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sur les Sciences
et les Technologies

The many faces of reproducibility

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Recherche reproductible : état des lieux, 8 mars 2023

RWTH AACHEN UNIVERSITY

C:o/re

Autopromo

Paper in Historical and Social Studies of Science | Published: 17 April 2021

Epistemic issues in computational reproducibility: software as the elephant in the room

Alexandre Hocquet & Frédéric Wieber

European Journal for Philosophy of Science **11**, Article number: 38 (2021) | Cite this article

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Models, Parameterization, and Software: Epistemic Opacity in Computational Chemistry

Frédéric Wieber, Alexandre Hocquet

> Author and Article Information

Perspectives on Science (2020) 28 (5): 610–629.
https://doi.org/10.1162/posc_a_00352

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Abstract

Journals & Magazines > IEEE Annals of the History of... > Volume: 39 Issue: 4

"Only the Initiates Will Have the Secrets Revealed": Computational Chemists and the Openness of Scientific Software

Publisher: IEEE

Cite This PDF

Alexandre Hocquet ; Frédéric Wieber All Authors

Histoire des sciences

Terminologies for Reproducible Research

Lorena A. Barba, the George Washington University, Washington D.C.

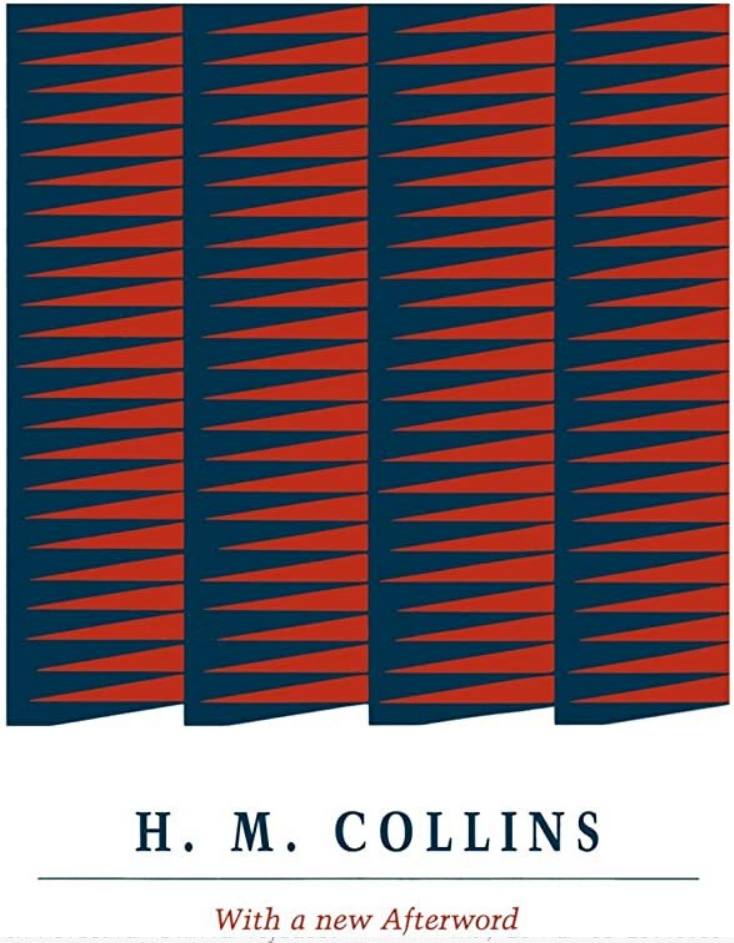
January 2018

Introduction

Reproducible research—by its many names—has come to be regarded as a key concern across disciplines and stakeholder groups. Funding agencies and journals, professional societies and even mass media are paying attention, often focusing on the so-called "crisis" of reproducibility. One big problem keeps coming up among those seeking to tackle the issue: different groups are using terminologies in utter contradiction with each other. In July 2017, over a dozen participants

r Reproducible Research

on University, Washington D.C.



