

The neural substrate of numerical cognition in dyscalculia revealed by eye tracking and ultra-high field 7T functional magnetic imaging

DYSC-EYE-7T

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Scientific Area: SOC – (Social Sciences and Humanities)





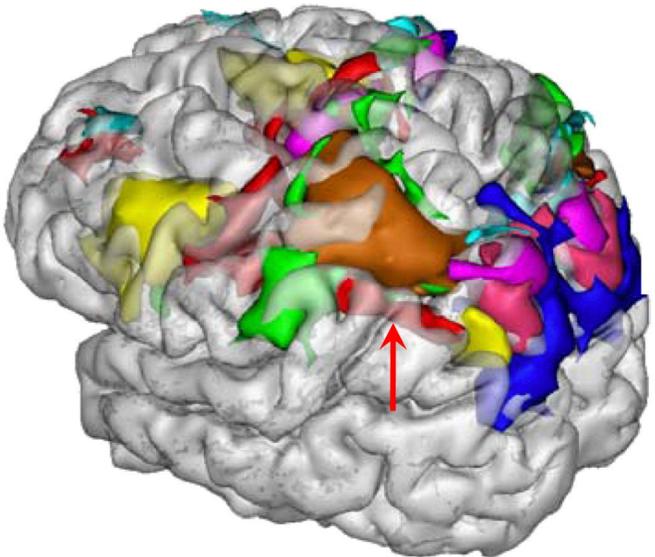
Developmental Dyscalculia

is a specific neurodevelopmental learning disability characterized by markedly below age level arithmetical skills in children with otherwise adequate intellectual abilities, appropriate neurological development and schooling opportunities.

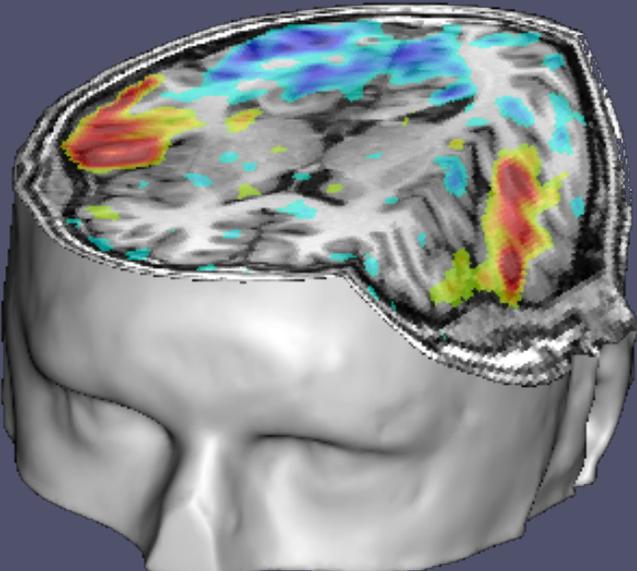
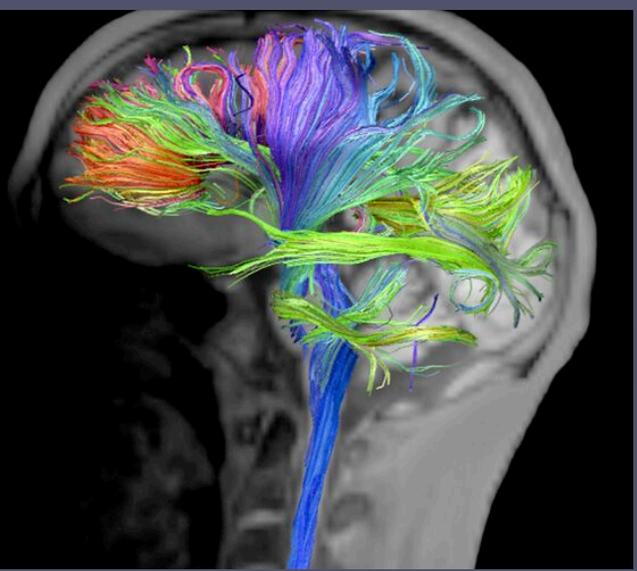
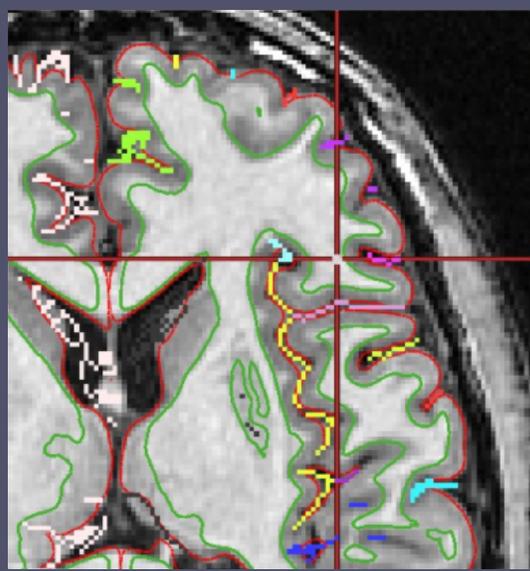
- a new theoretical framework
- new, objective and easily measurable markers

