

# Evidence-based decision making

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Rui Mata, FS 2021

# Rui Mata: Education and Main Academic Positions



# Cognitive and Decision Sciences

Aktuell      Studium      Forschung      Weiterbildung      **Fakultät**

 Fakultät > Abteilungen > Cognitive and Decision Sciences 

Research	Teaching	Applied Decision Science
Events	BSc Project	MSc Project
Team		

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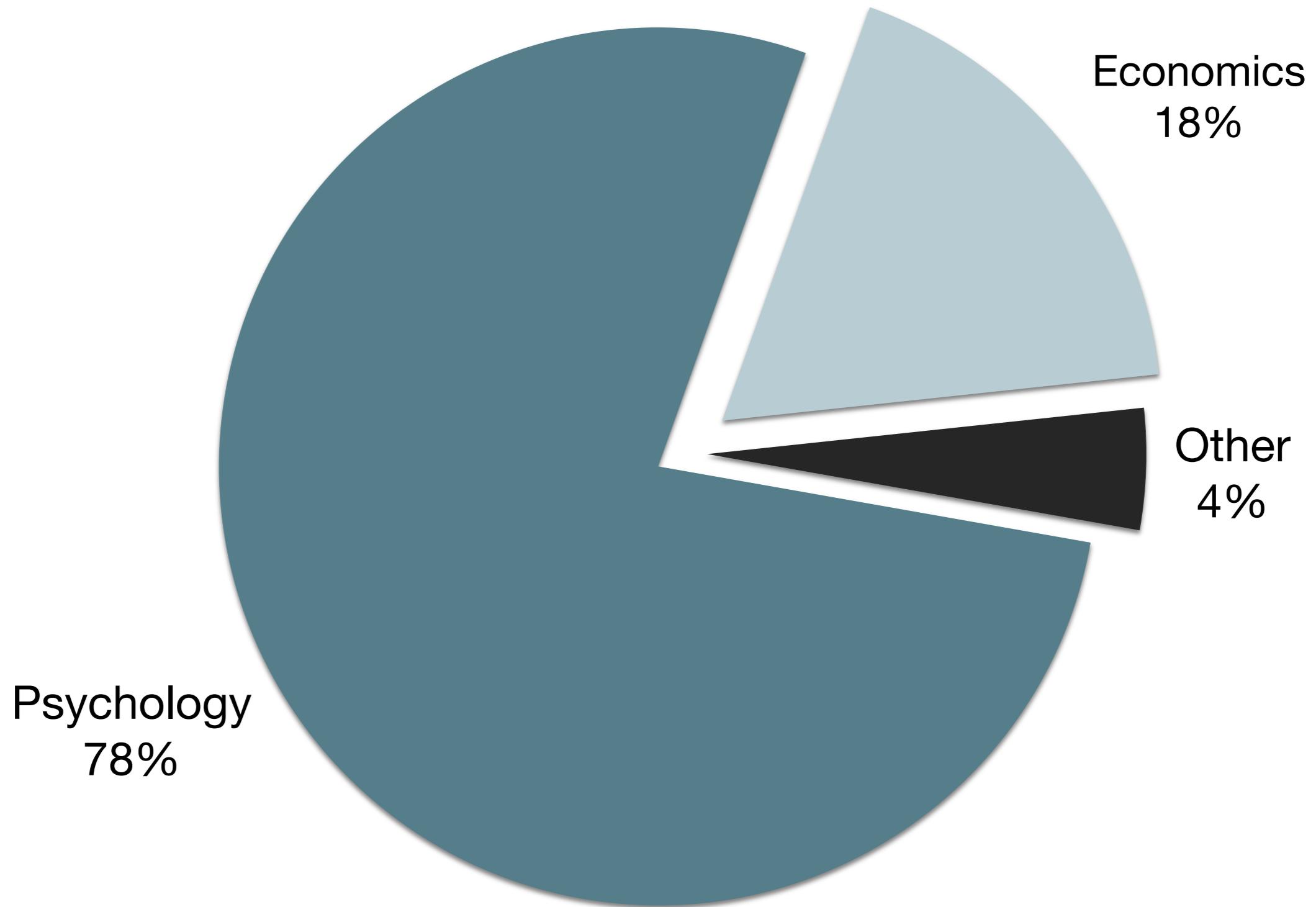
## Cognitive and Decision Sciences

The Center for Cognitive and Decision Sciences (CDS) investigates how people of all ages make decisions. Our goal is to understand the psychological mechanisms underlying decision making to ultimately help individuals make better choices in everyday life.

*«Our Mission: Understanding and improving human decision-making through the use and development of evidence-based practices»*

