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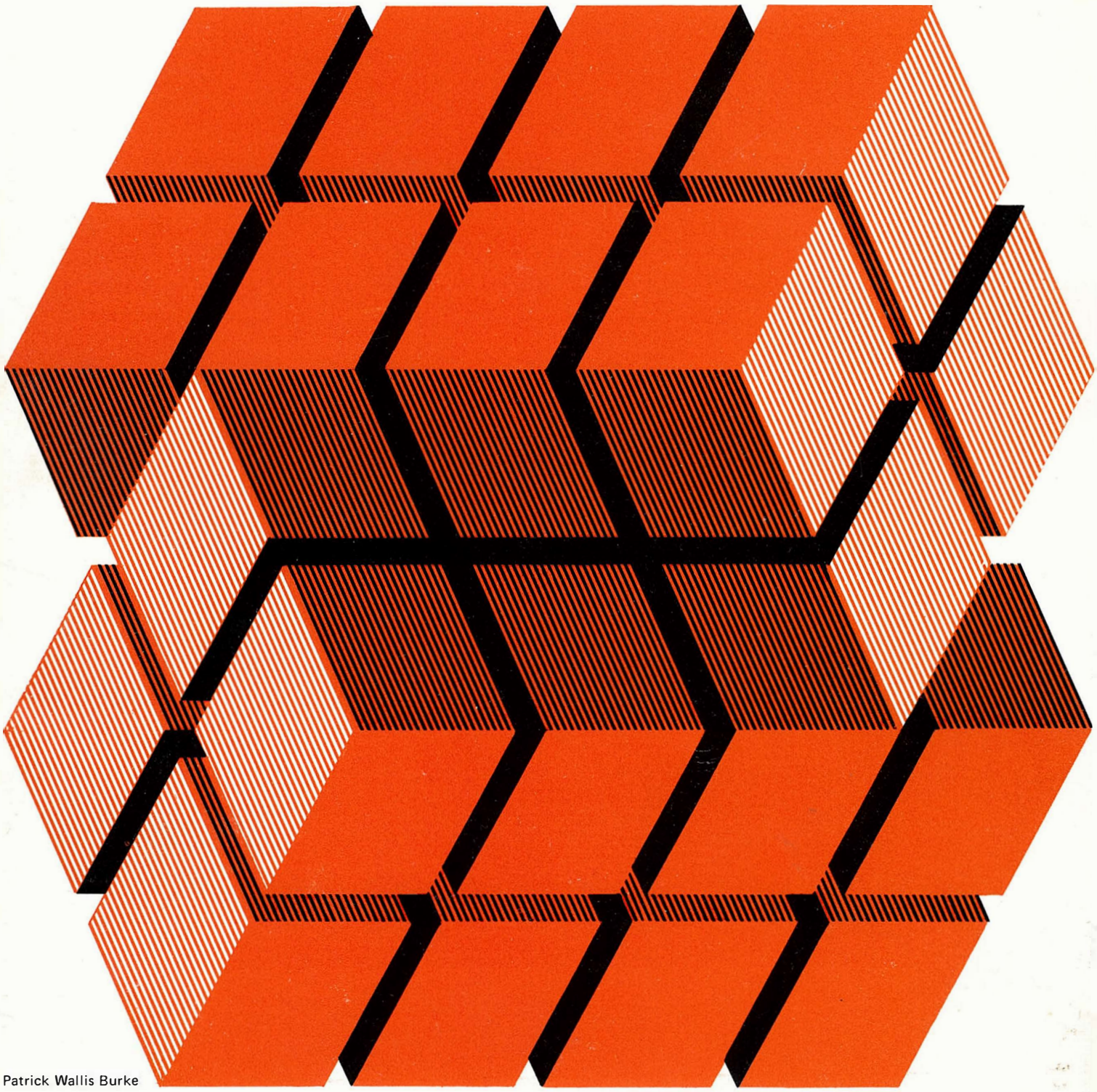

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icographic

A quarterly Review of International
Visual Communication Design

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Introduction by John Halas

There is little doubt that during VisCom 71, ICOGRADA was successful in bringing together the design profession and the Learning Industry, but the real integration of the two professions will be a painful and long process.

A book containing all that was said by the many eminent speakers who contributed, will be published in the Spring of 1972. It should serve as a valuable reference source on many aspects of visual communication, the re-organization of knowledge and the role of the designer in these processes. In the meantime, we are devoting this issue of *Icographic* to the publishing of a small selection of some of the views that were expressed during this unique congress. It was unique in that it was organized by the only representative international body that speaks for more than 20,000 designers. It was unique in that it provided a forum for designers, educators, industrialists and technologists to discuss how the television sets, videotape recorders, teaching machines, film projectors, computer data systems, that are being installed in schools all over the world can be matched by effective learning programmes that are appropriate to these new media.

