



# Rewriting science and its purpose: water the flowers, clean the volcanoes

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[Picture](#) - The little prince - Antoine de Saint-Exupéry

## Introduction

This talk stems from my personal journey into science, first, and open science, later. It's a journey that gifted me with the privilege to meet many interesting people, and that made me understand a bit better the world in which we live, a bit like it happened to the little prince. I hope that by the end of this presentation you can all appreciate that this journey has actually something to do with many of us, perhaps all of us.

I'd like to build up this work in **three sections**: in the first part I will talk about science as a social institution, with its own norms and values; in the second part I will try to highlight why I profoundly believe that these norms and values need to be redefined and readjusted, and how this can happen through narratives of openness; I will then close this presentation bringing in my personal experiences of going rogue, living science outside the traditional academic space.

Note: this talk was greatly inspired by [this blog post](#) of mine.

## Science as a social institution with values and norms

I used to think that science was infallible, that it was almost like a divinity. Then during my PhD, as I got a bit wiser, I realized that there is a great deal of misunderstanding about science, even by the people who practice it.

In "A Reasonable Skepticism"<sup>1</sup>, Richard Lewontin writes:

"We think that science as an institution, a set of methods, a set of people, a great

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<sup>1</sup> [A Reasonable Skepticism](#)

body of knowledge that we call scientific, is somehow apart from the forces that rule our everyday lives and that govern the structure of our society. [...] science, like other productive activities, like the state, the family, sport, is a social institution completely integrated into and influenced by the structure of all our other social institutions.”

The first sociologist to speak about a normative structure of science was Robert Merton. In 1942, he completed his work, “Science and Technology in a Democratic Order”<sup>2</sup>, putting together a conceptual framework that is supposed to regulate the behavior of scientists. This framework is based on four norms: **communality** (all scientists should have common ownership of scientific goods); **universalism** (scientific validity is independent of the attributes of its participants); **disinterest** (scientific institutions act for the benefit of a common scientific enterprise); **organized skepticism** (scientific claims should be exposed to critical scrutiny before being accepted).

It’s not too hard to imagine a world where these norms, usually presented in the form of prescriptive behavior, are ignored, or completely pushed into counter-norms, and where the whole scientific enterprise is governed by **secrecy, particularism, self-interest, and dogmatism**.

We have witnessed this in the last decade with the multiple crises that science is living through: the serial crisis<sup>3</sup>, the cherry-picking of sexy results (to make sure some journals would be inclined to consider our work for publication), low statistical power and HARKing<sup>4</sup>, the reproducibility crisis<sup>5</sup>, lack of trust from the public, the obsession over impact metrics (the h-index, the Impact Factor, the number of citations, ...).

I recommend reading the book “Science Fictions”<sup>6</sup>, by the way (which I have reviewed [here](#), in Italian), to get a general idea of how bad things have turned, especially in some disciplines.

I tend to believe that a big part of this crisis can be ascribed to the concept of **research excellence**, which every researcher has to hear about at least once in their professional life. But what is exactly research excellence? Let’s take a look at what some colleagues have said about it:

- the holy grail of academic life ([Michèle Lamont](#))
- a word we have chosen to avoid having a difficult conversation, a conversation about *values* ([Cameron Neylon](#))
- [something that] tells us nothing about how important the science is and everything about who decides ([Jack Stilgoe](#))
- used in its current unqualified form, research excellence is a pernicious and

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<sup>2</sup> [Robert K. Merton, The Normative Structure of Science \(1942\)](#)

<sup>3</sup> [Serials crisis - Wikipedia](#)

<sup>4</sup> [HARKing - Wikipedia](#)

<sup>5</sup> [Replication crisis - Wikipedia](#)

<sup>6</sup> [Science Fictions](#)

*dangerous rhetoric* that undermines the very foundations of good research and scholarship ([Moore et al.](#))

- a neocolonial agenda that reinforces *systemic biases in power structures*, reduces diversity, and *excludes* many participants from the processes of scholarship ([Cameron Neylon](#))

The rhetoric of research excellence has strengthened the **Matthew effect in science**, also known as the cumulative advantage effect, already described by Merton<sup>7</sup> in the forties: communities and researchers that are dimmed excellent, keep being well-rewarded, and keep receiving more (more prestige, more opportunities, more economic resources). All the rest keeps having less. A lot of people know about the Matthew effect, but I often find that too few know about the **Matilda effect**<sup>8</sup>: female invisibility in science is a fact, especially in the STEM. There is a bias against acknowledging the achievements of women scientists, whose work is (often) attributed to their male colleagues. This phenomenon was first described by Matilda Joslyn Gage in her work: “woman as inventor” and then referred to as the Matilda effect by Margaret W. Rossiter. The Spanish campaign [#NoMoreMatilda](#)<sup>9</sup> is absolutely great, take a look at it.