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ion with each other. In July 2017, over a dozen participants

Histoire des sciences

CHANGING ORDER

Replication and Induction in Scientific Practice

H. M. COLL

With a new Afterword

r Reproducible Research

on University, Washington D.C.

9 Feb 2018

Science Studies, 4 (1974), 165–86.

The TEA Set: Tacit Knowledge and Scientific Networks

H. M. COLLINS
School of Humanities and Social Sciences
*University of Bath**

INTRODUCTION: METHODOLOGICAL AND THEORETICAL ARGUMENT

Thomas Kuhn's concept of 'paradigm'[1] has attracted a lot of attention from

Histoire de la crise

THE TRUTH WEARS OFF?
THE REPRODUCIBILITY CRISIS IN HISTORICAL PERSPECTIVE

Nicole C. Nelson
nicole.nelson@wisc.ed
WISCONSIN

Published: 28 March 2012

Drug development

Raise standards for preclinical cancer research

C. Glenn Begley & Lee M. Ellis

Nature **483**, 531–533 (2012) | Cite this article

235k Accesses | **1852** Citations | **2300** Altmetric | Metrics

A Clarification to this article was published on 02 May 2012

"A scorching indictment of drug companies and their research and business practices...tough, persuasive and troubling."
—JANET MASLIN, *The New York Times*

The Truth About the Drug Companies

HOW THEY DECEIVE US AND WHAT TO DO ABOUT IT

MARCIA ANGELL, M.D.

Former editor in chief of The New England Journal of Medicine
Winner of the Polk Award

Revised and updated
Includes tips on what you can do to protect your interests

The many faces of reproducibility : S. Leonelli

- Assumed degree of **control** over research conditions
  - choice of variables vs what can/should be stabilized
- Understanding of **variation**
  - phenomenon to be explained, confounder or signal of error?
- Dependence on **statistics** and **computation**
  - as inferential tools
- Precision of the research **goals**
  - from exploratory research to hypothesis testing
- Stability of **background knowledge** and evidence base
- Dependence on researchers' **judgment**
  - role of expertise and related training

Leonelli 2016, 2018

The many faces of reproducibility : S. Leonelli

1. Computational reproducibility
2. Direct experimental reproducibility (highly standardized experiments)
3. Scoping/Indirect/Hypothetical reproducibility (semi-standardized experiments)
4. Reproducible expertise
5. Reproducible observation

Leonelli 2018

The many faces of reproducibility : S. Leonelli

Type of Reproducibility	Assumed control	Dependence on statistics	Precision of goals	Dependence on judgement
Computational Reproducibility	total	high	high	none
Direct Experimental Reproducibility	high	high	high	low
Scoping/Indirect/Hypothetical Reprod.	limited	variable	limited	variable
Reproducible Expertise	variable	variable	variable	high
Reproducible Observation	low	low	low	high
Irreproducible Research	none	low	low	total

