This paper presents the contributions of the present issue of *Quaderns* in the framework of the homage to Leibniz, three hundred years after his death. Leibniz was a multifaceted figure, devoted to study and analysis of Nature and society. His contributions are studied in this issue mostly from the perspective of mathematics, but we should be aware that, for Leibniz, mathematics was a powerful way to understand and to change the world. Mathematics was also a relevant component of technology.

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LEIBNIZ AND THE INFINITE

Eberhard Knobloch

How did Leibniz handle the infinite in mathematics? Above all one has to study his *Arithmetical quadrature of the circle* etc. in order to answer to this question. Its last, still available version was written between June and September 1676. A new, bilingual, annotated Latin-German edition has just appeared. The paper mainly deals with theorems, thoughts, and explanations of this treatise putting them into the historical context (Kepler, Galileo, Grégoire de St. Vincent, Mengoli, Pardies, Johann Bernoulli, Euler). Four issues will be especially discussed: 1. Leibniz’s notions of infinitely small and infinite emphasizing his crucial distinction between the unbounded and bounded infinite. It sheds new light on the meaning of the fictionality of these fictitious quantities. 2. How did Leibniz demonstrate that a certain quantity is infinitely small or infinite? Three possibilities will be explained (definition, third proportional, trichotomy law). 3. Asymptotic spaces: What happens in the neighbourhood of the asymptote? Finite spaces are equated with infinitely long spaces. Infinitely long spaces might be finite. Hyperboloids and the logarithmic curve serve as examples. Is there any connection with the spirituality of the human soul? 4. The divergence of the harmonic series: Leibniz’s
own demonstration is compared with Mengoli’s solution that Leibniz came to know only during his second sojourn in London (October 1676).

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ON THE MATHEESIS UNIVERSALIS IN LEIBNIZ

David Rabouin

On several occasions, Leibniz planned to write a book on Mathesis Universalis. In the mid 1690’s, he placed this project under the heading of a “Mathematical Logic” (Logica Mathematica)—a striking characterization for the modern reader, although rarely understood in its proper context. In this paper, I describe the corpus related to this topic, which I edited and translated with a group of French scholars (“Mathesis”, Paris). I present several discoveries made during this editorial enterprise and sketch the new picture which emerges from it. For lack of space, I do not dwell much upon the interpretative questions and mainly focus on the way in which a chronology can be gained from a precise study of the sources. This, as we will see, already modifies substantially the traditional picture of mathesis universalis in Leibniz.

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IN THE FOOTSTEPS OF LEIBNIZ

Guillermo Lusa Monforte

Everyone who have become interested in the work of Leibniz should admit that we were before the last and the greatest of the universal genius that the human species has produced. On the occasion of the 300th anniversary of his death, I wish to go from the uncritical acceptance of some topic about him to the examination of some of the evidence that corroborates the veracity of this unanimous rating of the work of Leibniz. In this objective, I would try to know the fundamentals of its philosophy, and to follow its trace and its impact on some facets of the history of European thought. In the paper, I will try to detect the wake of Leibniz in some of the fields of the history of science and technology that have attracted my attention during
the last decades: the Idea of Progress, the algebrization of logics, the foundations of mathematics, the calculating machines and computing, the history of science and technology as a path to integral education, the stimulation of the capacity for admiration, the anthology of human ingenuity.

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THE LEIBNIZ’S CRITICISM OF EUCLID. THE METHOD OF ANALYSIS SITU

Mary Sol de Mora

The project of Leibniz aims at the construction of a new Geometry, and no at the perfecting of the deductive or rational structure of the Euclid’s Elements. The main element of this new analysis is the use of letters as basic characters that represent anything: Leibniz insists repeatedly on the inadequacy of geometric figures to investigate or demonstrate propositions in geometry, and proposes the characters, i.e. the letters, as signs that will replace the figures and also the abstract equations such as the circle, which does not allow us to imagine its shape and properties without the help of the figure.