It seemed clear to me, at some point during my PhD, that something was not right: choosing the words of Christopher Long from Michigan State University, we, scientists, had designed a certain set of metrics, and we were letting these metrics completely distort our values. And I am, of course, also (but not only) talking about the Journal Impact Factor<sup>10</sup>, worshiped as a God. And so during my PhD journey, I found myself asking if we were all just pawns in a game, if we had no power at all in it, if we could not change the rules of this game. Who was winning? And who was losing? Who was keeping track? And did I want to keep on playing?

## Rewriting science through narratives of openness

When I got to know about this new way of doing research called Open Science, this was a pivotal moment for me: I also discovered later on that perhaps this new science could help to give a whole new purpose and meaning to whatever it is that I was trying to do.

*Crisis invites self-appraisal* - said Merton when considering what was going on with science already between the forties and the fifties. And so I did some self-appraisal myself.

It was, perhaps, possible, after all, to use open research practices to write a new set of values that could in turn inspire and guide new norms for science and for scientists. The last few years have seen the scientific community work hard in

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<sup>7</sup> [The Matthew Effect in Science by Robert K. Merton](#)

<sup>8</sup> [Matilda effect - Wikipedia](#)

<sup>9</sup> [#NoMoreMatildas](#)

<sup>10</sup> [Ten myths around open scholarly publishing](#) (see myth 2)

order to reach a **common understanding of open science**: a more open and participatory way of **conducting, publishing and evaluating** scholarly research. These three factors, conducting, publishing, evaluating, are for me the three factors in a minimum equation for open science. I don't think these are sufficient, but they are definitely a good starting point.

## Open access & language diversity

We know how it all started, more or less: with the **open access** chapter, already more than 20 years ago<sup>11</sup>. The “traditional” way of producing scientific knowledge, in particular scientific articles, is the one where the researchers give away their copyright, and then research articles are locked behind paywalls. The open access way instead enables free access to, and unrestricted use of, scientific information. Many people have used their voice to advocate for free open knowledge for everyone, and I want to mention at least two of these people: Aaron Swartz, and Jon Tennant. I recommend reading their works<sup>12</sup>.

However, the full transition to open access to scientific articles still remains a dream, 20 years later. And I actually think that the current way of promoting open access actually undermines good and inclusive scholarship. Let's talk for a moment about English being the lingua franca of science: this is important, as it permits communication and understanding, but it definitely comes with consequences: over-representation of positive and/or statistically significant results (because journals with high IF tend to publish only positive results); information on local species, ecosystems, and phenomena can be overlooked (because we tend to look for scientific information in English only); knowledge transfer problem, especially for local practitioners, policymakers, and the public at large who wants (and has all the rights) to access this knowledge.

If we then look into the production and the publication of scientific articles, we figure out that while only 14% of APC journals<sup>13</sup> are **multilingual**, meaning these accept articles written in more than one language (specifically different from English), this is true for 38% of diamond OA journals. Diamond Open Access journals are journals and platforms that don't charge fees to either authors or readers; these are community-driven, academic-led, and academic-owned publishing initiatives.

I am more and more convinced that the APC model is not the sustainable nor the equitable model to advance open access.

## Ethical by design: principles for good science

But a new, open way to do science is also a way where **research integrity and ethics** come back to the center of the discourse: we start practicing science in an

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<sup>11</sup> [Budapest Open Access Initiative](#)

<sup>12</sup> <https://archive.org/details/GuerillaOpenAccessManifesto>;  
<https://zenodo.org/record/3700646>

<sup>13</sup> [https://en.wikipedia.org/wiki/Article\\_processing\\_charge](https://en.wikipedia.org/wiki/Article_processing_charge)

ethical way by design. We think about our **purpose** (why do we do what we do?), our **values** (What drives our job? What do we desire? Care for? Defend?), our **principles** (Which road do we choose to achieve our purpose?), and our **functions** (how do we bring ethics into what we build, our data, tools, etc.?). And ideally, we also think about how to apply an **intersectional lens** to our processes: to data collection, and to the use of data research, for example.

