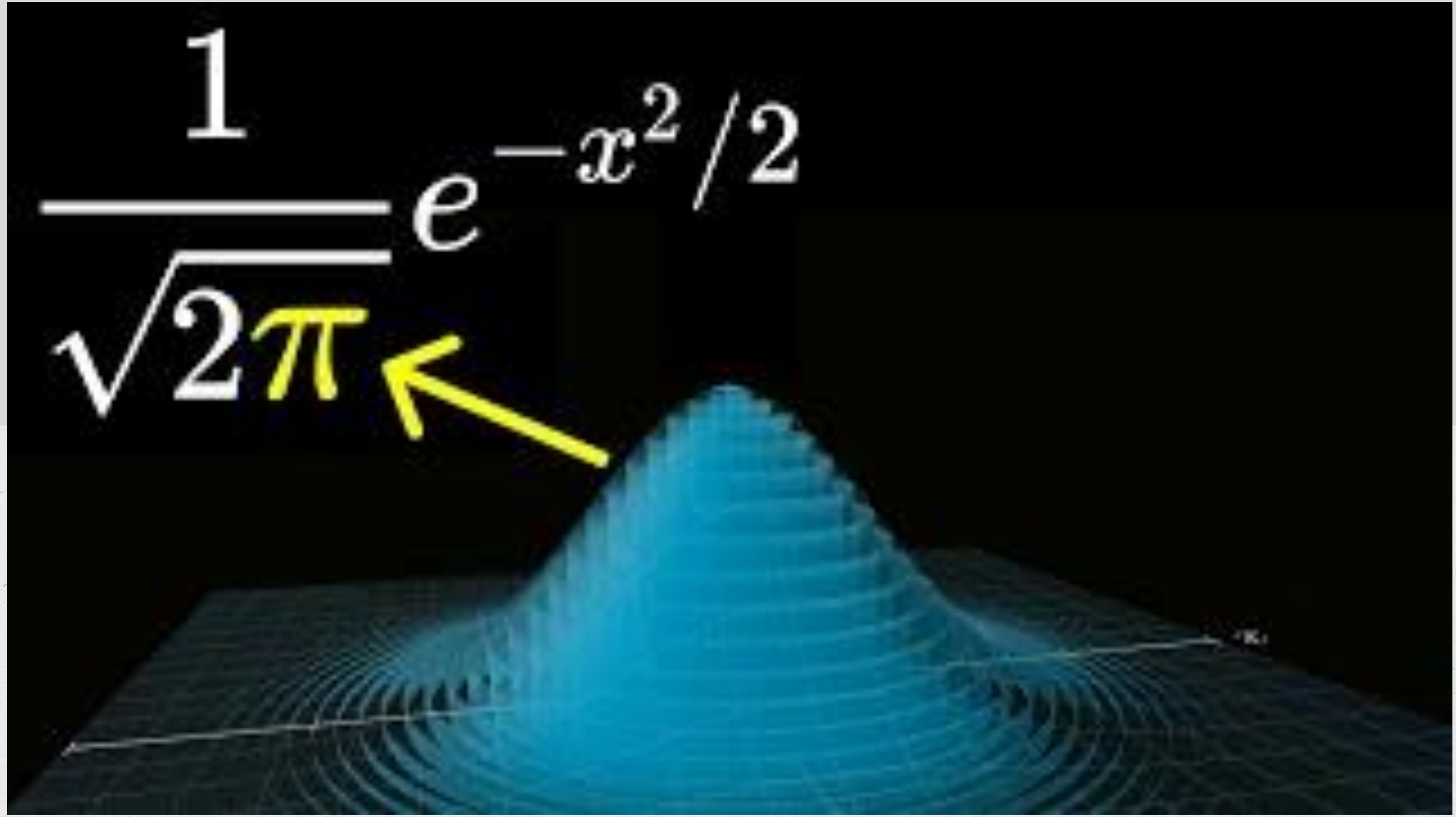
Villa Victoria
El Bosque
Valle de Bravo


6, 28, 496 ...?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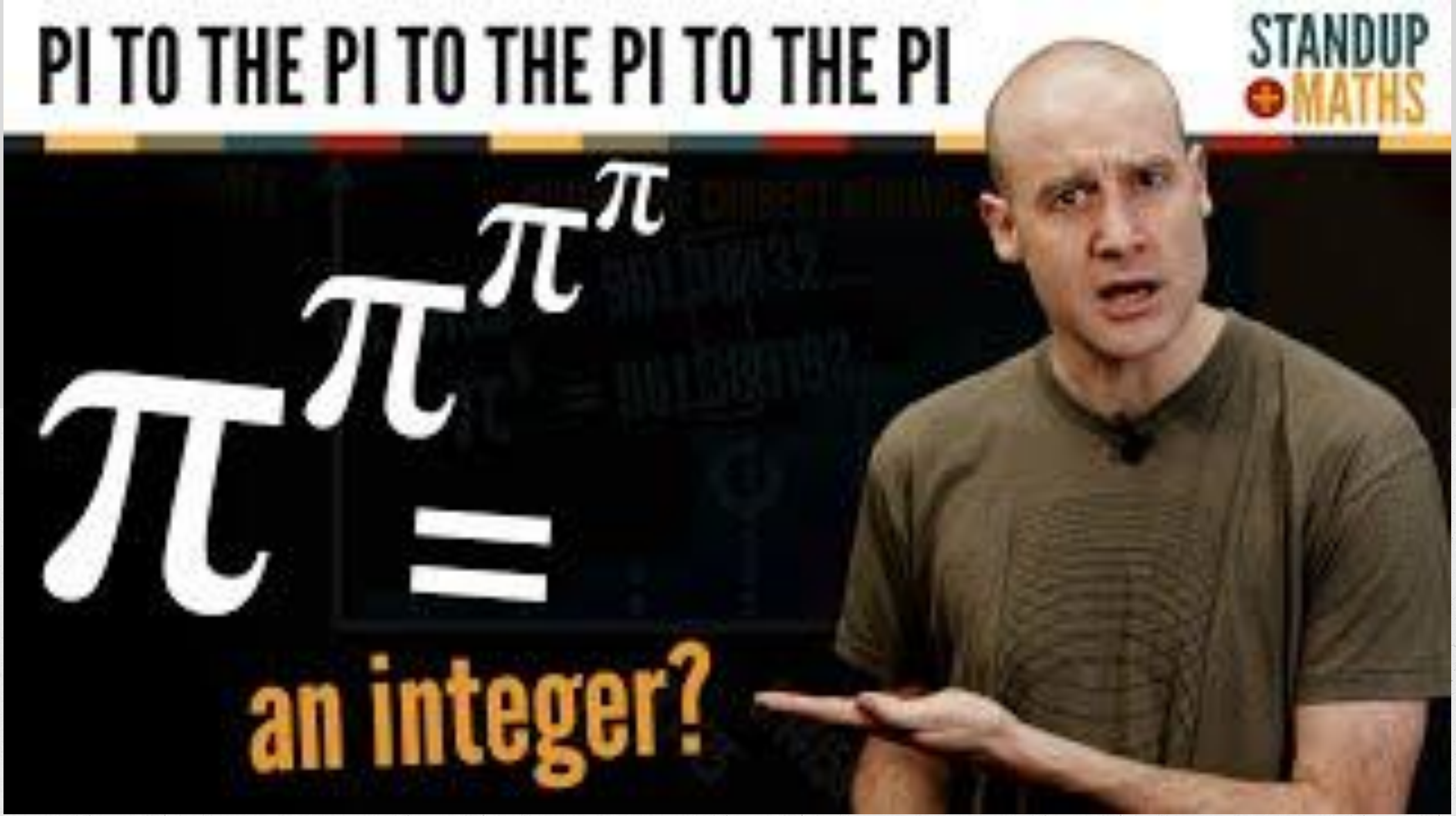