# You!

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# EBDM

Welcome to the website for *Evidence-based decision making FS21 (11230-01)*

Instructor: [Rui Mata](#), University of Basel

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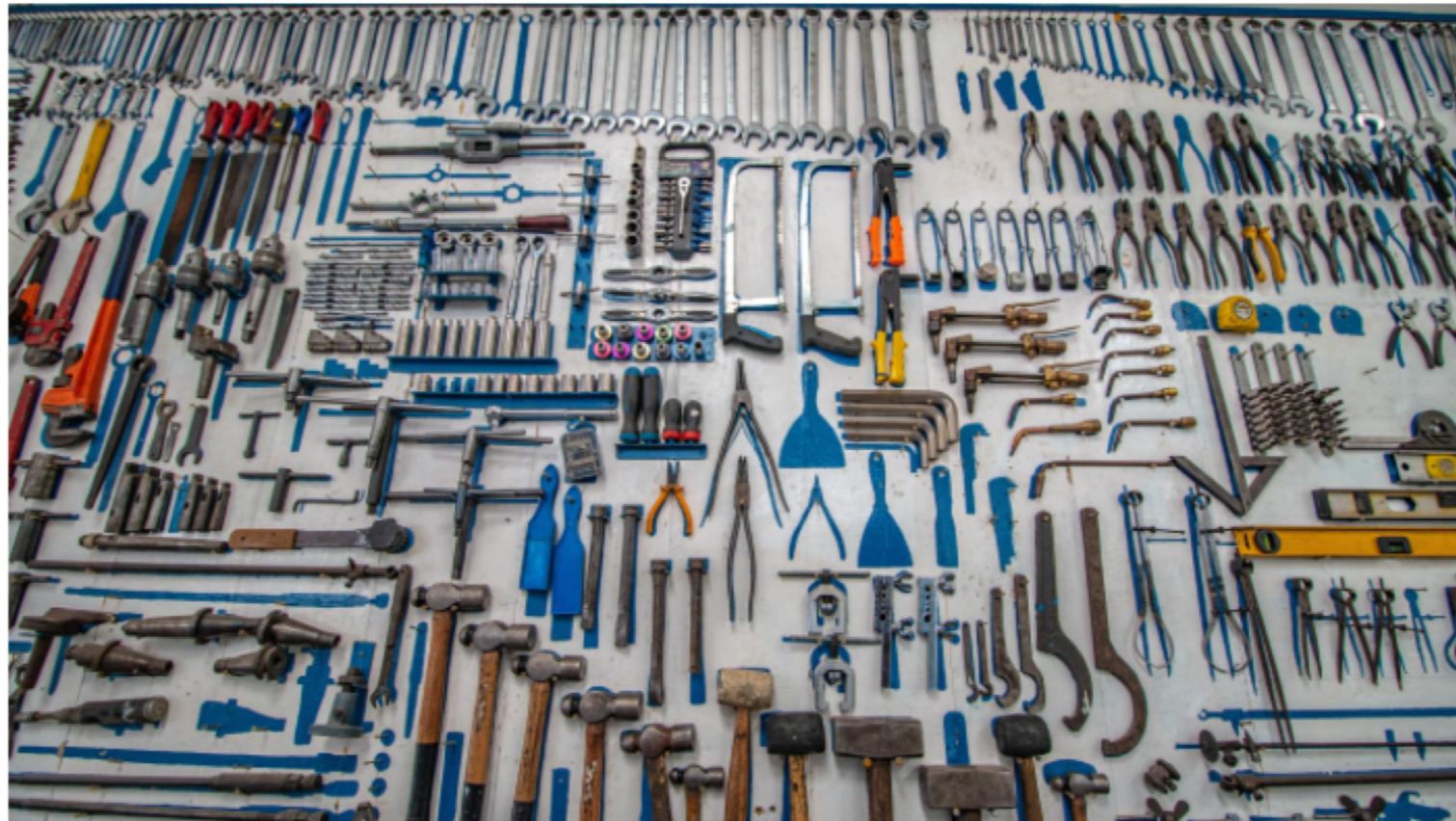
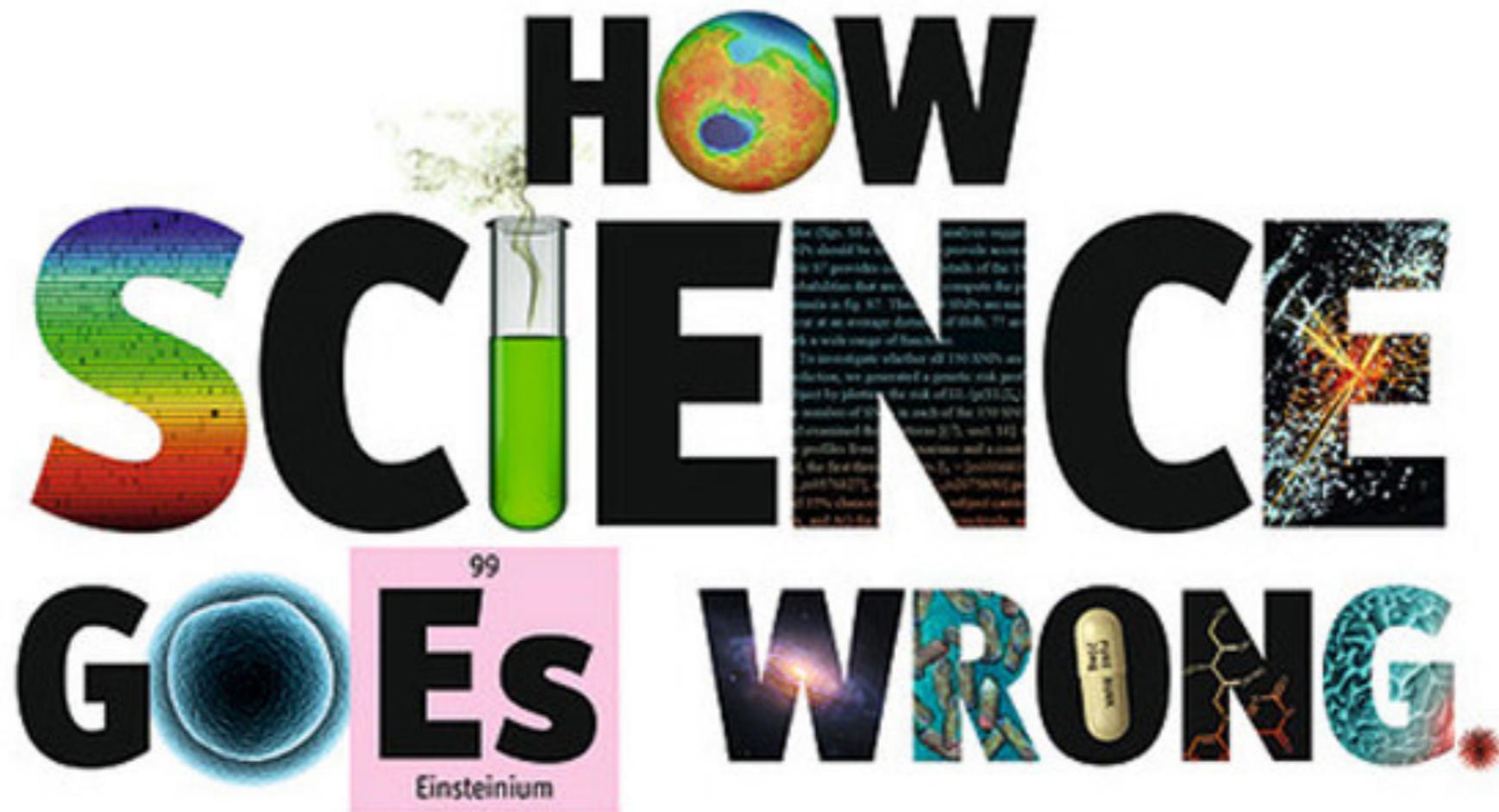


