

Cutting-Edge Research, Beyond Discipline Boundaries

Scuola Superiore Studi Avanzati Sapienza

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Paola Buzi is Full Professor of Egyptology and Coptic Studies. She was awarded an ERC Advanced Grant (2015) for the project "PATHs: Tracking Papyrus and Parchment Paths: An Archaeological Atlas of Coptic Literature. Literary Texts in their Geographical Context". She combines historical, literary and codicological interests with archaeological activities. She has taken part in several excavation campaigns in pharaonic and late-antique sites.

From the scribe of temples to the copyist of scriptoria: tools, techniques, literary products

The Egyptian scribe is a privileged person: he practices a prestigious art - thanks to a refined cultural training that allowed him to gain the highest steps on the social scale - he works without rush and with valuable materials. Lastly, he knows that any necessity will be satisfied by the sovereign. His late antique heir, the copyist of a monastic scriptorium, is often of humble origins, sometimes he does not understand the texts which he transcribes and he is often forced by his customers to work fast. What has so profoundly changed the profession of scribe over the centuries of the Egyptian history? This is the question that we will try to answer, in short.

Fabio Pellacini is an Associate Professor in the Computer Science Department where he leads the Computational Design Lab. He is the recipient of an NSF CAREER award and an Alfred P. Sloan fellowship, the two major awards for early stage career in North America. He also has credits on three Oscar nominated movies. He is interested in algorithms for 3D design with application to the entertainment and fabrication industries.

Collaborative 3D Content Creation: Current Technologies and Challenges Ahead

In today's always connected world, multiple users can concurrently edit the same written document, with platforms such as Google Docs, Dropbox, Paper, GitHub, etc. Differently than prior environments, such as Wikipedia, the collaboration is now seamless and real-time, removing any barrier for its use. This collaborative workflow though is limited to either simple documents, like text, or simple virtual worlds, like the cubes in Minecraft. No solution exists though for editing complex 3D environment, such as the ones used to design real-world objects, support 3D printing, make movies and games, and ultimately create an alternate virtual reality. In this brief presentation, I will discuss why this problem is complex both from a technical standpoint and from a user perspective and suggest a few solution being explored now.

Emanuela Cristiani is an Associate Professor in Prehistory. In 2014 she was awarded an ERC Starting grant for the project "HIDDEN FOODS. Plant foods in Palaeolithic and Mesolithic societies of south-eastern Europe and Italy". She is interested in prehistoric forager diet and technology by analysing micro-remains preserved on material culture and in human tartar.

Beyond the visible: new interdisciplinary approaches for understanding the role of plant foods in ancient forager societies

Popular narratives primarily envisage ancient foragers as 'meat-eaters' due to poorer preservation of vegetal remains than other elements of archaeological record (e.g., worked stone, animal and human bones, teeth). Such stereotype has worked as a conceptual barrier to understanding the complexity of ancient forager technological knowledge and has been reinforced over time by the application of approaches to early modern humans' subsistence which are particularly sensitive of the protein contribution to diet (i.e. archaeozoology and isotopic studies). As a consequence, the role of plant foods amongst prehistoric hunter-gatherer societies still remains one of the major issues of World Prehistory. In order to correct current biases in the prehistoric record, new cutting-edge approaches have recently been applied to different categories of archaeological materials. In particular, the analysis of micro-fossils entrapped in dental calculus from Late Mesolithic individuals from the Danube Gorges of the central Balkans has provided direct evidence of the role of Cerealia grasses within the forager diet of the region. Also, they revealed that domesticated plants were introduced to the Balkans half a millennium earlier than previously thought and eased by social networks existing between local foragers and the first farming communities.

Arianna D'Ottone Rambach is Associated Professor of Arabic Language and Literature at the Italian Institute for Oriental Studies. A specialist of the classical Arabic culture, her main fields of research are Islamic Numismatics and Arabic manuscripts. She was awarded the Nicholas Lowick Grant from the Royal Numismatic Society (London) and the Annual Grant from The Islamic Manuscript Association (Cambridge).