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STANDUP
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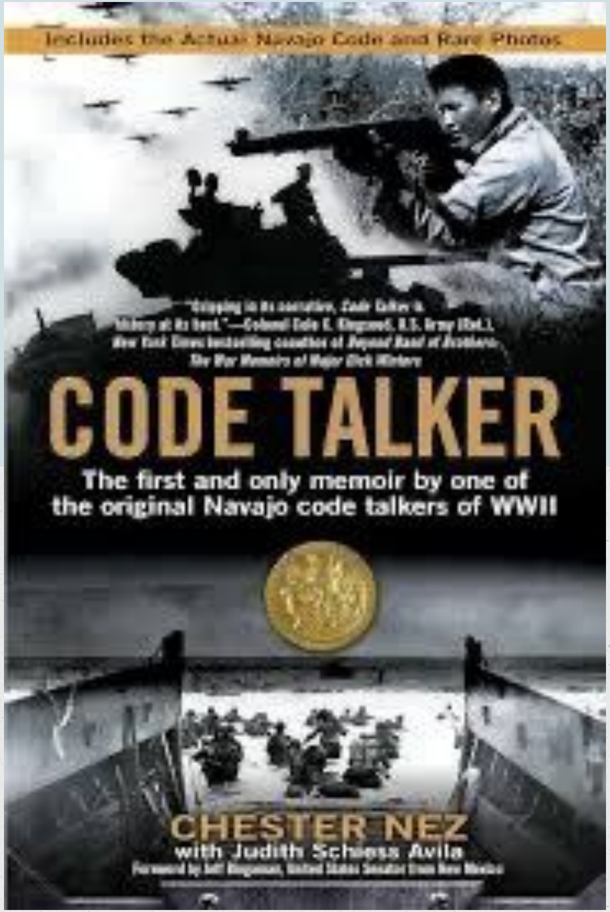
$\pi^{\pi^{\pi^{\pi}}} =$
an integer?