Photo by [Cesar Carlevarino Aragon](#) on [Unsplash](#)

<https://matarui.github.io/ebdm/>

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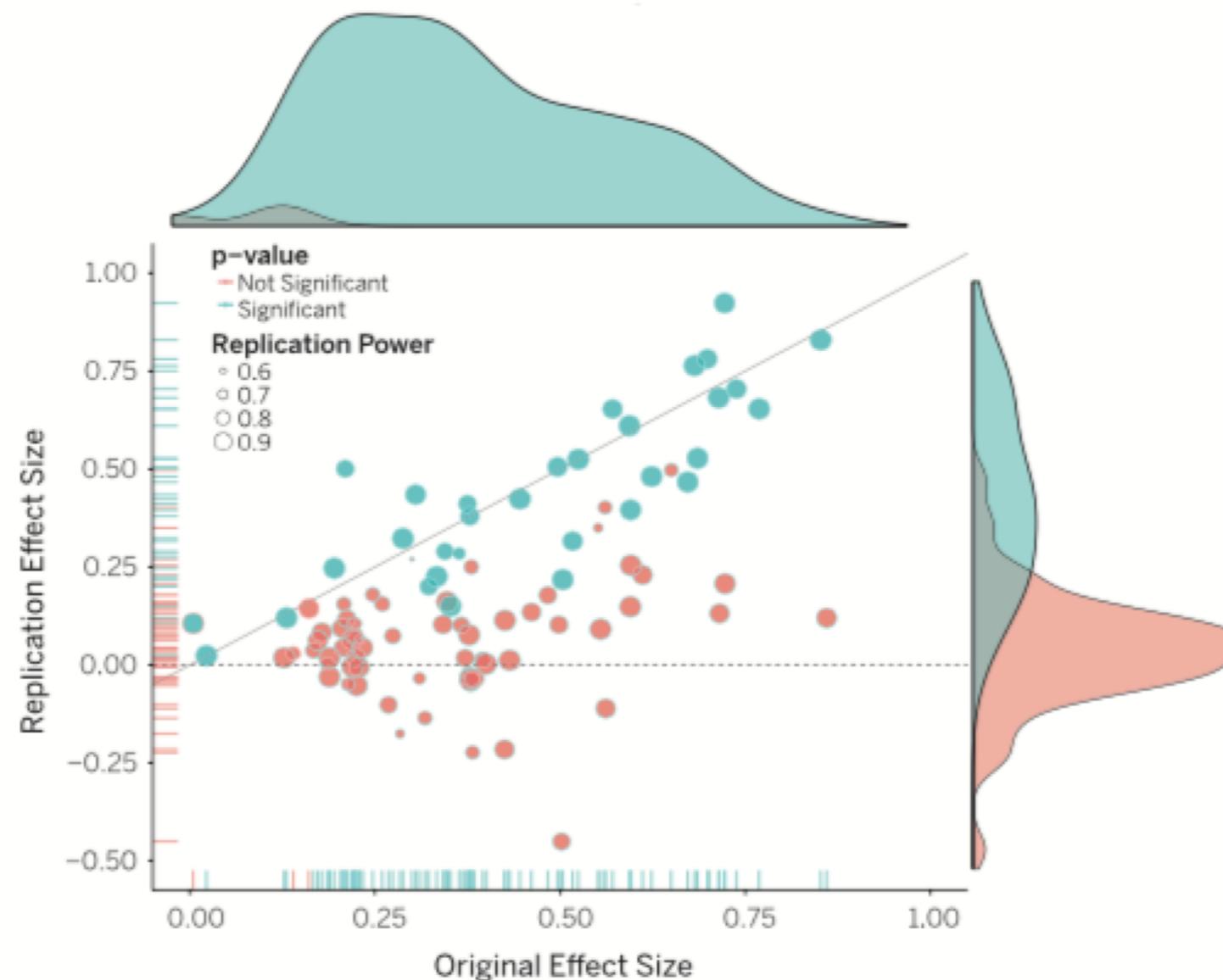
The image shows the front cover of the book 'How Science Goes Wrong' by John P. A. Ioannidis. The title is written in large, bold, black letters. The letter 'S' is filled with a rainbow gradient from white to red. The letter 'C' contains a green test tube with liquid. The letter 'E' features a pink square with the symbol for Einsteinium (<sup>99</sup>Ee) and the word 'Einsteinium'. The letter 'G' is filled with a blue electron microscope image of a cell. The letters 'O', 'W', 'R', and 'N' are partially visible behind a dark, textured background. The letter 'G' has a small red star at its bottom right.

