



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

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Back to fundamentals of research: Reliability, Transparency, Reproducibility

Roundtable 2: The researchers' perspective

20/05/2024

Aula Giorgio Prodi - Piazza San Giovanni in Monte 2 , Bologna



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Sharing protocols to confirm research reliability

Francesco Chemello

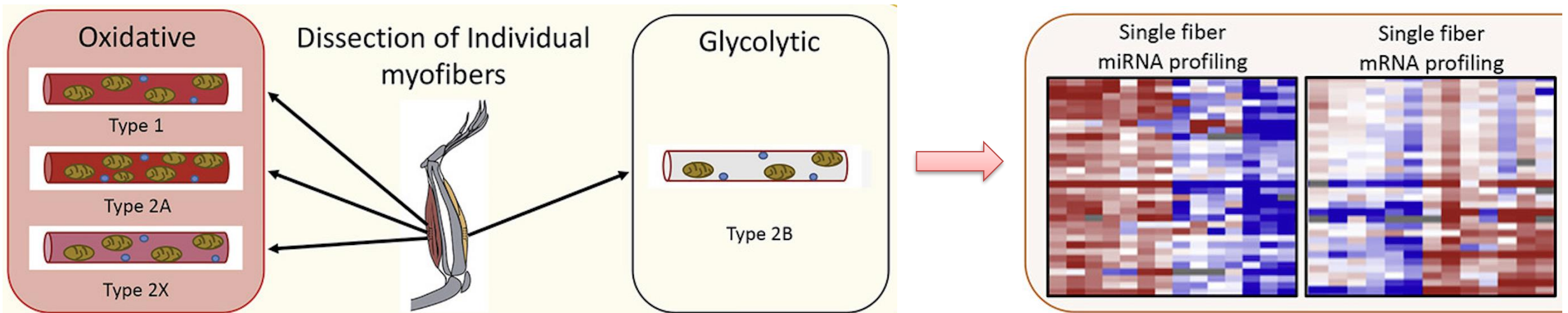
Department of Pharmacy and Biotechnology

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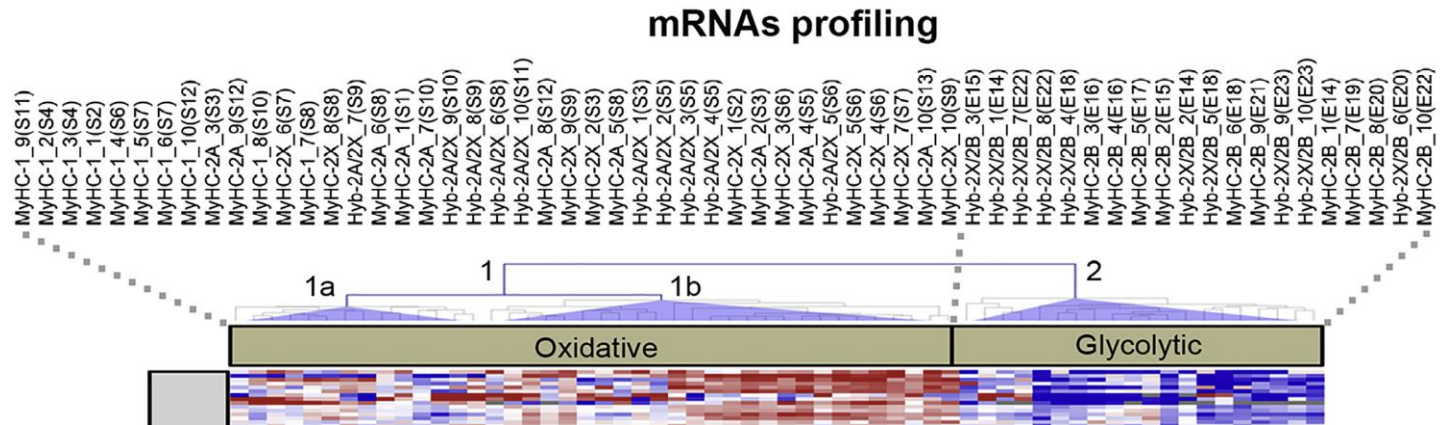
- ❖ Author: **Prof. Francesco Chemello**
- ❖ Project: **Analysis of the RNAs expressed in the different fiber types of the muscle**
- ❖ Context: **Innovative scientific research project funded by a private institution**

Case study:

Technical challenge to obtain a sufficient quantity of RNA for subsequent experiments from a limited sample such as individual murine muscle fibers.