Escuela de Gobierno @EGobiernoyTP · 30 ago.

Hoy en @TheDataPub, el Dr. Oliver López-Corona (@otrasenda_AC) habló del peligro de las narrativas falsas basadas en datos; se refirió a los límites de la inferencia en sistemas complejos, así como a las fallas típicas en el razonamiento estadístico y probabilístico.

Libros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CODE TALKER
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CHESTER NEZ
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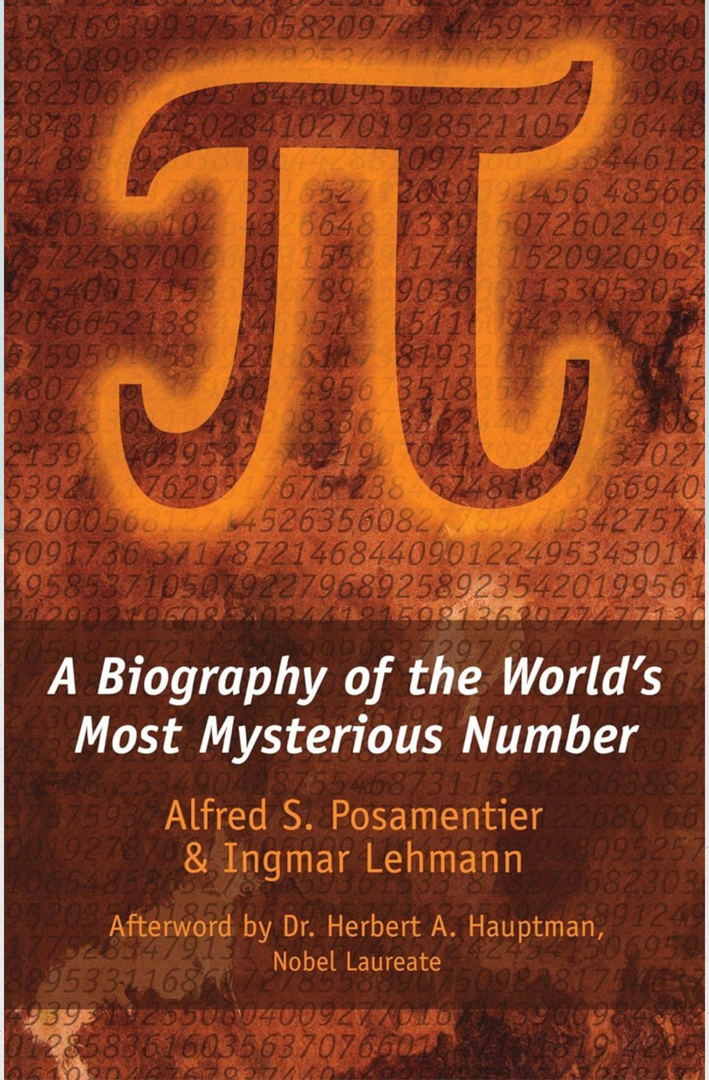
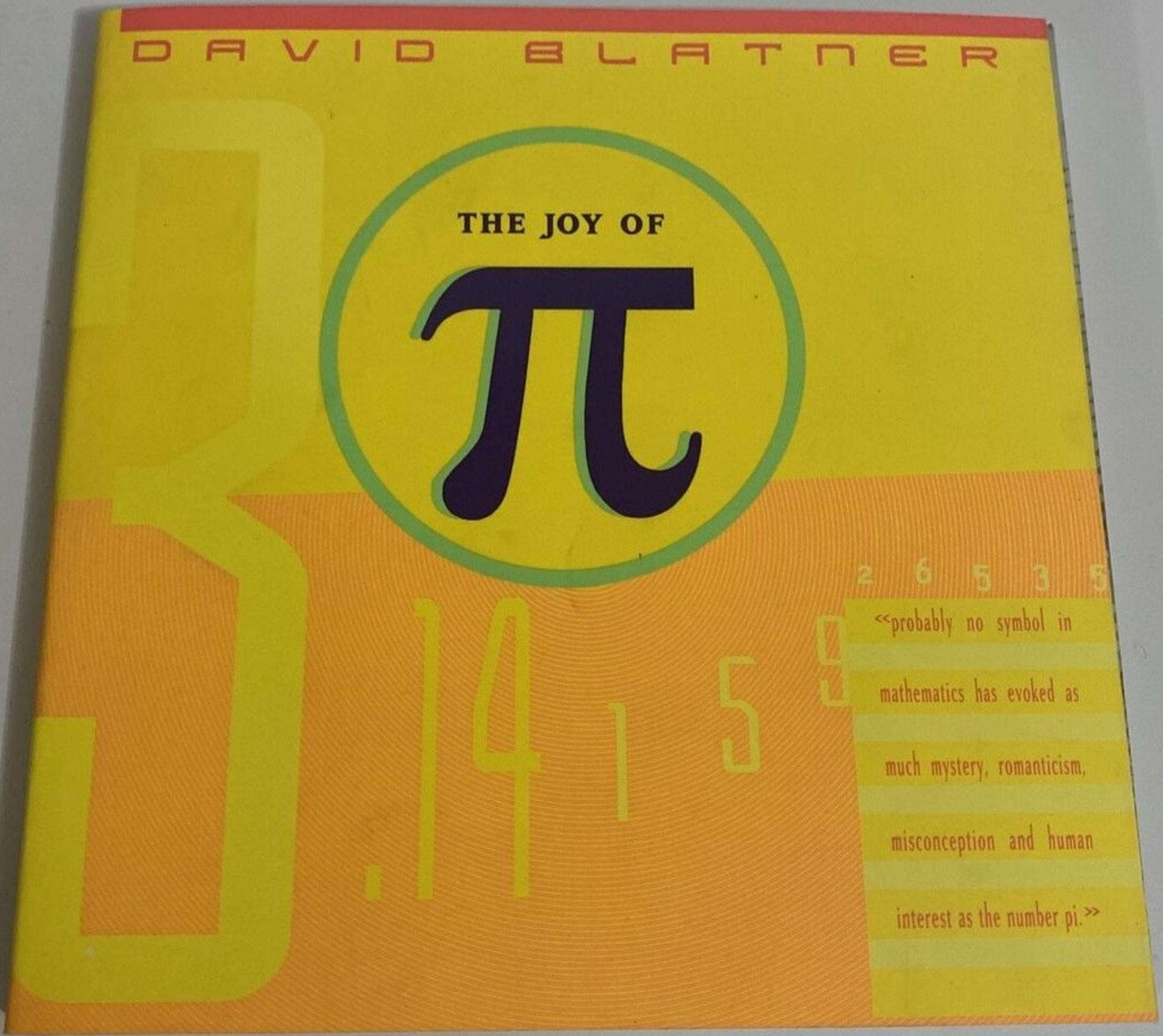