# HOW SCIENCE GOES WRONG.

Ioannidis, J. P. A. (2005). Why most published research findings are false. *PLoS Medicine*, 2(8), e124–6.  
<http://doi.org/10.1371/journal.pmed.0020124>

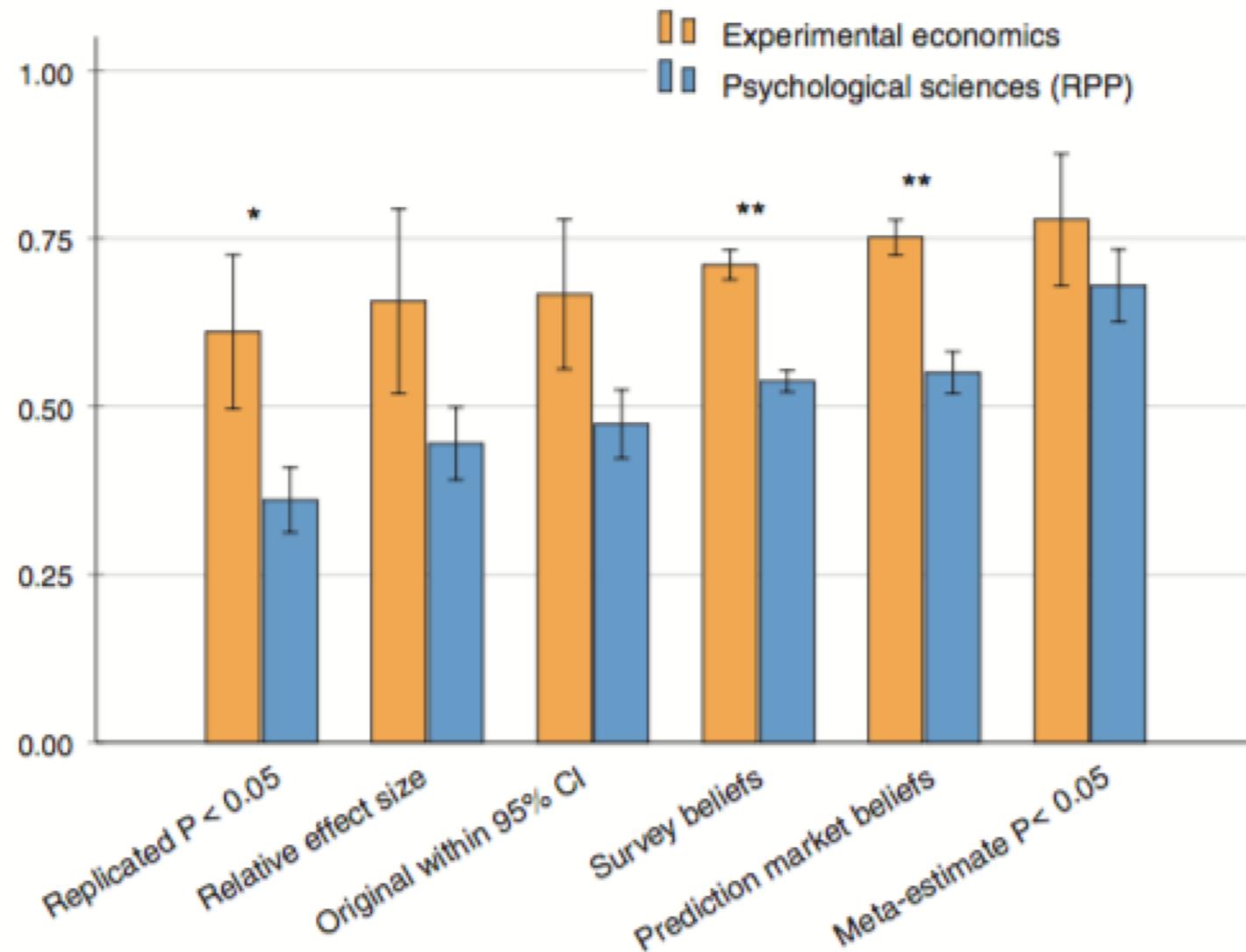
Ioannidis, J. (2005). Contradicted and initially stronger effects in highly cited clinical research. *JAMA*, 294(2), 218–228. <http://doi.org/10.1001/jama.294.2.218>

# Replicability Crisis in Psychology



**Original study effect size versus replication effect size (correlation coefficients).** Diagonal line represents replication effect size equal to original effect size. Dotted line represents replication effect size of 0. Points below the dotted line were effects in the opposite direction of the original. Density plots are separated by significant (blue) and nonsignificant (red) effects.

# Replicability Crisis in Psychology (vs Economics)



**Fig. 4. A comparison of replicability indicators in experimental economics (this study) and psychological sciences (RPP).** The graph shows means  $\pm$  SE for replicability indicators. All six replicability indicators are higher for experimental economics; this difference is significant for three of the replicability indicators. The average difference in replicability across the six indicators is 19 percentage points. Details about the statistical tests are included in the supplementary materials. \* $P < 0.05$ ; \*\* $P < 0.01$ .