I am a psychologist and neuroscientist with a strong research background in functional neuroimaging + clinical interest in learning disabilities

I strive to take advantage of scientific research to ameliorate the clinical and educational practice

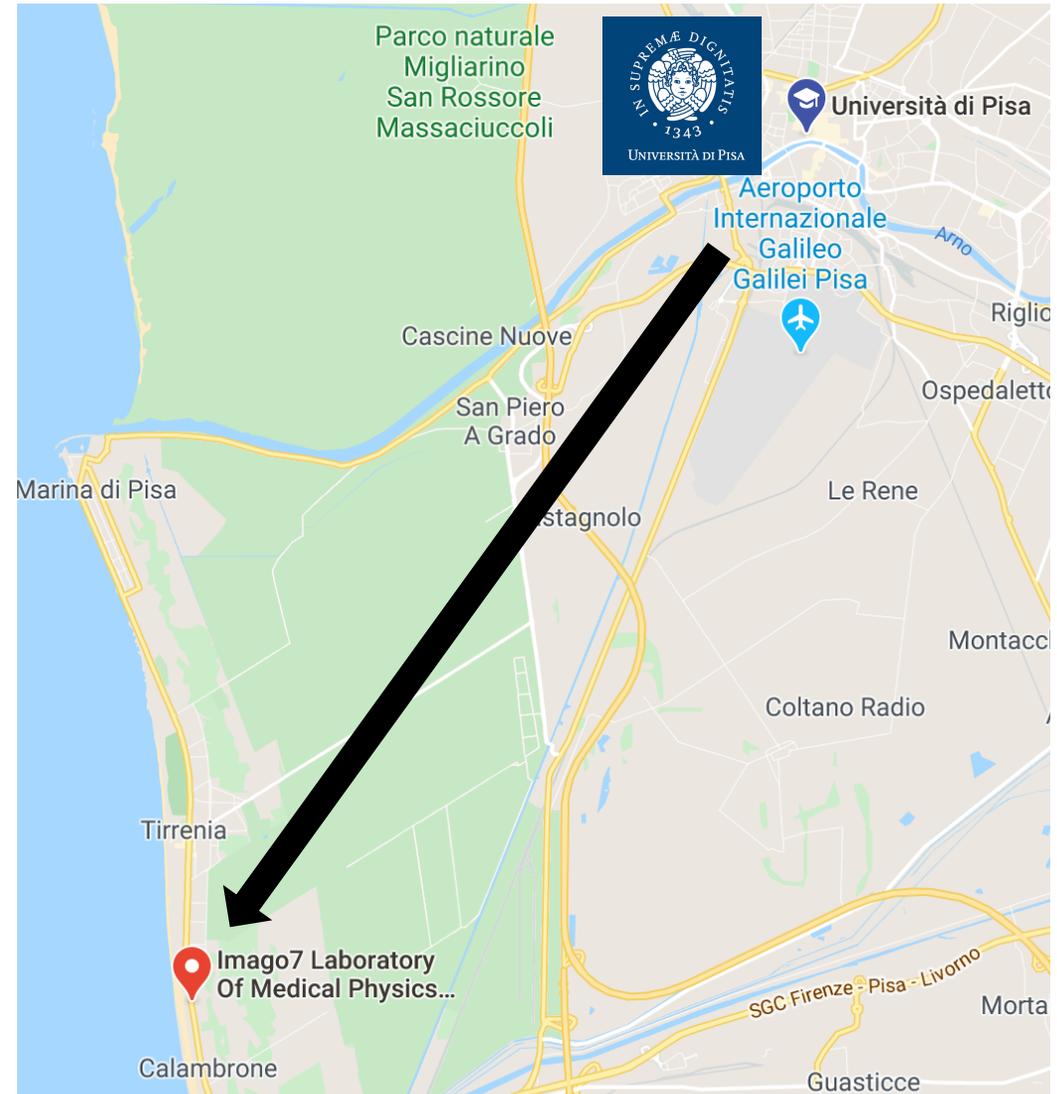