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FROM LEIBNIZ’S CHARACTERISTICA GEOMETRICA TO CONTEMPORARY GEOMETRIC ALGEBRA

Sebastià Xambó- Descamps

After a few remarks on the significance of Leibniz’s characteristica geometrica, seen as a subsystem of his characteristica universalis, we provide a brief historical perspective on the development of geometric algebra, one of its archetypal incarnations, and illustrate how it works in geometry and physics by a few chosen examples. In our considerations, Leibniz’s characteristica universalis is not seen as real possibility, but rather as an ideal horizon that fosters productive thinking moods and values, in line with his ars inveniendi and ars judicandi. These roles are underlined by inserting comments on ways in which they are reflected in contemporary developments.
THE CORRESPONDENCE LEIBNIZ-MARQUIS DE L’HOSPITAL: ON THE ENVELOPE OF A FAMILY OF CURVES

Mònica Blanco

In 1696 the Marquis de L’Hospital (1661-1704) published the Analyse des infiniment petits pour l’intelligence des lignes courbes, the first systematic work on differential calculus. The Analyse relied largely upon the lectures that Johann Bernoulli (1667-1748) gave L’Hospital between 1691 and 1692 during the former’s stay in France. After Bernoulli left France, the instruction continued in his subsequent correspondence with L’Hospital until 1701. In the same period of time (1692-1701), L’Hospital also corresponded with Gottfried W. Leibniz (1646-1716). In his first letter to Leibniz (14 December 14 1692), L’Hospital raised the following problem: how to find the curve that is tangent to each member of a family of parabolas at some point, that is, how to find the envelope of a family of parabolas. A few days earlier, L’Hospital had already suggested the same problem in a letter to Johann Bernoulli. The aim of this paper is to analyse the mathematical development of this specific problem, from the correspondence of L’Hospital with Leibniz and Johann Bernoulli to its final version in the Analyse. This paper will also show a number of applications of this problem.

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SIMPSON AND CERDÀ: ERASING BORDERS BETWEEN LEIBNIZ AND NEWTON

Joaquim Berenguer i Clarià

The Differential and Integral Calculus emerged in late seventeenth century Europe with Newton and Leibniz. During the eighteenth century, this new Calculus was strengthened through two different schools with several contrasting approaches.

Our aim in this paper is, on one hand, to reflect on the role of teachers such as Thomas Simpson (1710-1761), an English Mathematics teacher, and Tomàs Cerdà (1715-1791), a Catalan Jesuit teacher, in shaping a new discipli-
ne like Differential and Integral Calculus, and, on the other hand, to reflect
on the treatment of several approaches to Calculus in their works. We analyse
Simpson’s work and Cerdà’s work as examples of the permeability between
the Newtonian and Leibnizian visions.

With a few examples taken from Cerdà’s *Tratado de Fluxiones* and Simpson’s
The Doctrine and Application of fluxions, we consider the “heterodoxy” of
some approaches of these Newtonian authors, showing the influence of the
Leibnizian infinitesimals on the work of these mathematicians.

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THE RELATION BETWEEN LEIBNIZ AND WALLIS:
AN OVERVIEW FROM NEW SOURCES AND STUDIES

Siegmund Probst

2016 was the year of the 400th anniversary of the birth of John Wallis and
the year of the 300th anniversary of the death of Gottfried Wilhelm Leibniz.
The mutual reception and discussion of the two scholars comprises a period
of more than 30 years in their lives. Since the publication of the first volume
of the Correspondence of John Wallis in 2003, edited by Christoph J. Scriba (†
2013) and Philip Beeley, the available sources for the study of the relationship
of the two scientists continued to grow, mainly by the now four volumes of
the Correspondence of John Wallis and several new volumes of the Academy
edition of the Complete writings and letters of Leibniz. In addition, there
have been published a considerable number of research papers dealing with
Leibniz and Wallis, investigating not only their debates concerning the new
calculus and priority issues in mathematics but also other topics such as cryp-
tography, calendar reform, logic, linguistics and theology.