Camerer, C. F., Dreber, A., Forsell, E., Ho, T.-H., Huber, J., Johannesson, M., et al. (2016). Evaluating replicability of laboratory experiments in economics. *Science*, 351(6280), 1433–1436. <http://doi.org/10.1126/science.aaf0918>

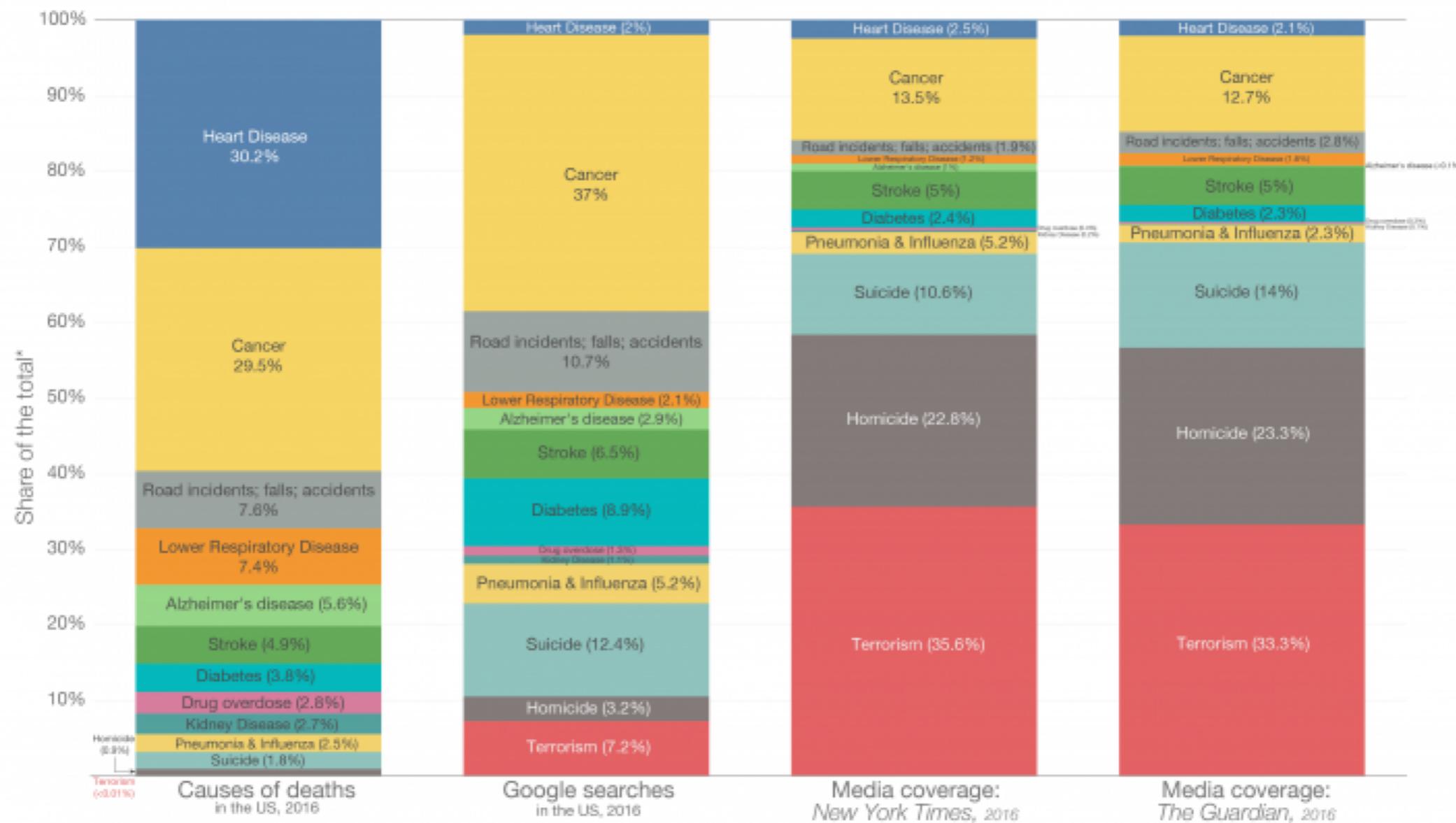
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<https://www.gapminder.org/ignorance/>

# Causes of death in the US

What Americans die from, what they search on Google, and what the media reports on