And speaking about data, let's take for a moment the **FAIR principles**; I am a big fan of the FAIR framework, I practice the principles, I teach them, but I need to keep in mind that these principles, alone, don't tell a story of power. While they serve to guide data discovery and data reuse, they don't account for structures of power, nor they take into consideration historical conditions associated with data collection. That's why the FAIR principles are much better in action, within the open idea in mind, and within the construction of a more sustainable contract between science and society, if accompanied by the CARE principles. We need to make sure that scientific data are used in ways that have a purpose, and that this purpose is oriented towards collective benefit.

## Diverse knowledge systems within ethical spaces

And I would like to give you just an example of how this can be achieved: the story of identifying climate challenges that affect the availability of fish in Canada. Usually, parachute researchers<sup>14</sup> use Indigenous knowledge without care to how it's applied, collected, or whether the subsequent research benefits the local communities at all. Today I want to present the story of Polarctic; what Polarctic is doing is trying to rewrite this way of working: because remote sensing data doesn't capture everything, and in situ observations in the Arctic are difficult due to the extreme weather conditions, they have used Indigenous knowledge from the Inuit community in Canada, to map for example where polar bears would normally be seen<sup>15</sup>. This type of knowledge construction implies the transition from parachuting to partnerships<sup>16</sup>; a way to do this is towards the creation of ethical spaces: places for knowledge systems to interact with mutual respect, kindness, and generosity, keeping in mind that all knowledge systems are equal, and that no single system has more weight or legitimacy than another. Collaboration, mutual support, and multi-directional knowledge sharing are crucial within ethical spaces, so kindness needs to be at the front row of every type of interaction.

## Open movements to support and fuel other fights

In this lens, what I would love to see for the Open Movements(s) is for them to support and fuel other fights, it is for them to work towards collective liberation.

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<sup>14</sup> [The Problem With 'Parachute Science'](#)

<sup>15</sup> [Blending Indigenous Knowledge and artificial intelligence to enable adaptation - WWF Arctic](#)

<sup>16</sup> [Partnerships, not parachutes: How Indigenous knowledge and citizen science can enhance climate research - Bulletin of the Atomic Scientists](#)

Think of **Leave No One Behind**<sup>17</sup>, the central promise of the 2030 agenda. The goal is to end discrimination and exclusion, reduce the inequalities and vulnerabilities that leave people behind and that undermine the potential of individuals and of humanity as a whole. Open knowledge can be a very powerful tool in this endeavor. This is well reflected in the **UNESCO recommendation on Open Science**<sup>18</sup>, which highlights how open science is not only about making things free on the web, but also about promoting inclusion and exchange from groups that have been underrepresented or excluded from the scientific discourse for way too long. I actually believe that the open movement probably has to go through its own decolonization process, because **Open Science can become an extension of privilege**. Truth to be told, it is already becoming an extension of privilege. There are times when openness - especially in the current form - is harmful to an individual or to a community of individuals. Bringing new voices to the table requires dealing with power dynamics and addressing such concerns as **diversity, decolonization, and intersectionality**.

How can we talk about an open reform, if we don't explicitly mention and work towards inclusion? We need to act for **diversity**: attract people with different background, skills, and experiences, but also ask culturally informed research questions that are relevant to diverse populations. We need to act for **inclusion**: empower these people by providing them with an environment that welcomes the best of those backgrounds, skills, and experiences. And we need to act for **inclusiveness**: include individuals or groups who were previously excluded, give them eligibility, opportunities, and involvement in decision-making and leadership, achieved when members share and not compete for resources.

I believe rewriting science through narratives of openness is possible, and I believe open science can be the driver to the change we so desperately need in science: it's about the way we conduct, publish, and evaluate research, but it's also about how we chose to invest in community-driven tools and initiatives, how we respect traditions and diversity of research groups and disciplines, how we finally have a discussion about values, and we redefine research excellence towards these. I'm personally invested in using openness to disrupt power and to redistribute it for more just and sustainable purposes. There is a need for new voices, but also a need for new narratives: new narratives can be built around other concepts, like democracy — while retaining the core values of the open movement. Openness can be a way to preserve democracy and democratization, it can be a way to work towards collective liberation, it can be the way we write new, more sustainable and equitable contracts between science and society. The goal should be: **democratize access to open scholarship discussions, empower underrepresented researchers, and make science more equitable**.