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Technical and biological replicates

Article focusing on the **new results**

Cell Reports

Transcriptomic Analysis of Single Isolated Myofibers Identifies miR-27a-3p and miR-142-3p as Regulators of Metabolism in Skeletal Muscle

Resource

❖ Take home message:
Transparency → Reproducibility → Reliability
(Trasparenza → Riproducibilità → Affidabilità)

Article focusing on the **methods**

Isolation and Transcriptomic Profiling of Single Myofibers from Mice



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Management strategies for cultural heritage at risk

Sara Fiorentino

Department of Cultural Heritage

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- ❖ **Sara Fiorentino** (Junior assistant professor - fixed-term | Department of Cultural Heritage)
- ❖ Project **CHANGES** "Cultural Heritage Active Innovation for the Next-Gen Sustainable Society"
- ❖ **National Recovery and Resilience Plan**
- ❖ Case study **SIRIUS** – management strategies for cultural heritage at risk
(<https://site.unibo.it/patrimonioculturalearischio/it>)


FAIR MANAGEMENT
of available data on territorial risks




SET-UP OF A RISK ATLAS



cross-sectoral
CAPACITY BUILDING and KNOWLEDGE TRANSFER



INTER-DISCIPLINARY TRAINING



AWARENESS RISING
among civil society



ENHANCEMENT OF A «RISK CULTURE»



- ❖ Development of a **bottom-up interdisciplinary methodological approach** for the management of natural and anthropogenic risks impacting on cultural heritage
- ❖ **Replicability of international recommendations** (UNESCO, ICCROM, CCI, ICOMOS, ICOM) and their **adaptation**, on a local scale, to the different types of cultural assets and - in perspective - environmental heritage

Back to Fundamentals of Research | Reliability, Transparency and Reproducibility

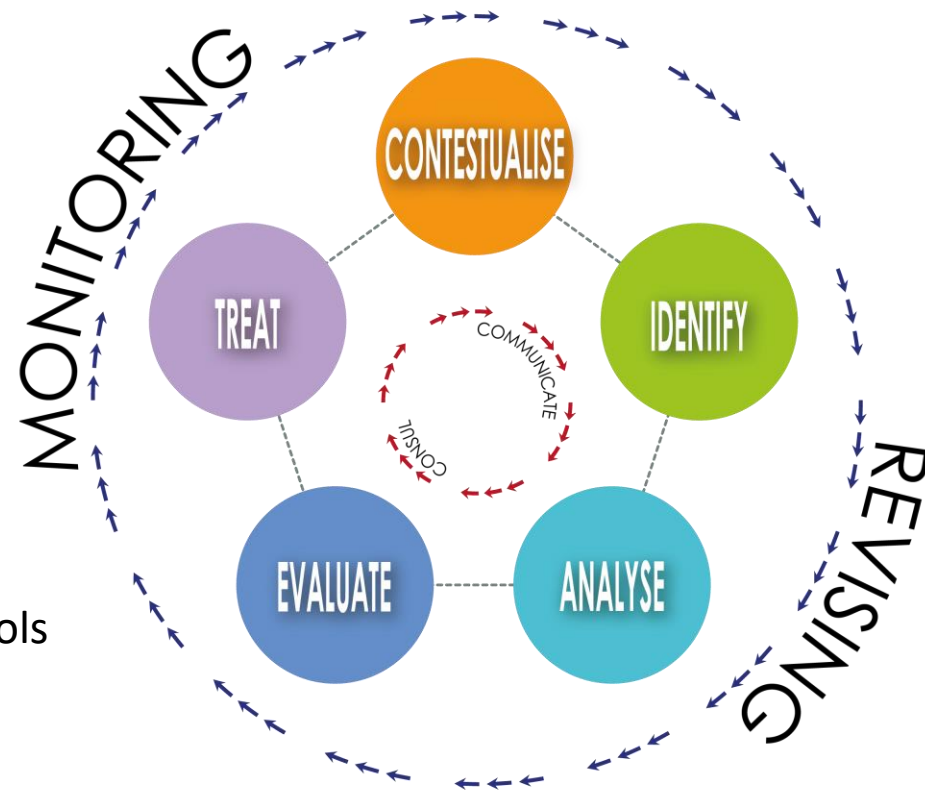
Take home messages

Advantages

- ❖ Sustainability of the methodological approach, flexible and adaptable to the inherent diversity and uniqueness of cultural heritage
- ❖ Multi-level risk management strategy that takes into account the variety and possible consequences of risks impacting on cultural heritage

Challenges > work in progress

- ❖ Data on territorial risks are accessible, but not always interoperable
- ❖ Set-up of FAIR (Findable, Accessible, Interoperable, Reusable) protocols
- ❖ Enhancing territorial impact of the research (AlmaCaReS > RESTART - REsilienza e Sviluppo Territoriale: patrimonio A Rischio e Tutela (<https://site.unibo.it/resilienza-patrimonio-culturale/it>))





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The critical edition and the transparency of the interpretive process