World palaeography

Palaeography is a discipline that requires many and different competences, and that contributes to various domains

of knowledge such as history, history of the texts, philology. Classical Palaeography is already based on written documents of the Greek-Byzantine and Latin cultures, that use different alphabets for different languages. Despite the resistance of Italian palaeographers, it is time to start thinking about a “Mediterranean Palaeography”, if not about a “World Palaeography” – reflecting the new horizons of the “World Philology” recently pointed out by Sheldon Pollock. Palaeography can indeed concur to a wider and deeper sense of the history and to a better knowledge of the written culture(s). In the future of palaeographical studies there will be no more boundaries dictated by alphabets or languages. Moreover, according to the concept of total Palaeography elaborated by Jean Mallon (1904-1982) the field of palaeographical studies becomes wider, since it is not limited to the books and documents production but can embrace all kind of written witnesses produced by a given culture. The frontiers between disciplines – Codicology, Epigraphy, Numismatics, Sphragistic – fade, especially in the context of the Arabic studies. The Arabic written materials are so multifarious to comprehend objects and artifacts traditionally belonging to different fields.

Mariangela Morlando is research fellow working in the field of Gene Expression Regulation. She was awarded by the Italian Society of Biophysics and Molecular Biology for the best 2004 publication in the Molecular Biology field and in 2007 she received a Medal from the Italian President Giorgio Napolitano, for the research activity carried out at the Oxford University (UK) during her postdoctoral period. She is currently investigating the metabolism of long non-coding and circular RNA molecules in muscle and neuronal cells both in physiological and pathological conditions.

Swimming in the Genome wearing a “Hi-tech” scuba mask

The flow of information described by the central dogma DNA-> RNA-> Protein has become more and more complicated over the last two decades. In 2001 when the human genome sequence was completed, one of the biggest shocks in Molecular Biology was the discovery that less than 2% of the DNA codes for proteins. More than 80% of the genomic material was therefore mistakenly signed as “junk DNA”. Even more remarkably, it became evident that the human complexity could not be explained by only referring to the classical model of genes as coding DNA. The advent of sensitive high-throughput sequencing technologies with an unprecedented ability to detect novel transcripts combined with new computational tools, equipped us with “Hi-Tech” scuba mask to figure out the reason of so much non-coding DNA. By swimming into the genome with such powerful mask we understood that “junk DNA” is the source of human biological complexity: the more sophisticated an organism, the higher the percentage of “junk DNA” it contains. This complexity emerged from the discovery that this part of the genome holds the instructions to build large, small and circular RNA molecules required for regulating the 2% of DNA coding for proteins. The way these RNA molecules function in regulating gene expression, in time and space, ranges from fine-tuning individual genes to switching off entire chromosomes. By regulating a variety of cellular processes they contribute in defining cell identity. Our research activity in the last few years was focused on the study of non coding RNA molecules expressed during skeletal muscle and motor neurons formation and their activity was analysed not only in physiological but also in pathological conditions. Even though the overcoming of several technical and conceptual barriers led us the opportunity to explore the “dark side” of our genome, many steps have still to be made in order to understand what this “junk DNA” does in our cells. We are at the start of this swim, at the first couple of miles of this long race.

Roberto Navigli is an Associate Professor in the Department of Computer Science of the Sapienza University of Rome. He has received an ERC Starting Grant (2011-2016) and an ERC Consolidator Grant (2017-2022) on multilingual Natural Language Processing.

Overcoming the language barrier with BabelNet

In this talk, I will introduce the most recent developments in Natural Language Processing, an area of artificial intelligence which deals with treating and understanding text. I will introduce BabelNet (<http://babelnet.org>), the main result of an ERC project I led (2011-2016), and show the possibilities that it opens up, especially in terms of enabling text processing and understanding in arbitrary languages. I will also briefly discuss future work in the context of a new ERC project that will start in June.

Roberto Di Leonardo is Associate Professor of Experimental Condensed Matter Physics. He was awarded an ERC Starting Grant (2012) for the project “SMART: Statistical Mechanics of Active Matter”. He develops novel optical tools to understand and control motions at the micron scale, from synthetic objects to living cells.

Irene Giardina is Associate Professor of Theoretical Physics. She was awarded an ERC Starting-Consolidator Grant in 2010 for the project “SWARM: Empirical analysis and theoretical modelling of self-organized collective behaviour in three-dimensions: from insect swarms and bird flocks to new schemes of distributed coordination”, and an ERC - PoC grant for the project “PROCEEDS” in 2015. Her group studies collective phenomena in biological systems using techniques and approaches from statistical physics.

From Physics to Biology and back

A journey from Physics to Biology and back, discussing how the simple rules of physical systems can explain complex animal behavior but also how, using the modern tools of molecular biology, we can build controllable biological propellers for synthetic micro-machines.