- Grasping only (G)
- Calculation only (C)
- Saccades only (S)
- Attention only (A)
- Pointing and grasping (P+G)
- Visuo-spatial tasks (VS)
- Calculation and Language (C+L)
- Saccades pointing and attention



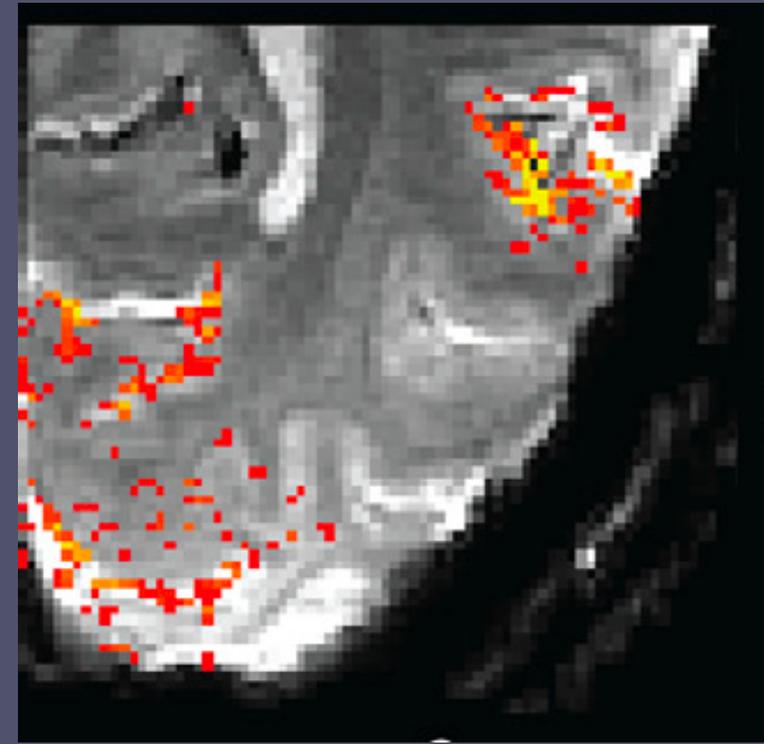
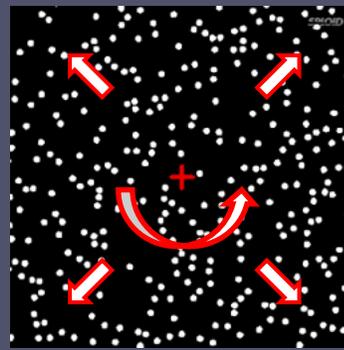


