

which lies in changing dimension. If one takes an infinite sequence of decreasing lines, then in the limit, one arrives at a point, and so changes from dimension 1 to dimension 0. Newton followed this practice in defining his 'fluxion', although unclearly. By contrast, in Leibniz's theory, one adds to a given variable line x an infinitesimally short 'differential' incremental line dx , with dx as its own increment, and so on; limits are explicitly avoided, and ' dy/dx ' is the ratio, usually finite, of two differentials. This role of dimension could have been explained; instead, we learn about "the free play of mind, which browses on the pastures of phenomena", and find quotations from a novel and from Meister Eckhart.

More should have been said about set theory. For example, in the summary of non-standard analysis as the modern theory of infinitesimals, there is a poem by Christian Morgenstern instead of a relevant explanation. Set theory has an empty set \emptyset , which is also not 'nothing': the author notes the definition of zero as the unit set of \emptyset , but he does not discuss the related tri-distinction between \emptyset , zero and nothing, which Bertrand Russell effected around 1900 (after anticipation by Gottlob Frege).

A similar non-nothing worth noting, and omitted in Kaplan's book, is the empty space, such as that between words. Their absence or presence is essential in contexts such as 'READINGANCIENTPAPYRI' and using modern computer programmes. Also, the bibliography is available only on the World-Wide Web. This is a regrettable feature, for the book as it stands is useless, since no details can be checked or pursued in it.

Thus, *The Nothing That Is* is somewhat frustrating. The book as a whole is less than the sum of its parts — to invoke another fascinating mathematical topic with a long history, which has a zero and even a 0/0 of its own with algebraic logicians such as George Boole and C. S. Peirce. ■

Ivor Grattan-Guinness in the Middlesex University Business School, Enfield, Middlesex EN3 4SF, UK.

More mathematical somethings
Discovering the Truth and Beauty of the Cosmos: A Mathematical Mystery Tour

by A. K. Dewdney
 Wiley, £17.99, \$22.95

The Mathematics of Measurement: A Critical History

by John J. Roche
 Athlone, £55

Mathematical Sorcery: Revealing the Secrets of Numbers

by Calcin C. Clawson
 Perseus, \$26.95

Science in culture



Design by digits

The Collier Campbell painted designs
 Martin Kemp

The origins of the term 'digital', which has come to signify the ultimate in depersonalized processing, lie in that most specifically human of instruments, the hand. The original 'digits' of computation were those ten fingers on which rudimentary acts of calculation were first performed. Now, in the age of computers, practitioners in almost every area of visual representation in art and science have witnessed severe polarization between designs arising from hand-eye coordination and the visual products of technology. The life's work of the remarkable design partnership, Collier Campbell (the archive of which is soon to be sold), proves that the divorce between the handmade and the machine-produced is not irrevocable.

Entering the world of textiles in the 1960s from engagement in painting rather than training in design techniques, the sisters Susan Collier and Sarah Campbell had a mission. It was to replace the tediously repetitive, graphically lifeless and coloristically crude textile patterns then generally available on the mass market with prints that retained the inherent life of freehand paintings. The motive was at once aesthetic and social, since they aspired to bring the costly and elite qualities of the individually made item within the reach of the widest possible public.

The painted designs that poured forth in a torrent of creative enthusiasm, in teeming various styles, possess a vigour of mark-making, vitality of line and energy of colour more akin to a Matisse painting than to a stock 'repeat'. Indeed, they set out to "cheat the repeat", that is to say, to arrive at designs which, if repeated above and below, and on either side of one another, would flow dynamically across the whole surface, without the monotony of insistent repetitiveness.

Beginning commercial production with Liberty of London Prints in 1961, Collier (joined in 1968 by her sister) pushed printed textiles into new technical and visual realms. They insisted that printers exploit and extend their technologies to translate the painterly freshness

and colorism of their designs into prints on a variety of fabrics, so that they could

be reproduced without degradation of effect. The premise on which they worked was that the eye can unerringly identify something that expressed the reach of hand, and that our aesthetic response to a hand-made item has its own unique character, something at once visual and somatic.

They were relying, without theory, on how the eye can undertake awesomely subtle acts of minute perceptual discrimination. These are the acts that allow us to recognize thousands of individual faces even from a fleeting glimpse of a mobile expression; to identify instantly a friend's handwriting on an envelope; and to distinguish a Leonardo da Vinci drawing from a pupil's pious copy. The tiny shadings of difference involved in such human discriminations are beyond description, relying upon what Collier Campbell term "inking without words".

After almost 40 years of undiminished artistic fertility, working with leading international companies and fashion designers, Collier Campbell find themselves in a changed world. The present danger is, as they say, that "the hand can't be seen; only the price". The problem lies with the increasing domination of manufacturing and retail by a few conglomerates. The tendency has been to concentrate on the 'real estate' value of a few 'designer names' which are used to endorse a huge range of products, from perfumes to pants.

The core of the matter is not therefore a necessary incompatibility between hand and technology, between digits and digital, but how we can establish modes of practice that permit the visual traces of human presence to speak eloquently through the new technologies. The final product does need to be literally handmade, but if all we can offer in the popular market-place are mechanical designs devoid of human vibrancy, we will be impoverishing our visual culture. ■

Martin Kemp is in the Department of the History of Art, University of Oxford, 35 Beaumont Street, Oxford OX1 2PG, UK.

COLLIER CAMPBELL ARCHIVE