Maria Teresa Galli

Department of Classical Philology and Italian Studies

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- ❖ **Researcher:** Maria Teresa Galli (Department of Classical Philology and Italian Studies)
- ❖ **Project title:** *cross-cutting case study across multiple projects, including*
 - ❖ «OPA. Opere perdute e opere anonime – sec. III-XV» (University of Bologna)
 - ❖ «LatEBo. Latino Epigrafico a Bologna» (University of Bologna)
 - ❖ «CALCOS. Edizione critica, commento e traduzione di otto centoni virgiliani del codice Salmasiano» (University of Trento)
- ❖ **Context:** post-doc research projects
- ❖ **Case study:** setting up critical edition, commentary and translation of Latin texts.
 - ❖ Examples of **transparency** and **reliability**:
 - ❖ the critical apparatus clearly and concisely illustrates the manuscripts that hand down the text, the textual variants and any proposal for corrections;
 - ❖ the printed text unmistakably shows the editor's textual choices;
 - ❖ translation and commentary clarify the editor's interpretation.
 - ❖ Example of **reproducibility**:
 - ❖ previously unknown or little-known texts are provided with an interpretation key → solid and rigorous basis → starting point for increasingly in-depth studies.



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❖ Take home messages:

❖ challenges

- ❖ texts whose author, date and context of composition are unknown;
- ❖ texts with a single manuscript;

❖ advantages

this typology of work:

- ❖ clarifies the elements of **novelty** compared to previous studies;
- ❖ makes texts that are part of our **cultural heritage accessible** (or more accessible) to the scientific community and also to a non-expert public
 - **dissemination**, Third Mission
 - strengthens dialogue and **interaction** among **University** and **society**.





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The point of view of the BIT-ACT
research project, qualitative,
developed in unstable contexts and
on sensitive topics

Alice Mattoni

Department of Political and Social Sciences

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- ❖ **Alice Mattoni**, associate professor in the Department of Political and Social Sciences
- ❖ **Research project BIT-ACT**, that investigates how civil society and social movement organizations use digital technologies and media to counter corruption and increase transparency from the grassroots
- ❖ Funds from the **European Research Council** through a Starting Grant
- ❖ **Reproducibility and transparency practices**
 - ❖ Project with qualitative data (interviews, participant observation) that cannot be made open for ethical and security reasons.
 - ❖ However, transparency can be applied to the process of data analysis, which will be tracked, documented and made available in the form of a research protocol.
 - ❖ It is not the data that can be reproduced, but the research protocol related to data collection/construction and analysis.



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❖ Advantages

- ❖ Safeguarding the confidentiality and security of research participants
- ❖ Increased reflexivity on qualitative data collection and analysis methods
- ❖ Increased transparency regarding the methodology used to gather and analyse data

❖ Challenges

- ❖ Developing a set of best practices and rules of thumb to understand what kind of transparency is feasible when conducting qualitative research in unstable contexts and on sensitive issues.
- ❖ Formulate a different understanding of reproducibility, adapted to the disciplinary context and consistent with the research methods used to collect data
- ❖ Structuring a scalable reproducibility protocol that allows research similar to that conducted in BIT-ACT to be reproduced in different research contexts (e.g. small-scale projects)





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Robust and reproducible experimental deep learning setting

Federico Ruggeri

Department of Computer Science and Engineering

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Author: Federico Ruggeri, Post-doc research fellow (DISI @ LT-NLP-Lab, prof. Torrioni)

Context

- ⚡ *More than 70% of researchers failed in their attempt to reproduce another researcher's experiments, and over 50% failed to reproduce one of their own experiments. [[Baker et al., 2016](#)]*
- ⚡ *Several studies showed that new proposed methods are often not better than previous ones. [[Lucic et al., 2018](#); [Melis et al., 2017](#); [Bouthillier et al., 2019](#); [Henderson et al., 2018](#)]*
- ⚡ *[[Raff, 2019](#)] showed that 85% of 255 papers could be reproduced only with authors' assistance.*

Would you accept (trust) a work that has any of these flaws?



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Case Study : Cinnamon Toolkit

- ❖ **Community-based** to foster open research
- ❖ **Minimal** requirements
- ❖ **Modular** to meet different requirements
- ❖ **General-purpose** to simplify code organization and re-use

Takeaways

- ❖ Reproducible and robust research is still an **open problem** → lack of awareness
- ❖ Several **recommendations** to avoid flaws: data [[Gebru et al., 2021](#)], model [[Mitchell et al., 2019](#)], etc...
- ❖ Need for **educating** researchers towards quality Research
- ❖ Ensuring clean **coding** environment is crucial (e.g., CodeOcean [[Clyburne-Sherin et al., 2019](#)])