FONDAZIONE
DI RICERCA ONLUS
IMAGO7





Morrone et al., Nat Neurosc, 2000
1.5T fMRI

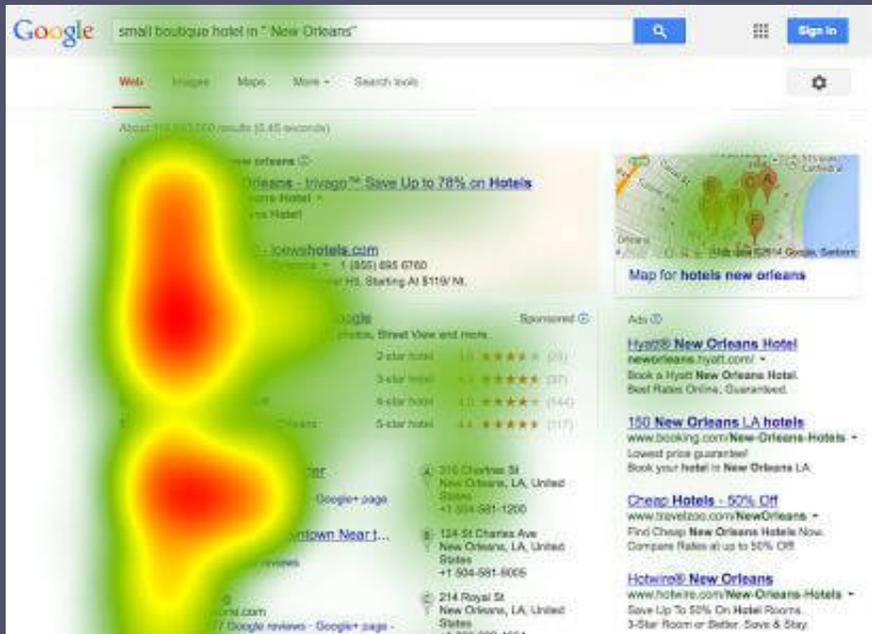
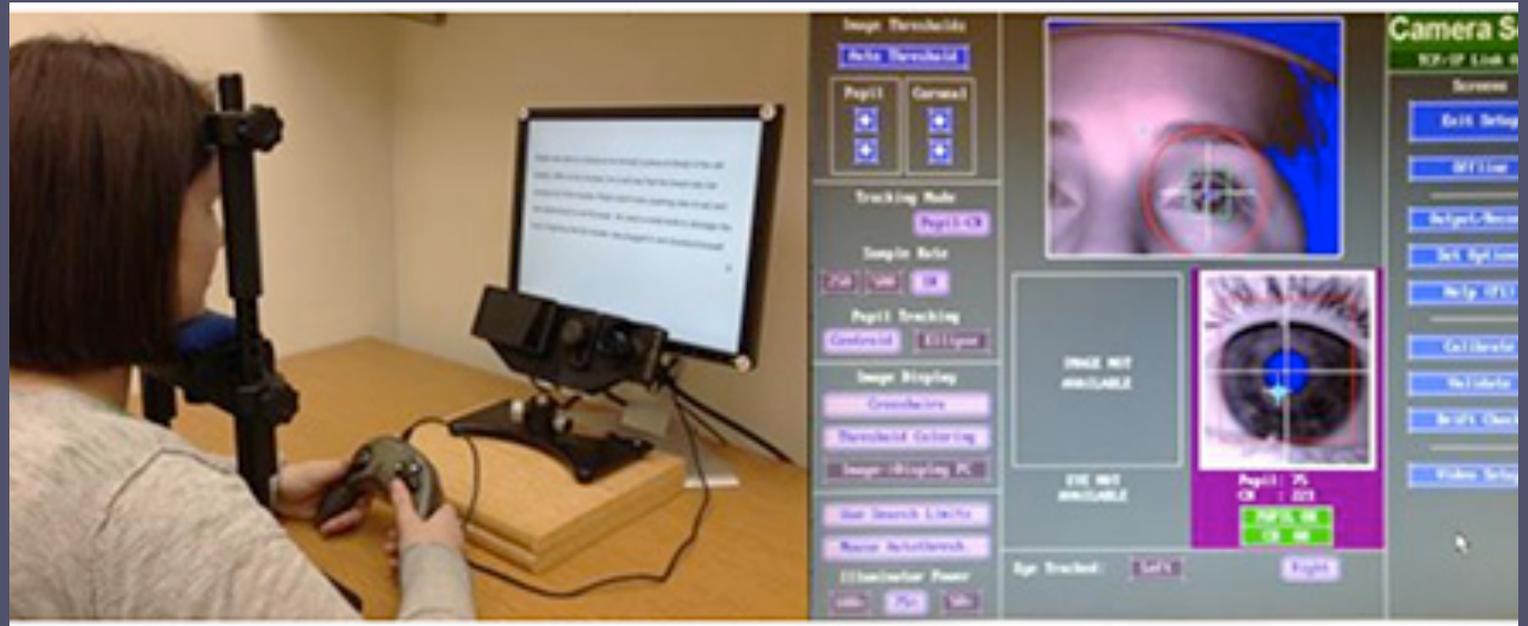