π
A Biography of the World's Most Mysterious Number
Alfred S. Posamentier
& Ingmar Lehmann
Afterword by Dr. Herbert A. Hauptman,
Nobel Laureate


DAVID BLATNER
THE JOY OF
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26535
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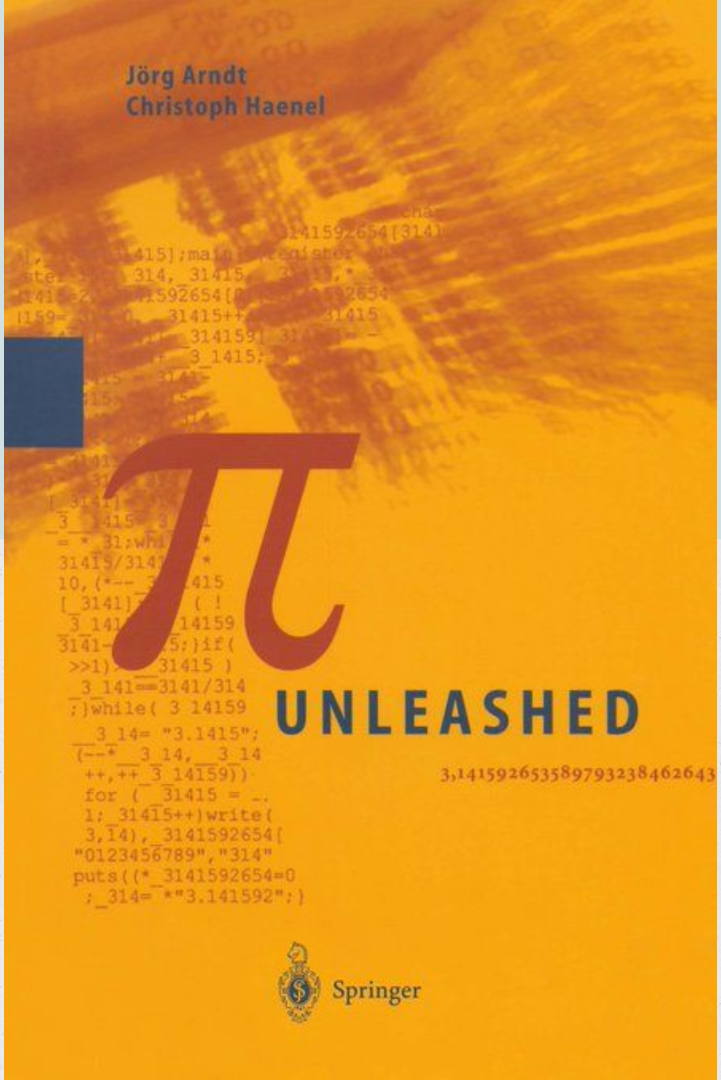