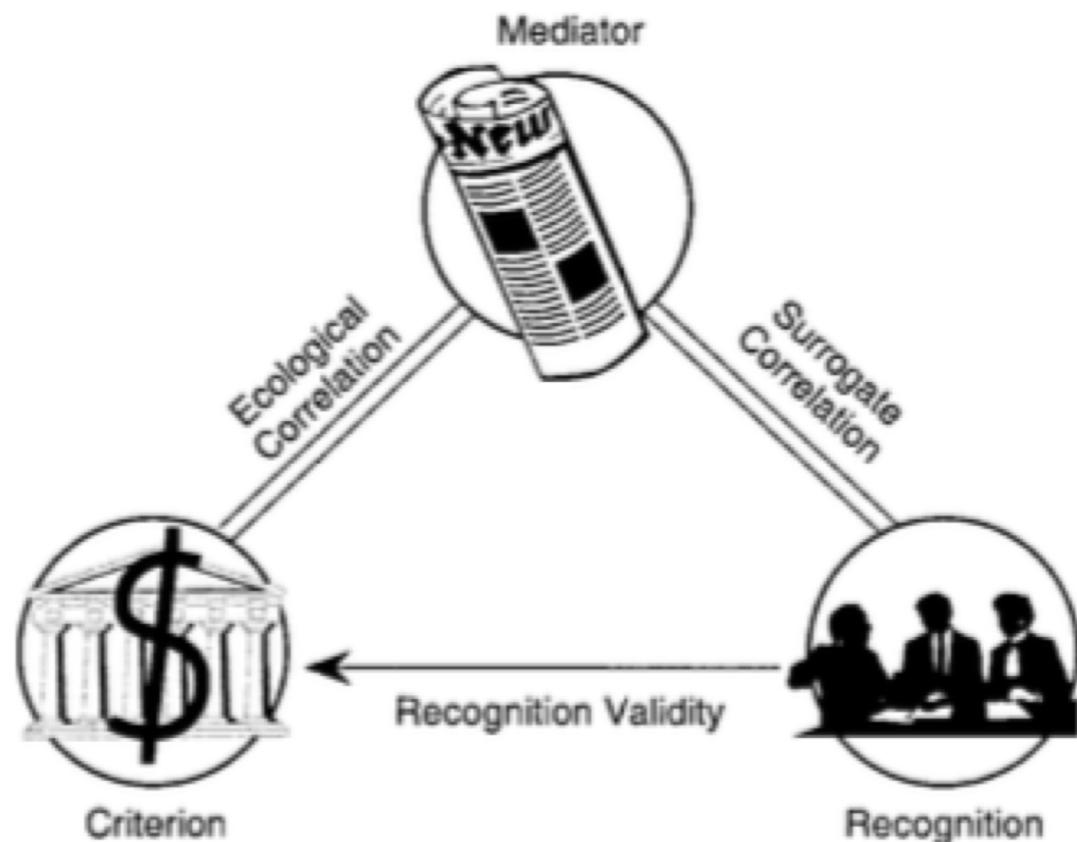
This represents each cause's share of the top ten causes of death in the US plus homicides, drug overdoses and terrorism. Collectively these 13 causes accounted for approximately 88% of deaths in the US in 2016. Full breakdown of causes of death can be found at the CDC's WONDER public health database: <https://wonder.cdc.gov/>

Based on data from Shen et al (2018) – Death: reality vs. reported. All data available at: <https://owenrshen24.github.io/charting-death>  
All data refers to 2016.

Not all causes of death are shown: Shown is the data on the ten leading causes of death in the United States plus drug overdoses, homicides and terrorism.

All values are normalized to 100% so they represent their relative share of the top causes, rather than absolute counts (e.g. 'deaths' represents each cause's share of deaths within the 13 categories shown rather than total deaths). The causes of death shown here account for approximately 88% of total deaths in the United States in 2016.

This is a visualization from OurWorldInData.org, where you find data and research on how the world is changing. Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.



*Figure 1.* The ecological rationality of the recognition heuristic. An inaccessible criterion (e.g., the endowment of an institution) is reflected by a mediator variable (e.g., the number of times the institution is mentioned in the news), and the mediator influences the probability of recognition. The mind, in turn, uses recognition to infer the criterion.

Goldstein, D. G., & Gigerenzer, G. (2002). Models of ecological rationality: The recognition heuristic. *Psychological Review*, 109(1), 75–90. <http://doi.org/10.1037/0033-295X.109.1.75>