Rua et al., Mag Res Imag, 2017
7T fMRI @ IMAGO7
0.75 mm² isotropic

UNIFI hosts one of the few 7T scanners in Europe and worldwide

Having a 7T scanner installed, however, does not mean having it ready to acquire the high-quality images that would justify its use

Only possible thanks to the collaboration between neuroscientists, clinicians, physicists, engineers and computer scientists



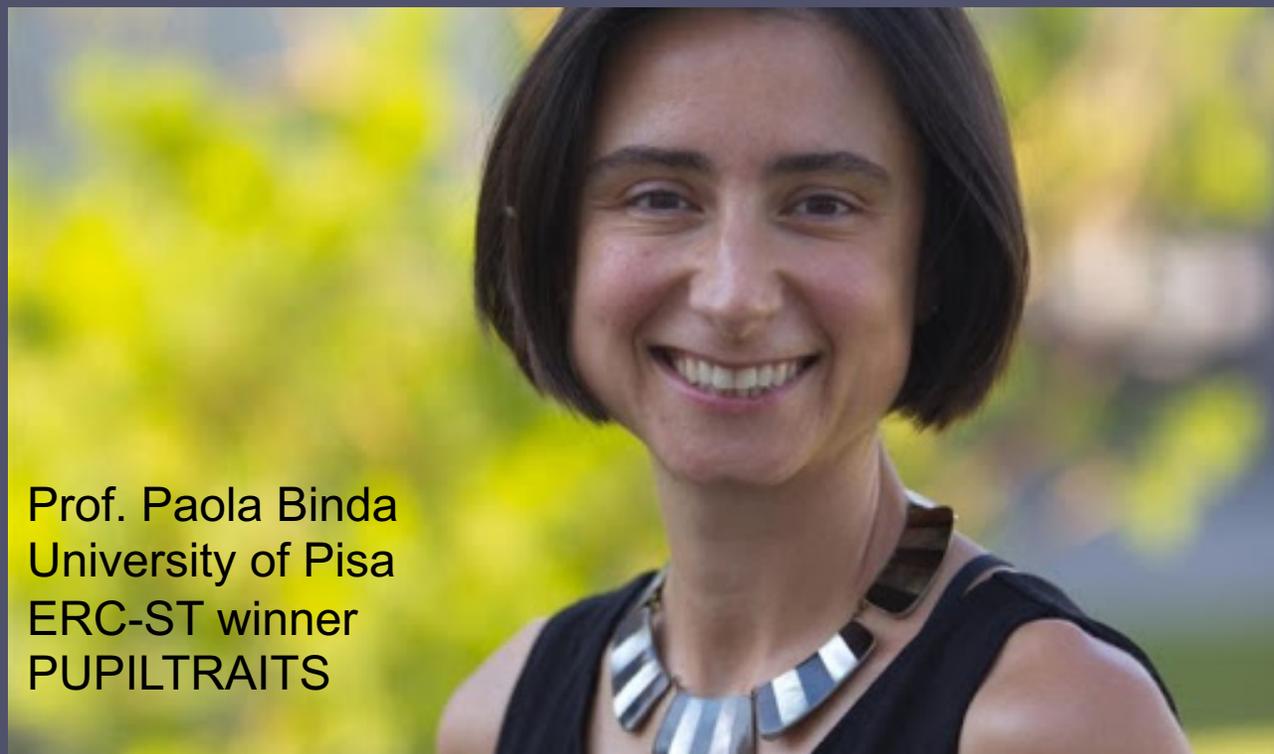
Eye tracker



Prof. GIOVANNI CIONI
Direttore Scientifico



IRCCS FONDAZIONE
STELLA MARIS



Prof. Paola Binda
University of Pisa
ERC-ST winner
PUPILTRAITS



Martina Calamusa
Research facilitator
Unità Servizi per la Ricerca - University of Pisa