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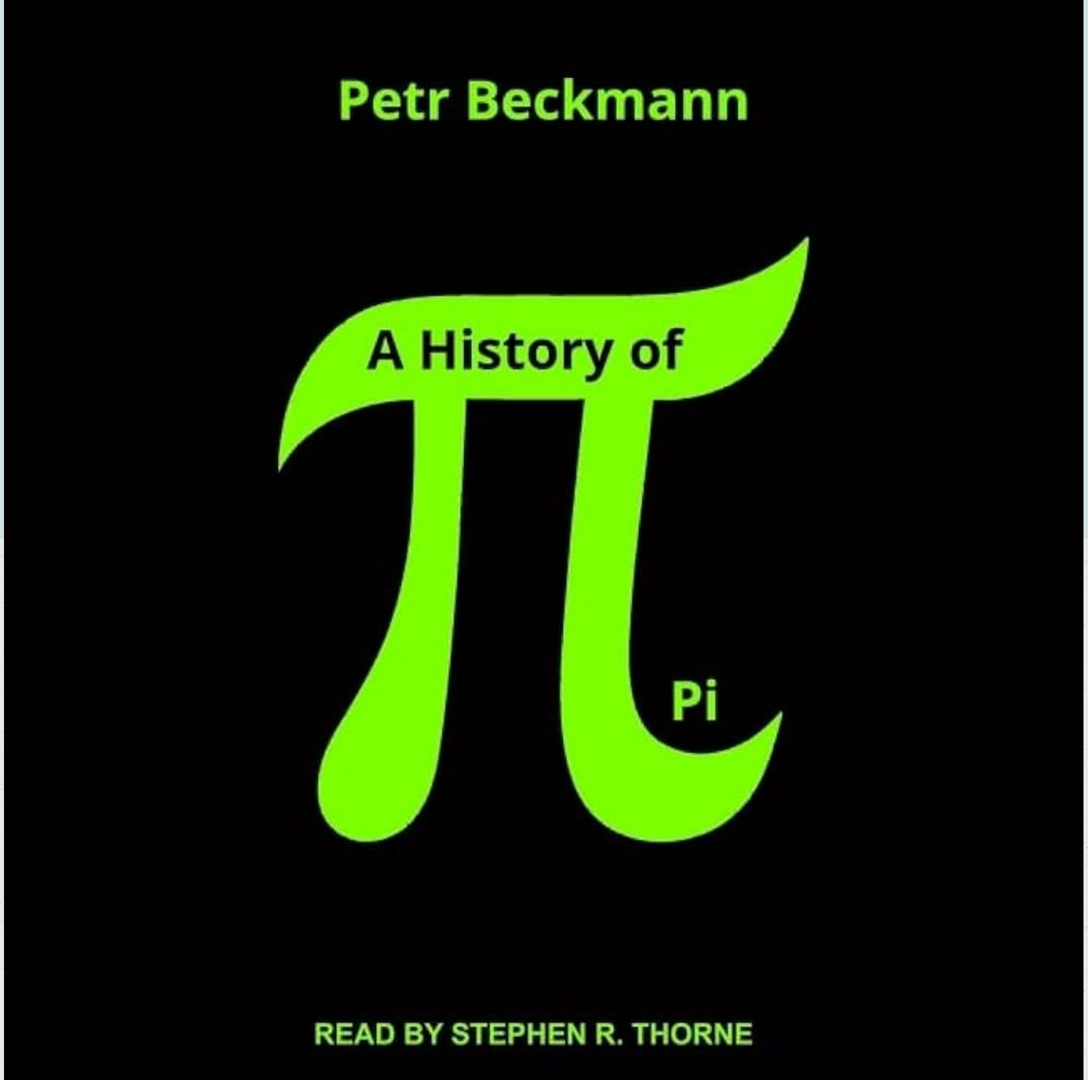
Petr Beckmann
A History of
Pi
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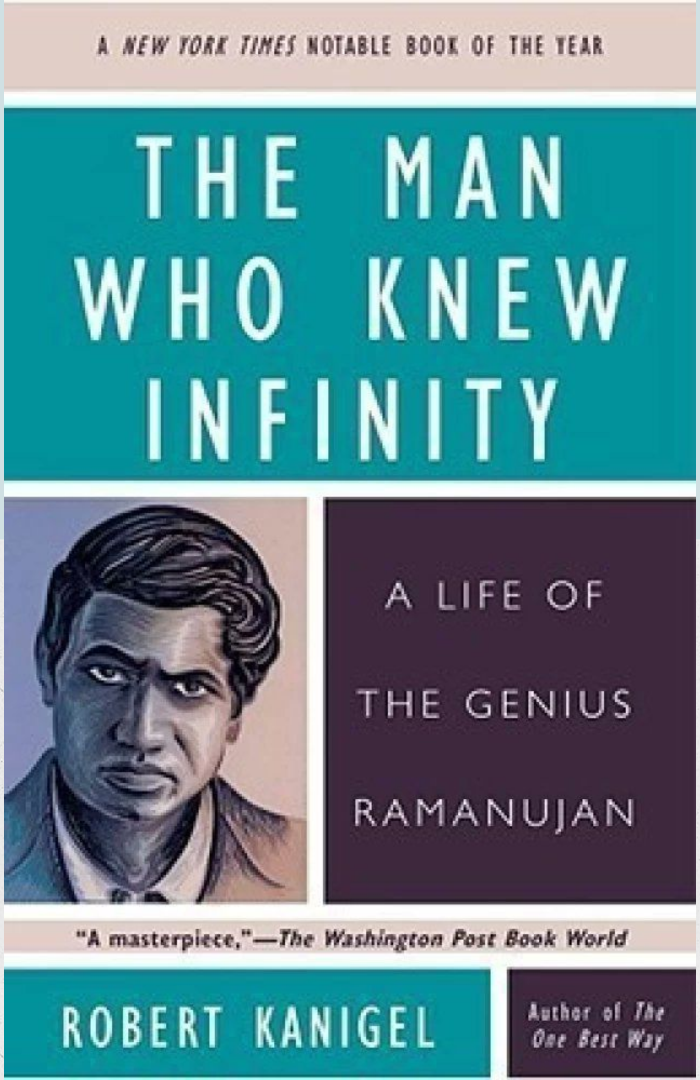