Learning is beginning to move away from the almost passive process in which the teacher explained a text and children followed it. Systems that promote inquiry and discovery are becoming the foundation upon which most of the new educational materials are being built.

In his book, *The Act of Creation,* Arthur Koestler says something that sums up much of what VisCom 71 was concerned with;

'The traditional method of confronting the student not with the problem but with the finished solution, means depriving him of all excitement, to shut off the creative impulse, to reduce the adventure of mankind to a dusty heap of theorems.

Art is a form of communication which aims at eliciting a re-creative echo. *Education should be regarded as an art, and use the appropriate techniques of art to call forth that echo.* The novice, who has gone through some of the main stages in the evolution of the race during his pre-natal development, and of the evolution from savage to civilized society by the time he reaches adolescence, should then be made to continue his curriculum by re-capitulating some of the decisive episodes, impasses, and turning points on the road to the conquest of knowledge. Our textbooks and methods of teaching reflect a static, pre-evolutionary concept of the world. For man cannot inherit the past; he has to re-create it.'

To design a television system not merely for social communication, but also capable of responding to a whole range of intellectual values and spiritual problems, is at the heart of the design challenge and of our present dilemma.

Aubrey Singer contributes a challenging and controversial view of some of the problems raised by television broadcasting. He is at present Head of Features Group for BBC Television (United Kingdom)

Television as universal educator

Aubrey Singer

Television as Universal Educator!!! This title is not mine. I disown it and dislike it. It plays on words and makes assumptions. It treats different realms of experience as if they were alike.
The use of the word *Educator* in this title tacitly equates the use of Television by the *Educationalist* with the use of Television by those who use the medium to win and hold large audiences.

Secondly, the title is too broad in its implications. By all means cast a net over the subject but let the mesh be fine enough to hold something when it is finally hauled in. Just as a Television programme depends on constraints to enhance the subject so should a title have some limits. Perhaps a better title for this particular address would be *Image Bound versus Imagination Unbound* or *You Pay Your Money What's the Choice?* or more popular perhaps in today's terms *The Ecology of Television* or *How our Culture was Settled by the Pioneers but Cultivated by Unrestrained Education and the Subsequent Erosion that took place?* Nevertheless, although the original title is not mine, this address is! At the outset I must declare that it is a personal statement. The opinions expressed in it do not necessarily coincide with those of my employers.

As a Programme Executive by my programme output must I stand or fall. I am committed to the belief that television can only establish its right to be considered as a serious medium by the undertaking of serious programme enterprises, designed for transmission at peak hours and also designed to maximise that part of the general audience who are in some way pre-disposed to be interested in the matter at hand. If I am engaged in 'Education' it is from the position that it 'is learning not teaching, drawing things out not forcing them in'.

Of all organisations my own, the one I work for, the BBC applies itself most assiduously to this position. (It equally applies itself to the more formal educational programme designed to teach). It is after all charged in its Charter with the task of disseminating information, education and entertainment. Those of us engaged in this general factual programming would in fact be unwilling to be looked upon as *Educators* (except in the widest sense of the word). Nor incidentally do we consider ourselves, in our programme making function, as mass-communicators. We know only too well that communication is a two way interraction not a one way dissemination. We know too that mass is composed of individuals in small groups around television sets.

What we, the makers of those programmes are, is *Impresarios of Fact - Mass Disseminators - Individual Stimulators.*

More of this later. At this moment I had better try to define the terms under which we might be prepared to accept of ourselves and of our part in the medium, the term *Educator.*

In his book *Education Through Art* Herbert Read poses the question 'What is the purpose of Education?' Naturally he answers it and in doing so states terms in which television and those who work in it might be called *Educators.* Forgive me if I quote this at length.

'We can answer the question' says Herbert Read 'when we elect for a Libertarian conception of democracy. The purpose of education can then only be to develop, at the same time as the uniqueness, the social consciousness or reciprocity of the individual. As a result of the infinite permutations of heredity, the individual will inevitably be unique and this uniqueness will be of value to the community.

But uniqueness has no practical value in isolation. One of the most certain lessons of modern psychology and of recent historical experience is that education must be a process not only of individuation but also of integration which is the reconciliation of individual uniqueness with social unity'.