Overarching Gold standard

Published: 28 March 2012

Drug development

Raise standards for preclinical cancer research

C. Glenn Begley & Lee M. Ellis

Nature **483**, 531–533 (2012) | Cite this article

A Clarification to this article was published or

PLOS MEDICINE

OPEN ACCESS

ESSAY

Why Most Published Research Findings Are False

John P. A. Ioannidis

Published: August 30, 2005 • https://doi.org/10.1371/journal.pmed.0020124

The Irreproducibility Crisis of Modern Science

Causes, Consequences, and the Road to Reform

David Randall Christopher Welser

April 09, 2018

The many faces of gel electrophoresis

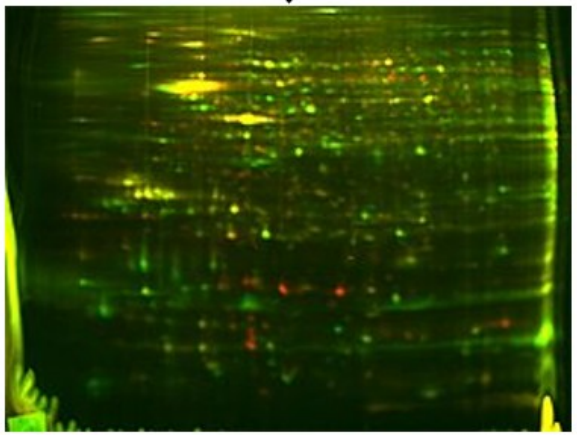
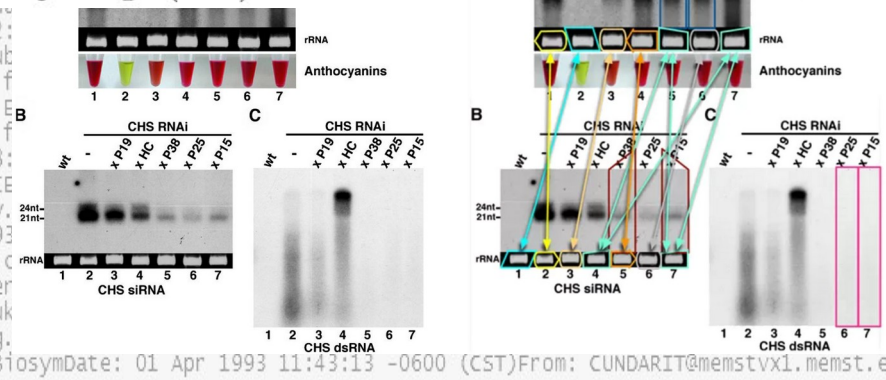
	A. SDS-PAGE [2nd tier]	B. DIGE [1st tier]
Apparatus		
Gel electrophoresis image		

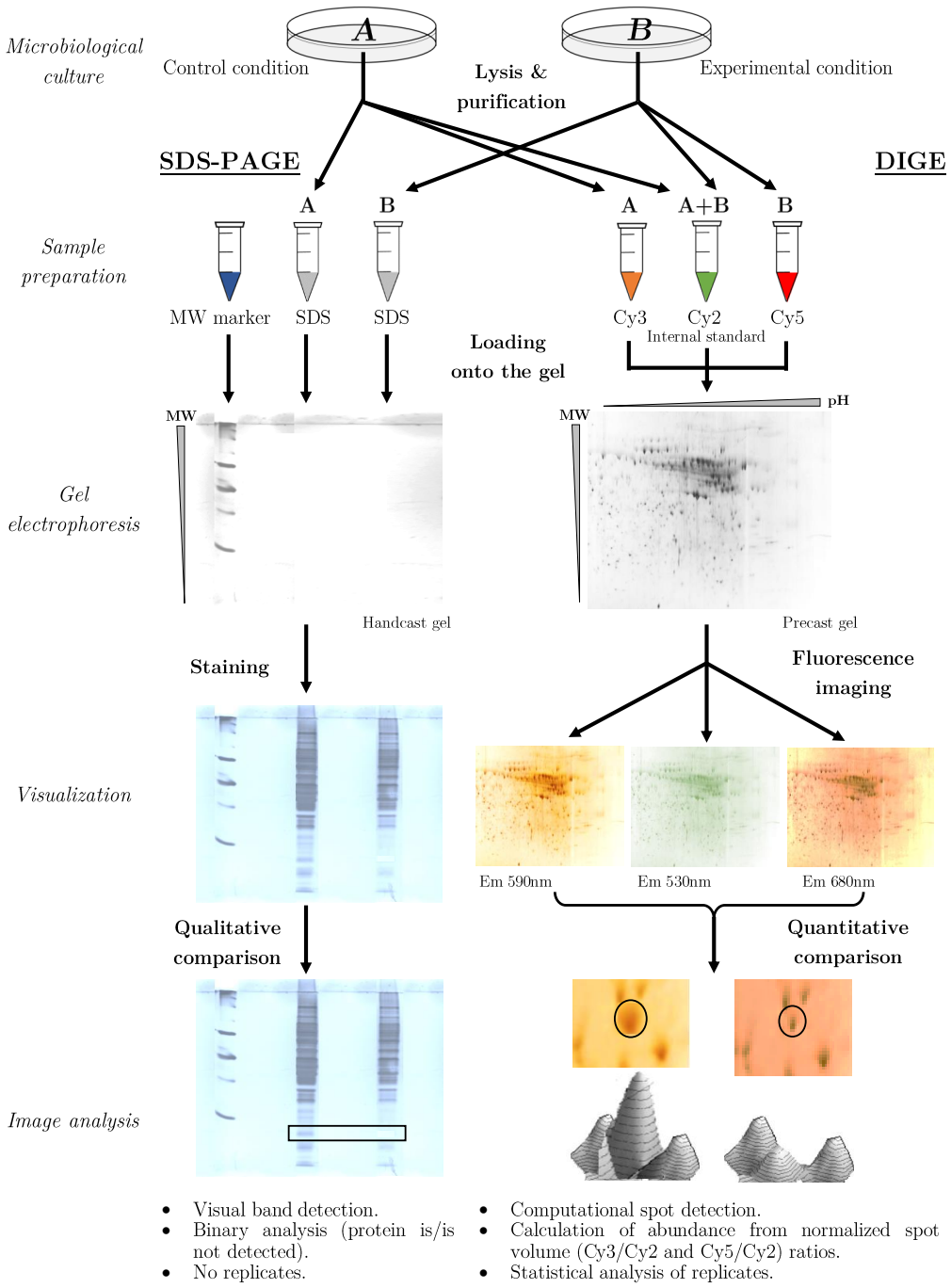
Image CC-BY-SA Callaerts et al.