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# The Economist

MAY 6TH-12TH 2017

Crunch time in France

Ten years on: banking after the crisis

South Korea's unfinished revolution

Biology, but without the cells

# The world's most valuable resource

Data and the new rules  
of competition



# Data scientists missing

emerging  
roles,  
global  
change  
by 2022



declining  
roles,  
global  
change  
by 2022



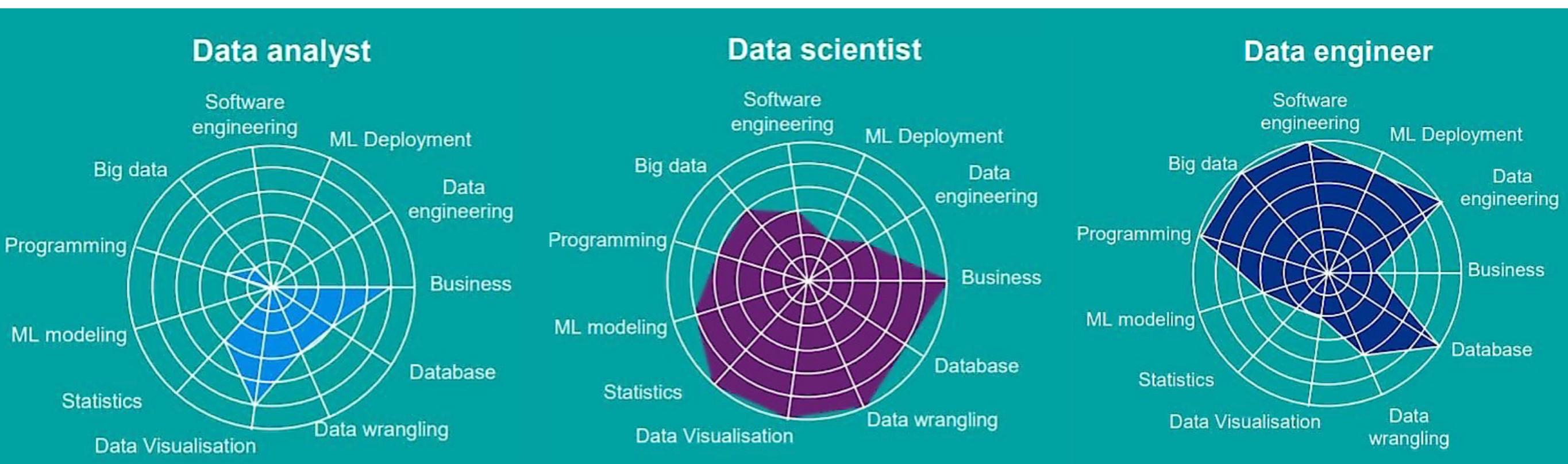
## Top 10 Emerging

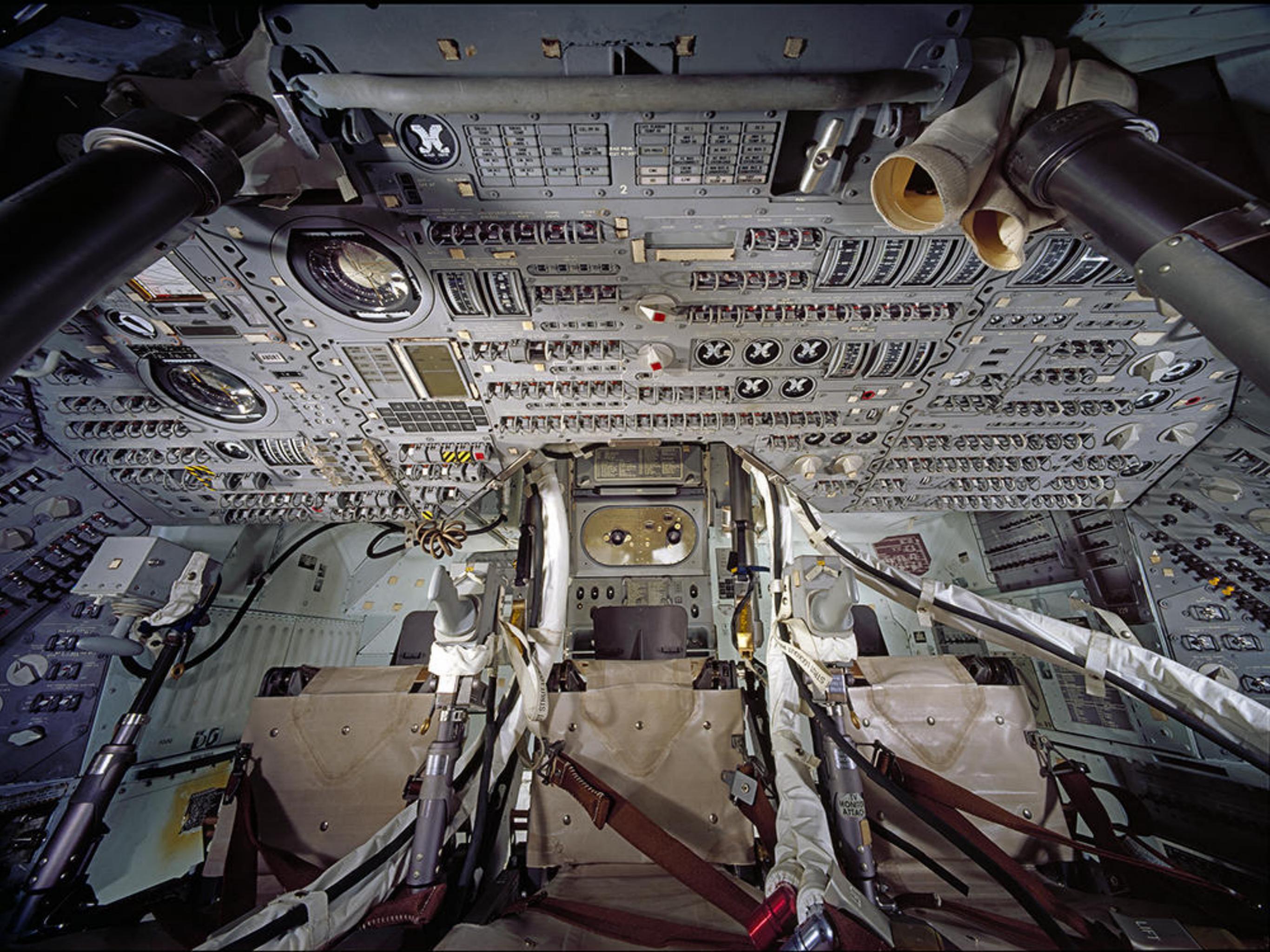
1. Data Analysts and Scientists
2. AI and Machine Learning Specialists
3. General and Operations Managers
4. Software and Applications Developers and Analysts
5. Sales and Marketing Professionals
6. Big Data Specialists
7. Digital Transformation Specialists
8. New Technology Specialists
9. Organisational Development Specialists
10. Information Technology Services

## Top 10 Declining

1. Data Entry Clerks
2. Accounting, Bookkeeping and Payroll Clerks
3. Administrative and Executive Secretaries
4. Assembly and Factory Workers
5. Client Information and Customer Service Workers
6. Business Services and Administration Managers
7. Accountants and Auditors
8. Material-Recording and Stock-Keeping Clerks
9. General and Operations Managers
10. Postal Service Clerks

# Data science is not (only) machine learning and AI





# Policy Statement on Evidence-Based Practice in Psychology

*The following statement was approved as policy of the American Psychological Association (APA) by the APA Council of Representatives during its August, 2005 meeting.*

Evidence-based practice in psychology (EBPP) is the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences. This definition of EBPP closely parallels the definition of evidence-based practice adopted by the Institute of Medicine (2001, p. 147) as adapted from Sackett and colleagues (2000): "**Evidence-based practice is the integration of best research evidence with clinical expertise and patient values.**" The purpose of EBPP is to promote effective psychological practice and enhance public health by applying empirically supported principles of psychological assessment, case formulation, therapeutic relationship, and intervention.