This platonic definition was written in 1942 at the time of the first thousand bomber raid, just as the anti-aircraft gun predictor was laying the basis of the computer, before the emphasis has shifted to integration at the expense of uniqueness. It is however a definition with nobility of vision, leaning toward learning rather than teaching. It is a definition of education within which television would be willing to be termed *Educator.*

Now one of our dons - Raymond Williams - once trenchantly pointed out that 'there are probably no masses at all only operators in the mass media trying to form masses!'. This is certainly true of the *Educators* of television - the Impresarios of Fact. They have to compete with other channels and with other television programmes for peak hour programme spaces. They therefore have to maximise their audience to ensure that their programmes reach as many of those as possible who are pre-disposed toward the subject. It is no good doing a programme on art or science for those with no interest in the subject. This way lies the worst assumptions, patronisations and excesses of the mass media. There has to be community of interest before there can be communication, and

communion of image before imagination can be stimulated.

The Impresario of Fact, the Mass Disseminator-Stimulator works on the principle of shared enthusiasms. He believes that 'Everybody ought to be taught' is cold-bloodedly different from 'Everybody ought to know'. He believes in excitement, stimulation, involvement by story telling. These people, myself included, work alongside colleagues who are indeed engaged directly in so-called Educational Broadcasting. Their relationship to the definition of *Educator* we have adduced is that of *Educationalist.* They are different in that they do have a mission to teach. They do believe in limited audiences, in that 'only people who want to be taught about this subject need watch'. In doing this they tend to play down those skills which lie at the heart of communication. The skill of getting, gripping, and holding an audience.

In Britain, such Educational Television comes in three categories: Schools Television, Further Education and The Open University. In explaining and outlining what goes on in my own country I am outlining what happens in many countries.

Schools Television, as its title suggests, broadcasts programmes into the classrooms of schools. In the past year some twenty-seven series have been broadcast. They range from programmes designed to extend the experience of infants to programmes for those about to leave school and enter university. They go into some 23,639 schools (there are incidentally about 38,000 schools in the British Isles). The cost is roughly £1,000,000 per year paid by Licence money (a sum paid by every set owner, £6 for black and white, £11 for colour).

Further Education is a second, yet totally different category. It encompasses vocational guidance, enrichment programmes and liberal arts. Some thirty series were broadcast , including language courses in the last year. *Management Accounting, Medicine Today* for doctors, *Using Broadcasts in Schools* for teachers, *Making Out* a series on modern artists, *Men and Materials,* a series on the science of materials. The cost per year is about £1,280,000 and again, this money comes out of the Licence fee.

Finally there is a new area, probably the most important social experiment of all - The Open University. This is in its first year, at the moment broadcasting four foundation courses, but as the pattern repeats and the main courses start, is due to broadcast some nineteen hundred television programmes a year. The capital cost over the first two years was £800,000 - it will rise to £1,000,000. The programme revenue cost for the television part of the operation is approximately £1,000,000 per year. Television and Radio Broadcasts are allied with book work and a tutorial system and call for some ten hours work each week from those who enrol. It will take upwards of four years for a student to qualify. The cost of all this does not come from Broadcasting Licence fees, it is supported by enrolment fees and a Government subsidy.

This then, Schools, Further Education and Open University absorbs about £4,500,000 each year and occupies about 960 broadcasting hours. Similar educational operations exist in other countries, in Germany, in Italy, in Japan, The Soviet Union and the Socialist Countries. So far as my own country goes this 960 hours of *Educational Broadcasting* takes place alongside 600 hours of *General factual* output.

However, since the mass *Educationalists* in *targeting* their audience limit its size, this Plethora of Pedagogy plays only a minor part in any consideration of television as a Universal Educator, and yet in commanding attention it uses the medium in ways imitative of those used in *General* programming. There is nevertheless a significant difference between the two approaches, that of *educationalist* and that of *educator.*

The first difference lies in the size of audience. None of the *Educational* output referred to commands more than 0.6% of the audience. This is partly a function of time. These programmes tend to go out at off-peak hours, and yet some of the programmes are transmitted at between six and seven in the evening, or at eleven-twenty at night. Since between six and seven, a *General* Technological programme can command approximately 10% of the potential audience (about 5,000,000 people), why the disparity? For it is a disparity which exists no matter what conversion factors are applied. The 960 hours of *education* will yield one tenth or less of the audience for the 600 hours *general* programming. It proves the limiting and delineating nature of the approach.

The second difference lies in the budgets for the programmes. *Educational* television does work on smaller budgets than programmes in *general* television. Even so, the *cost effectiveness* is very low. 8,000 people is the potential enrolment (at the moment) for those interested in each Open University and Foundation Course television programme. The cost per thousand viewers is, therefore, astronomically high. There are only (at this moment) 32,000 students. Average costs of programming are £1,600,000, which works out at approximately £50 per student per year! Correspondingly the cost of a *general* programme works out at a fraction of a penny per viewer.

