1. The Bernoulli Logo

A society needs a logo, and if the society is called the Bernoulli Society it seems natural to look for the logo in the works of our namesake, the Swiss mathematician Jacob Bernoulli (1654–1705).

Though we may value Bernoulli's contributions to probability theory (where would we be without Bernoulli trials?) Jacob Bernoulli had a special attachment to his work on the logarithmic spiral. In his 1692 paper 'Lineae Cycloidales, evolutae, anti-evolutae, causticae, anti-causticae, pericaustice' this spiral and related curves are studied intensively. The paper is reproduced as number 49 in the 'Opera'. As logo we have taken the central part of the main figure from that paper, which illustrates the construction of the spiral. Along with a spiral repeated (by rotation) six times, the detail shows parts of various construction lines and annotations. This detail is reproduced in silver on the cover of BERNOULLI. The tracery art-work on the cover, very professionally designed by Chapman and Hall, does not have a specific Bernoulli connection, but the colours (silver and green) are taken from the Bernoulli family coat of arms.

The logarithmic spiral, also known as growth spiral, is the course taken by a ship always sailing in a direction at a fixed angle to the straight line between the ship and a certain fixed point, e.g., a lighthouse. It is characterised by the property that rotation through a fixed angle corresponds to a fixed proportional increase in distance from the origin. In polar coordinates, $r = e^{a\theta}$. Consequently, rotating the curve at constant speed cannot be distinguished from a constant rate magnification of scale. This is actually a self-similarity property: one could say that the logarithmic spiral is one of the earliest known fractals. Bernoulli found this the most remarkable property of all and described the spiral as 'spiralis miribabilis', the miraculous spiral. He closes his paper expressing his pride in his discoveries, eulogising the spiral, and remarking that he would like the phrase 'eadem mutata resurgo semperdem', (though transformed I rise again unchanged, again and again) engraved on his tombstone together with a depiction of the spiral.

Indeed his tombstone in the cathedral of Basel does show a spiral of sorts (though in my opinion it looks more like the rather more boring Archimedean spiral $r = a\theta$ – perhaps the stone-mason did not carefully read Bernoulli's paper). Also interesting is the fact that the epitaph has been shortened to 'eadem mutata resurgo'. In the Christian religion one is only reborn once, not time and time again! Still, with the addition 'time and time again' implicitly understood, the epitaph remains appropriate as motto for a scientific society which as long as our science is truly alive will be subject to continual change and renewal.

The logo has been programmed in the Postscript language by Dr. Frits Beukers (University of Utrecht) for the Bernoulli Society. I would like to express my thanks to him here! Organisers of Bernoulli Society activities (conferences, etc.) are encouraged to make use of the logo. It made a first appearance on conference material and t-shirts at Aarhus and can be seen inside the Ferris wheel logo of the Vienna World Congress.

Richard Gill
Utrecht

Editor's comment:

Richard Gill is of course right: the spiral shown on Jacob Bernoulli's epitaph is Archimedean; it is not the logarithmic spiral, by which J. Bernoulli was so much fascinated. A simple explanation was offered by Fritz Hohenberg, Praxis der Mathematik **26** (1982/12), p. 373f. We present a translation of parts of his text.

> "According to customs, the production of an epitaph was arranged by the closest relative, who was Bernoulli's widow; this is apparent from the text of the epitaph. The maker of the epitaph is unknown. Today the epitaph is situated on a pillar of the cathedral of Basel. It has been observed that the "drawing" of the spiral is wrong [Otto Spiess, Basler Nachrichten 192 (1955)], since the epitaph shows several windings of an Archimedean, but not of a logarithmic spiral. What is the reason for such a mistake? One possible explanation might be that, since antiquity, in the art of painting a spiral was Archimedean, this being so approximately also for Ionic capitals. Neither Bernoulli's widow nor the craftsman making the epitaph knew the logarithmic spiral, and knowledgeable mathematicians did not participate in the project."

The photo of the epitaph as well as some very interesting material on the Bernoulli family and the logarithmic spiral was kindly provided by BERNOULLI-EDITION, Forschungsstelle Basel, Universitätsbibliothek Basel.

Text of the epitaph:

Loved by his family:
Jacob Bernoulli
the incomparable mathematician,
more than 18 years professor
at the University of Basel,
member of the royal academies
of Paris and Berlin,
famous for his writings.
By a chronic disease,
being in unimpaired mind until the end,
in the year of grace 1705, on the 16th of August
at the age of 50 years and 6 months
extinguished,
awaiting the resurrection of the devout.
JUDITH STUPAN
20 years his wife,
has with both their children
to the alas! sadly missed
husband and father
erected a monument.

Transformed I rise again.