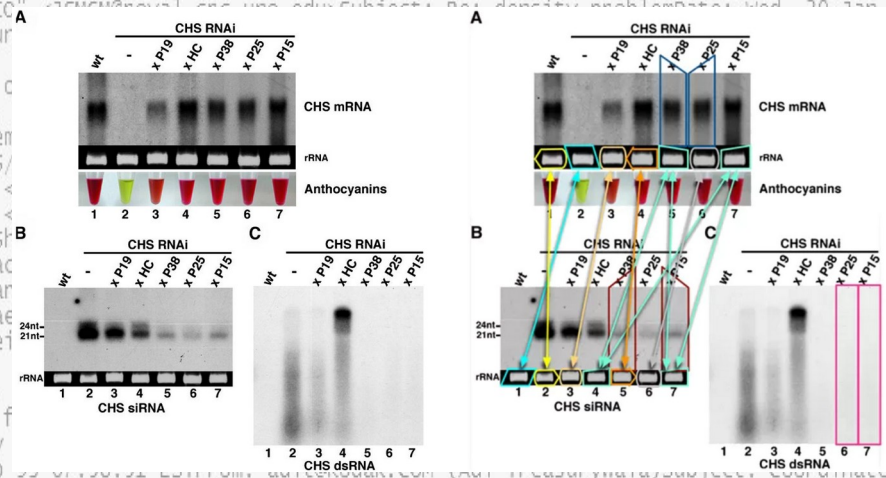
Physically printed gel (1996)

Digitally superimposed gel (2010)



The many faces of gel electrophoresis





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The Voinnet Affair: Testing the Norms of Scientific Image Management

Catherine Guaspare and Emmanuel Didier

In the 1980s, it was already obvious that large companies were using metrics to track numerically the efficacy and efficiency of their employees. Management methods based on quantification gained widespread recognition during this decade (Camp, 1989; Hammer and Champy, 1993). Since the 2000s, these metrics seem to have migrated far beyond the borders of the corporate world, permeating the public bureaucracies of most liberal states, giving rise to what has come to be called the "New Public Manage-

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Overarching gold standard

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