The third, final and crucial difference lies in the method of the selection of subject matter for series and programmes. Schools and Open University programmes are, in the main, geared to a syllabus. This is defined by soundings among the Educationalists responsible for these areas of teaching, ratified and supported by a structure of Committees and Advisory Councils.

The classical example of this is, of course, Further Education. As might be expected where the goal is something as vague as *enrichment* or *vocational guidance,* the end-product wide-ranging in its selection, tends toward limitation in conception and therefore tends to lack the excitement and enthusiasm which comes from trying to maximise the audience.

In Britain, Further Education works to Advisory Committees. Since the broadcasting hours of television programming are limited by the Ministry of Posts and Telecommunications, the Further Education Advisory Committee has to give its imprimatur to all programmes purporting to be *Further Education* which fall outside these hours. The Committee consists of representatives from twenty-four educational bodies. The Association of Chief Education Officers, The Association of Education Committees, Association of Municipal Corporations, Association of Principals of Technical Institutions, Association of Tutors in Adult Education, Association of University Teachers, British Association for the Advancement of Science, Committee of Vice-Chancellors and Principals, County Councils Association, Department of Education and Science, Industrial representative, Inner London Education Authority, Minister of Education Northern Ireland, National Advisory Committee on Education for Industry and Commerce, National Federation of Women's Institutes of Adult Education, National Union of Students, National Union of Townswomen's Guilds' Open University, Schools Broadcasting Council for the United Kingdom, Scottish Institute of Adult Education, Trades Union Congress Education Committee, Universities Council for Adult Education, Welsh Joint Education Committee, Workers Educational Association and finally three representatives from the BBC.

This structure has given its imprimatur to the range of programmes I have indicated, ranging from highly specialised vocational guidance through to the visual arts. True these ideas will probably have come up to them from Producers in the first place, but the range of programming the Committee has agreed, including as it does programmes on fishing and yachting and the history of pop could, to a disinterested observer, suggest that someone is employing elephants to breed mice!

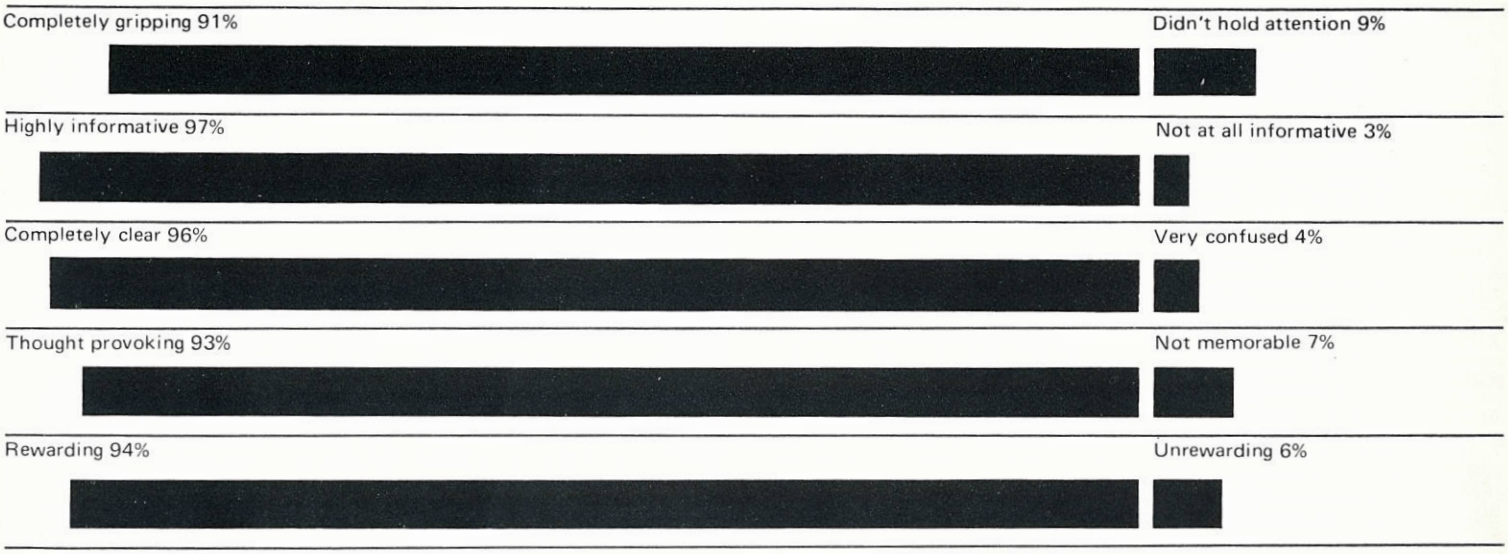
The world over, Educational Television, where it is under the direct control of an Educational Establishment, suffers from this poverty of aspirations, it is goal oriented, aimed in a limited way at *target* audiences and syllabus directed. Although it may cover much of the ground dealt with by regular peak-hour cultural and public affairs programming, it differs from it in the same manner as the *free range* chicken differs from the broiler fowl. Now, were it to ride on a free market, were it to shake off the controls and work to a genuine situation of supply and demand, then the inequalities would fast disappear. New technology could do, and indeed should do just this! Video cassettes, with their emphasis on *publishing* rather than *broadcasting* will for the first time make the educationalists accurately determine and live by the market. The economics will force them to put earned money into proven need, rather than scattering subsidy indiscriminately. The sooner this happens the better, and a heavy burden will be lifted from the broadcasting authorities, for if (as Andre Malraux maintains) our culture is indeed 'A heritage of the quality of the World' then too much of our limited television time is devoted to formally delineating this culture, within the circumscribed polarisation of syllabus and the woolly aspirations of committees of *teachers,* rather than exploring it in a free and open way, designed to grip and attract an audience, so that in stimulating and satisfying curiosity, learning takes place.

