

effect on the selection of the type of mould, systems of feeding plastic from the nozzle to the various cavities which go to make up the impression, parting surfaces and cooling.

More advanced constructions are dealt with in the second part. This includes moulds which are split to permit extraction of products of complex shape, those with side covers and cavities and those which are adapted for moulding internal undercuts. Detailed descriptions are given of the complex arrangements necessary for releasing screwed components.

To a certain extent, injection moulding is an art rather than a science and its terminology has been evolved by the mould designers themselves with some variations in nomenclature. The inclusion in the book of a comprehensive glossary of terms is therefore timely and valuable.

The treatment is descriptive rather than numerate, although empirical formulae are given to enable the most important dimensions required in a mould design to be estimated. Thus such factors as the diameter of guide pillars for different sizes of mould, the area of moulding appropriate to the action of each injector pin, runner diameters and the dimensions of gates can be determined in the light of established practice.

The empirical approach is not a basis for criticism of a book intended to enable designers to appreciate and apply the results of years of intensive development, but consideration of the contents reveals some interesting basic problems which might well repay study from the scientific point of view. Such studies might include the flow of non-Newtonian fluids at changing temperatures through channels of various shapes and the transient heat flow associated with the introduction of hot material into moulds from which heat must be removed rapidly for the product to solidify sufficiently to withstand the forces applied when the work is removed at the completion of the moulding cycle.

The book is intended for, and admirably suited to, the student of plastics technology, but is unlikely to appeal to the non-specialist reader.

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The Knights' Move

SIR,—Now that imagination has been banished from philosophy, and maintains a fleeting existence in laboratories, a somewhat furtive existence due to a widespread belief in the antipathy of fact and fancy, it is necessary to consider what forces are working towards its further suppression and extinction, and, in particular, to seek for any epidemic disorder of thought against which action can be taken. This is, as you point out so forcibly (*Nature*, 221, 109; 1969), no idle speculation. The scientific imagination, the most extreme manifestation of the human mind, is at stake. The scientific paper, Medavar tells us, is largely fraudulent. The heureka cry is muffled and we are denied the sight of the heureka-man, naked and dripping from immersion in some apparently irrelevant experience. The single author, the herald of insight, is being banished until age and administrative duties have deprived him of long and uninterrupted contact with raw data, an exile of youth most extreme in countries which are most vociferously democratic. The lights of the imagination are being dimmed, amidst widespread applause that the shadows of obscure inference are disappearing. The very seed-corn of reason is being sterilized because it is weed-infested and germinates unpredictably.

There are doubtless many reasons for the diminishing return in response to increased investment, but the matter is so important that a proportion of the space allocated to

what you call scientific journalism, in its best sense, should be devoted to it. I think I have identified one major virus which, originally incorporated as a useful symbiont, has now overwhelmed its host in many of the less robust sciences, and is disseminated by incorporation in their basic teaching. By infiltrating ready-to-wear computer programs it has now infected these devices which, in other ways, are so well fitted to the economical recall of fact and the orderly display of fancy.

I refer to the null hypothesis, the simplest concept which can permit surprise to be measured so that it can be expressed vicariously, appreciated communally and approved editorially.

The first alchemists sought gold without commerce, for they were ignorant of elements. Their successors sought to extract energy from closed systems, for they were ignorant of disorderliness. Our present alchemy is the disembodiment of intellect into simple rituals which will allow discoveries to be made without the tedium of thought or the indignity of the heureka, an event which tends to occur at inconvenient times to inconvenient people, usually lighting up the blind ending of some highway which has involved a major investment in resources and in the reputations of their trustees.

The null hypothesis is not to be confused with statistics although it provides the basis for the simplest decisional procedures which have so effectively colonized the more gullible sciences. An editorial policy which demanded the explicit formulation of any implicit null hypothesis would restrict this useful device to those few problems about which experts were adequately ignorant. It would also divert the talents of applied mathematicians from presuming to tell other people when they ought to be surprised to accelerating the colonization of those vast and fertile areas of the unknown which could benefit from simulation, model building, parameter fitting, the graphic portrayal of likelihoods, and to serious study of the genuine problems of machine intelligence. Most of these activities are assisted by computers and some are impossible without them.

Imagination, which has survived the attack of the theorists of knowledge acquisition, is now threatened by the sales-directed spread of transistorized sophistry, a threat of such gravity that discussion is necessary. Epidemiologists usually err in their first diagnoses, but this is no argument against epidemiology. Still less is it an argument against serious consideration of the alarmist views of those outsiders who pursue their subject without their thoughts being infiltrated by nullity or their manuscripts being decorated with significance tests.

Before complacency is induced by the widespread use, and occasional appropriateness, of these conventions, we should consider the sterilizing effect of the Aristotelian logic which was taught and practised for two thousand years. Bertrand Russell, after a prolonged search for some useful consequence of these rituals of inference, records the solitary example of a German metaphysician who was assisted in understanding a joke.

Yours sincerely,

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Mr Short's Shibboleth

SIR,—You are being less than fair to Mr Short (*Nature*, 221, 298; 1969). Your main reason for "profound despair" seems to be the apparent discrepancy between his figure of 90 per cent of parents who want religious instruction to continue and 20 per cent of the population confirmed in the Church of England. To the latter figure must surely be added: (a) the active members of other Christian denominations; (b) those who deny the divinity