Impact & Implementation

Tables:
Communication and outreach activities
Dissemination activities
Risks

Communication and outreach activities

Dedicated activities	Measures to maximize impact	Targets audience	GANTT reference and quantified impact indicator per measure
DYSC-EYE-7T website Blog/social media accounts	Official information on the project, Blog, Facebook, Twitter and LinkedIn DYSC-EYE-7T accounts	media, local community, lay audience, scientific community, academics	#1 WP5, D5.6.1 1 website, 500 visits during the project, 300 social media impression.
Open Day/Science Café/Bright	Participation to Outreaching events as MSCA ambassador	Local community, lay audience, SLD families, specific associations	#1 WP5, D5.8.n 10 surveys #2 WP5, D5.9.n 10 surveys #3 WP5, D5.10.n 10 surveys
Handwritten letters with pupils (Penne amiche della scienza initiative: https://sites.google.com/view/penne-amiche-della-scienza)	To stimulate kids' interest in science and make them familiar with DD. The initiative 'Penne amiche della scienza' puts researchers in contact with primary school Italian classroom to exchange letters.	School pupils	#1 WP5, D5.7.n 8 letters

Dissemination activities

Dedicated activities	Measures to maximize impact	Targets audience	GANTT reference and quantified impact indicator per measure
Scientific publications	Publication in open access papers and in Biorxiv, spread the news through social media and press	scientific community, lay audience, media	#1 WP2, D2.2 – 1 Journal of ... (IF ..) #2 WP3, D3.2 – 1 Journal of ... (IF ..) #3 WP4, D4.2 – 1 Journal of ... (IF ..)
National and international conferences European Workshop of ... (...) ... Science Society (...), European Conference of ... (...)	Oral/poster presentations, spread the news through social media	scientific community, stakeholders, local communities, patent associations, media	#1 WP2, D2.1 poster/talk #2 WP3, D3.1 poster/talk #3 WP4, D4.1 poster/talk #4 WP5, D5.2.1 poster/talk For the conference held in: 2020, 2021, for national conferences ~1200 attendees, for international conferences ~1000-30000 attendees
scientific workshop	Open Access with subscription	academics, scientific community, media	#1 WP5, D5.3 1 workshop report ~300 expected participants
Seminars and student training	Open Access, advertised through the universities' agenda	scientific community, academics, students	#1 WP5, D5.4 2 students report #2 WP5, D5.5.n 2 talks/40 questionnaires ~20 students per seminars and training activities

Risks

Description of risk	Likelihood	Proposed risk-mitigation measures	WPs
Difficulties testing kids	Unlikely	Experiments will be performed on teenagers/young adults	WP1 M1.1
Patients recruitment	Unlikely	Stella Maris is already in contract with patients. Results in the control group are interesting.	WP1 M1.1
Challenges with data collection and analysis	Medium	Variation of previously validated paradigms, preliminary results. Teams at the hosts, supervisors and international collaborators will provide support.	WP2 M2.1, M2.2, M2.3 WP3 M3.1, M3.2, M3.3 WP4 M4.1, M4.2, M4.3
Results do not support the main hypothesis	Medium	Results will support one of mutually exclusive hypotheses, thus being scientifically interesting anyhow. WP4 will be adapted accordingly.	WP2 M2.1, M2.3 WP3 M3.1, M3.3 WP4 M4.1

Tips

- Keep the lazy referee in mind! Not really lazy, just human
 - Figures and Tables
 - Pilot data
- Ask your grandma to read it
- Recent publications (or at least preprints) on the topic
- If it doesn't go through, don't worry, try to address all the evaluators' comments
- Never give up, you are a great researcher anyway!



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Questions?