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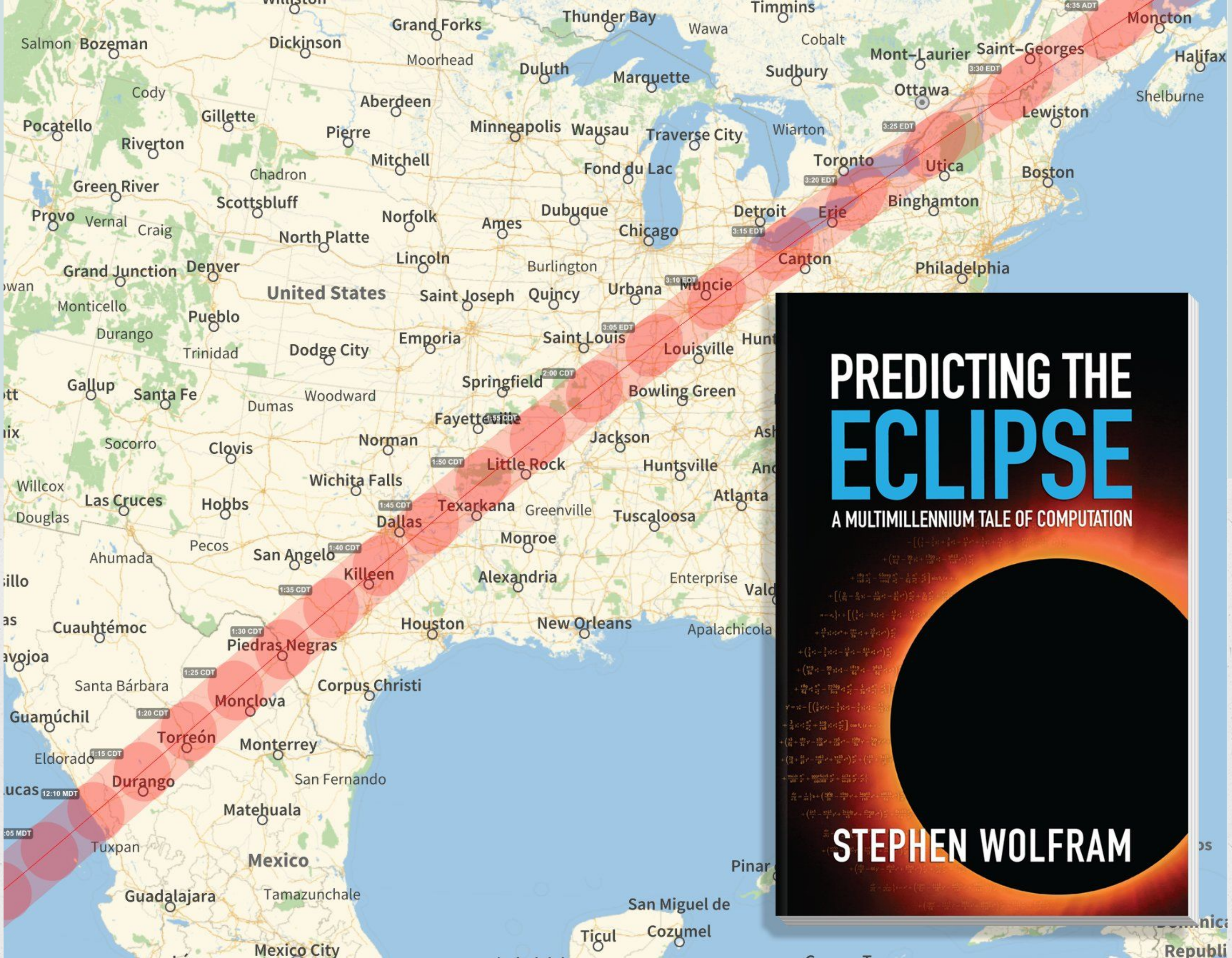
Author of The One Best Way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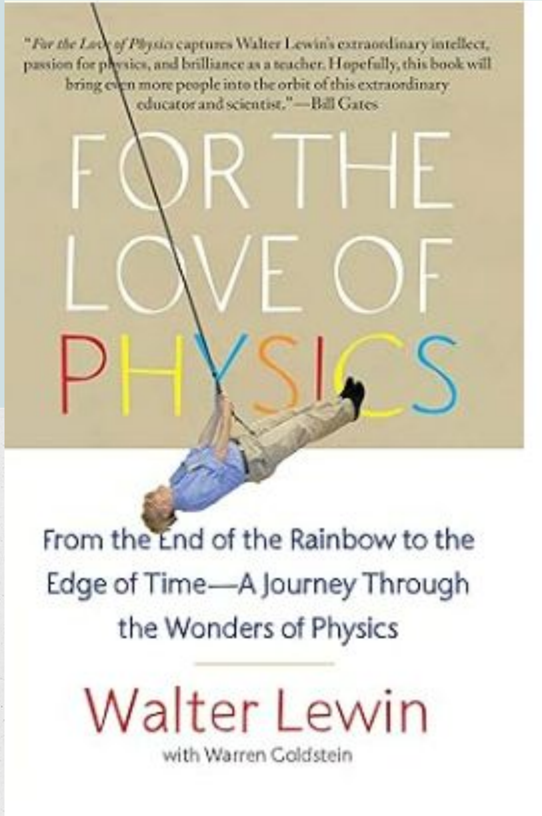
United States
Mexico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Walter Lewin
with Warren Goldstein