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<sup>17</sup> <https://unsdg.un.org/2030-agenda/universal-values/leave-no-one-behind>

<sup>18</sup> <https://www.unesco.org/en/open-science/about?hub=686>

## Going rogue: living alternative spaces

Science is a big, fundamental, democratic matter. It needs to find back its values, reaffirm its objectives, and design ethical spaces in which flourish and serve society. When I left academia, I decided to look for these ethical spaces somewhere else, and today I want to talk to you about two of these spaces: onData<sup>19</sup>, and IGDORE<sup>20</sup>.

onData is an Italian non-profit association for social promotion that uses open knowledge, and in particular open data, to help build an open society. If you think about all the challenges of today's world - climate change, social polarization, political violence - copyright matters and open access issues seem a bit too small when they are brought close to this lens, don't you think? So my question to you is: *how can we make the open movement really involved in fighting some of these different causes?* onData and associations like onData are a way to do this. Public and open data are the tools of onData, and obviously the passion of the people within this space, but never their goal. Our goal is to set knowledge free for the collective benefit, and to build constructive dialogues and collaborations with all interested parties. onData achieves this with crowdsourcing activities, citizen science projects, work of advocacy and lobbying, creation of guides and tutorials for the public. Two projects of onData in particular I want to present to you today.

The first is **Dati Bene Comune**<sup>21</sup>; onData wants to think of data as a common good. In a modern liberal democracy, common goods include things like the road system, public parks and schools, museums and cultural institutions, public transportation, even clean air and clean water. When the COVID-19 pandemic hit Italy, and we didn't have any data available to understand what was going on, and everybody was panicking, we thought - this is *it* - public data needs to become common good. So we launched a campaign, Dati Bene Comune - which literally means data common good - together with Transparency International and Action Aid, and we managed to set COVID data free, for all.

The second story is **Disabled data**<sup>22</sup>, in collaboration with "Fight the stroke", which is a movement that supports the cause of young stroke survivors. "Fight the stroke" wanted to know which data were available, in Italy, in order to understand and talk about the conditions of disability. The data did not exist. Or, if it existed, it was presented with many barriers. Please note that managing to have access to these data, and designing an accessible way to make these available to everyone, was not a whim, not something we fancied to do, it was a matter of the law. The

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<sup>19</sup> <https://www.ondata.it/>

<sup>20</sup> <https://igdore.org/>

<sup>21</sup> <https://www.datibenecomune.it/>

<sup>22</sup> <https://disableddata.fightthestroke.org/>

United Nations Convention on the Rights of Persons with Disabilities (CRPD) states in fact, in its Article 31 on Statistics and data collection, that citizens need to be supported in researching and understanding the disability data available. We wanted to provide this support.

The second space is the space of **IGDORE**, the Institute for Globally Distributed Open Research and Education, a space where I could see academia taking the shape I was desiring. The academia I started dreaming about was a safe harbor dedicated to the reappropriation and the free sharing of knowledge, in all its forms, and an institution that can provide its researchers with the tools, time, and space they need to become who they want to be. IGDORE is an independent research institute dedicated to improving the quality of science, science education, and quality of life for scientists, students and their families. Something we are proud of - and that somehow defines IGDORE's identity - is our commitment to open science: our Code of Research Conduct<sup>23</sup> states two things: 1) IGDORE affiliates need to make their research articles available in open access, and 2) upon request, they need to promptly provide data and other information necessary for independent verification of any publication in which they have been included as author(s).

IGDORE promotes a **slow and responsible scientific discourse**, privileges alternative forms of discussions, where criticism is welcome and kindness is a must. We try to support and protect researchers that have found themselves involved in questionable research practices, or that have had to blow the whistle on someone.

## Epilogue

My story has come to an end. I hope you can now appreciate why this is a precious story for me, and why I hope it can inspire many more stories to come. In the chapter 13 of the Little Prince, the prince meets the businessman, busy at his desk counting stars, writing them down in his accounting book.

"I myself own a flower," he (the prince) continued his conversation with the businessman, "which I water every day. I own three volcanoes, which I clean out every week (for I also clean out the one that is extinct; one never knows). It is of some use to my volcanoes, and it is of some use to my flower, that I own them. But you are of no use to the stars..."

**We are all custodians of knowledge**, a common good so precious and yet so fragile. We can choose where to direct our energies and our passion: are we going to collect stars, or are we going to tend to our flowers and our volcanoes? People or profit: what's going to be?

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<sup>23</sup> <https://igdore.org/wp-content/uploads/2022/07/IGDORE-Code-of-Research-Conduct.pdf>