**Best research evidence refers to scientific results related to intervention strategies, assessment, clinical problems, and patient populations in laboratory and field settings as well as to clinically relevant results of basic research in psychology and related fields. A sizeable body of evidence drawn from a variety of research designs and methodologies attests to the effectiveness of psychological practices. Generally, evidence derived from clinically relevant research on psychological practices should be based on systematic reviews, reasonable effect sizes, statistical and clinical significance, and a body of supporting evidence. The validity of conclusions from research on interventions is based on a general progression from clinical observation through systematic reviews of randomized clinical trials, while also recognizing gaps and limitations in the existing literature and its applicability to the specific case at hand (APA, 2002). Health policy and practice are also informed by research using a variety of methods in such areas as public health, epidemiology, human development, social relations, and neuroscience.**

Researchers and practitioners should join together to ensure that the research available on psychological practice is both clinically relevant and internally valid. It is important not to assume that interventions that have not yet been studied in controlled trials are ineffective. However, widely used psychological practices as well as innovations developed in the field or laboratory should be rigorously evaluated and barriers to conducting this research should be identified and addressed.

# We need data and evidence-based practices to...

- 1 fix (psychological) science.**
- 2 tackle societal challenges.**
- 3 be ready for the jobs of the future.**
- 4 do our work right.**

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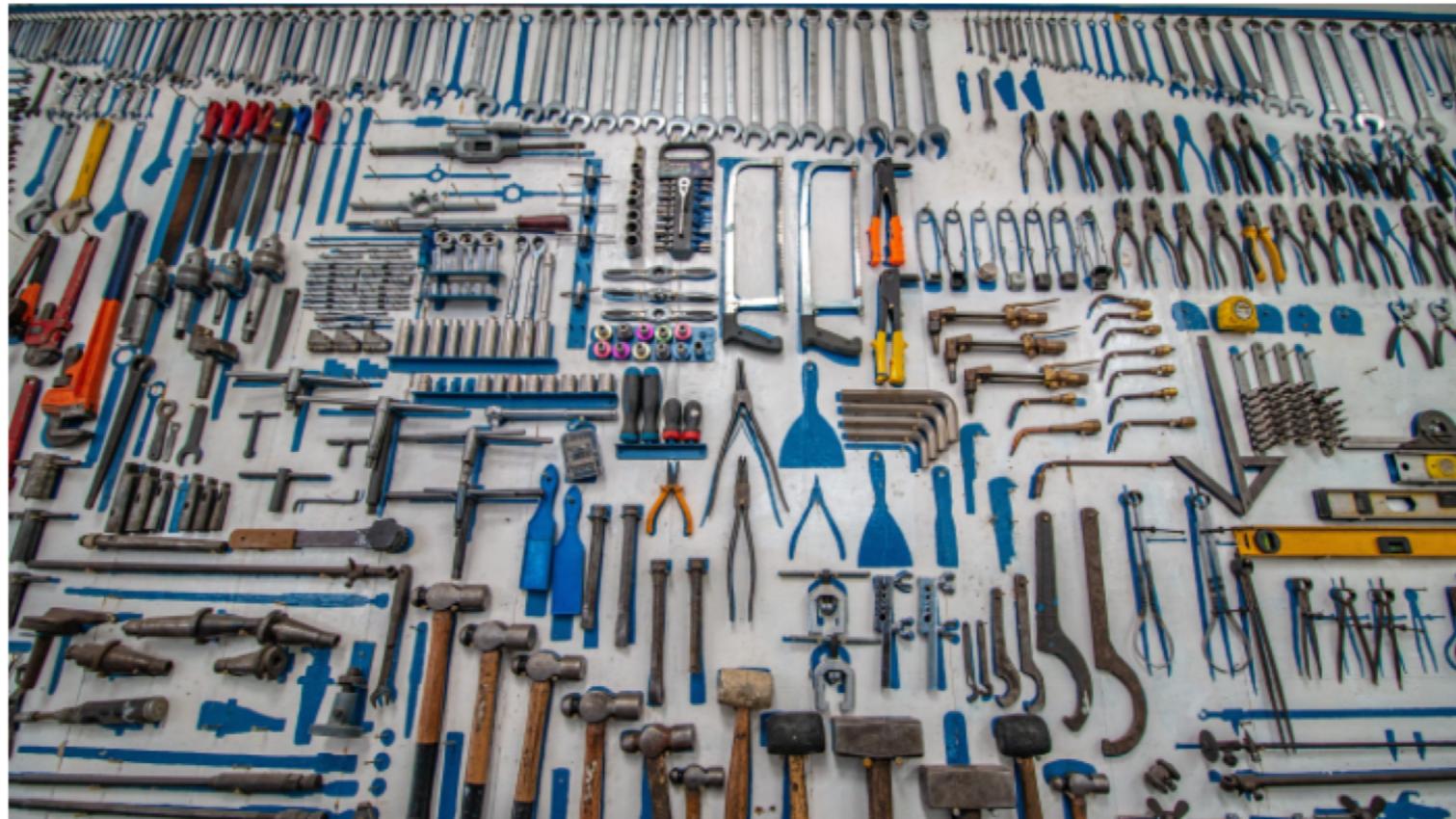


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