The Re-Read List (RRL)

Contrary to those never ending reading lists, inhere we will only share Lindy books that deserve not only to be read but re-read several times. Those books that renew themselves when reopened, in which you may find new hidden details or deeper layers of knowledge.

by

Giovanni H. Uribe & Oliver López-Corona

Notas

Life as a planetary regulator: an experimental test

A new paper proposes an experimental setup that could test the classic Daisyworld model — a hypothesis of a self-regulating planetary ecosystem — in the lab via two synthetic bacterial strains. (image: Victor Maull, created with Image Designer)

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REVISTA

Las demandas ambientales tienen que formar parte de las demandas sociales

El sistema Cutzamala del Valle de México, el más vulnerable ante el cambio climático: Dr. Oscar Escolero de la UNAM

13 NOVIEMBRE 2014

Y está documentado también que los impactos del cambio climático inciden de manera importante en muchos aspectos de la vida, especialmente en la disponibilidad del agua, en la posibilidad de que ésta sea de calidad, así como en el incremento de los fenómenos hidrometeorológicos extremos (sequías e inundaciones) que año con año ocasionan pérdidas humanas.

En el Valle de México en donde conviven alrededor de 20 millones de personas, se han exacerbado en los últimos años las crisis por el agua. El modelo de crecimiento de la zona ha sobreexplotado a la cuenca, y ha sido necesario desarrollar grandes proyectos de infraestructura hidráulica, y de importación de agua de los alrededores, para garantizar el abasto de los servicios.

New Research

Honey Bees Can Do Simple Math, After a Little Schooling

Researchers trained 14 bees to add and subtract by one, suggesting their tiny brains have found novel ways of doing complicated tasks

Jason Daley

Correspondent

February 7, 2019

How bees prove to be skilled mathematicians and 3 other amazing science stories you may have missed

By Colm Gorey, Science Communications Manager