The text consists of two parts, the longer first section presents an overview
on the relation between Wallis and Leibniz with focus on the early years,
and especially on the recent research on that relation: the year 2003 when the
300th anniversary of the death of John Wallis was commemorated, will be the
starting point. The second section presents some results of an investigation
in the origins of the term “infinitesimal“, where Wallis and Leibniz play a
prominent role.
ON LEIBNIZ’S THEOREM ABOUT THE IMPOSSIBILITY OF SQUARING THE CIRCLE AND ITS RELATION WITH JAMES GREGORY’S VERA CIRCULI QUADRATURA

Davide Crippa

In this paper, I shall study the last proposition of G. W. Leibniz’s De Quadratura Arithmetica (1676), which states that it is impossible to solve algebraically the quadrature of an arbitrary sector of the circle, the hyperbola and the ellipse. I shall deal with the quadrature of the circle only, and I shall put this mathematical result into its proper context, that is to say the controversy that had opposed James Gregory and Christiaan Huygens several years earlier. Probably under Huygens’ guidance, Leibniz studied the documents related to the controversy and wrote several observations about it. These observations show that Leibniz was led to investigate the problem of impossibility with the hope of correcting some flaws in Gregory’s reasoning, and eventually come up with an original impossibility theorem.

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THE HARMONIC TRIANGLE IN MENGOLI’S AND LEIBNIZ’S WORKS

Mª Rosa Massa-Esteve

The harmonic triangle was defined by Gottfried Wilhelm Leibniz (1646-1716) in 1673, and its definition was related to the successive differences of the harmonic series. Leibniz studied it in many different texts throughout his life. Pietro Mengoli (1627-1686), rather at the same time, used the harmonic triangle as a triangular table to perform quadratures and also the interpolated harmonic triangle to calculate the quadrature of the circle. In this article we analyze and compare the independent treatment of harmonic triangle by Mengoli and Leibniz in their works, referring to their sources, their aims, and their uses. We show that, on the one hand, Mengoli uses triangular tables as a tool of calculus, and uses the harmonic triangle to perform quadratures through one procedure called by him “homology”. On the other hand, at the
same time, Leibniz defines the harmonic triangle from the study on harmonic series, analyses its properties, and uses it to perform the summations of infinite series through one procedure called by him “sums of all the differences”. Harmonic triangle has an open visual structure in which the number of terms arranged in this way can be made infinite. The infinite therefore becomes one more element in the mathematical calculations of these authors, which in seventeenth century mathematics opened up a world of possibilities in the series and in their relations with infinitesimal calculus.

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PARALLEL RESEARCH OF THE SOLAR POWER IN THE 1970 DECADE: MIT, UNIVERSITY OF BARCELONA, CORFO AND BATELLE INSTITUTE

Nelson Arellano-Escudero

The oil embargo could have been incidence for the revitalization of research and development of solar energy technologies circa 1978. Nevertheless, it seems not have been recognized or keep back memories of the previous achievements since the XIX century, including the special creative and productive period between 1950 to 1972.

Archives at the Massachusetts Institute of technology, the Universitat Politècnica de Catalunya, the Fundación Luigi Micheletti, and the Corporación de Fomento de la Producción (CORFO) in Chile store information about circulation of technical, scientific, and management knowledge that was produced thanks Western researchers and engineers. They form worldwide boosting up collaborative networks about solar energy applying either the thermosolar devices or the recent experimentation with photovoltaic.

At the same epoch, History of technology incorporated for the first time the problem of solar energy as part of its subjects, for example at the Edison Centennial Symposium held at San Francisco, California in 1979. Thomas P. Hughes and George Basalla made lectures at that meeting. Basalla discussed the persistent myth of energy and a vision about “Energy and Civilization”, the same title for the recent book by Vaclav Smil.

The whole background (including the loosed memories) offers us an excellent opportunity for reflect about the problems of the evolution of
technology, the energetic transitions, the intermittent duration of the objects and the interpretation of cultures, all of this connecting with the proposal by Julia Thomas about an Eco-Economical History that allow us to analyse the environmental crisis caused by humankind and the problem of sustainability.

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