At this juncture, having considered the *educational* programme, let me turn to the *general* cultural and public affairs programmes.

These kinds of programme are prepared by the same methods and use the same medium, yet they differ greatly from the spectrum of *Educational* programmes. In the first place, in their first selection, they are not an impersonal committee deliberation, they are one man's vision. A producer's personal priority. Ideas which have come to dominate his frame of reference, whose excitement cries out to be communicated to others. They are ideas conceived by an impresario who knows they will stimulate and hold the largest possible audience.

Secondly, in their execution, not only will the programmes tell a real story, be invested with dramatic form -

BBC Audience Research
Reaction Profile
'Civilisation'



given a beginning, middle and end (though not - as Mr Luc Godard once said - necessarily in that order) they will also be designed to give pleasure.

The pleasure principle is well known. It may be as simple as the sensuous beauty of the images seen in some episodes of the programme *Civilisation* - as direct as the thrill of intellectual adventure one gains from the insights of a good science programme - as subtle as the conveying of the enthusiastic relationship between a supreme master and his subject, such as Tortellier taming a master class of cellists or Fred Hoyle explaining cosmological theory. Since no goal is at stake, no exam, no course - nothing except the enjoyment and knowledge for its own sake. The producer and participants, whilst striving for comprehensibility, will not necessarily expect complete understanding. In no way, therefore, has anyone a need to patronise the audience by making assumptions about talking down to lower intellectual levels.
Certainly complete understanding may not be achieved, but the revealing of the relationship of the subject to the programme participant and to the audiences' life consciousness and experience is more than sufficient for enjoyment.

Thirdly, in the producer's attitude to the audience, like the good showman he is, he makes sure that he tells a story and by the honourable and natural means used since the dawn of history, seeks to get, grip and hold as many people as possible. He will (as I have said before) aim at those with latent interest in the subject, fully aware it cannot please all of the people, all of the time. (Parenthetically, if he thinks it can only please a few people for part of the time, he won't do the programme).

This form of programming is, as you can see, in varying degree apart from the *educational programme.* Different in approach - different in execution - different in its attitude to getting and imparting knowledge to an audience. Although the *educational* is larger than the *general* output, the cost per viewer is much higher and the audience penetration lower. No wonder then that the educational establishment views these budgets and placings with envy. Naturally, since the *general programmes* are the ones which fill the role of *universal educator* envisaged in the title of this article, it is only right to examine their universality. In audience terms alone they are very effective.

The Forsyte Saga, for example, was seen by 26,000,000 people in Britain over three runs. Abroad, the numbers are staggering - an estimated 50,000,000.
The programme *Civilisation,* has been shown three times in Britain with an average of 5,000,000 viewers per episode. When screened on Channel 2 it averaged about 3,500,000.
The science programme *Horizon,* the feature programme *Bird's Eye View,* and the arts programme *Review,* all command audiences six or seven times as large as their educational counterparts.
These audiences by themselves are large enough to excite great envy in any educationalist. But the size of an audience by itself is only a superficial reason - are the programmes making an impact?

We can produce some measurements. The diagrams which accompany this article show audience reaction profiles - they tell their own story.

However, none of these shows anything more than the audiences' preferences. What about wider correlations? More lasting effects?

Here we are on much more difficult ground. Yet book sales may be a clue.

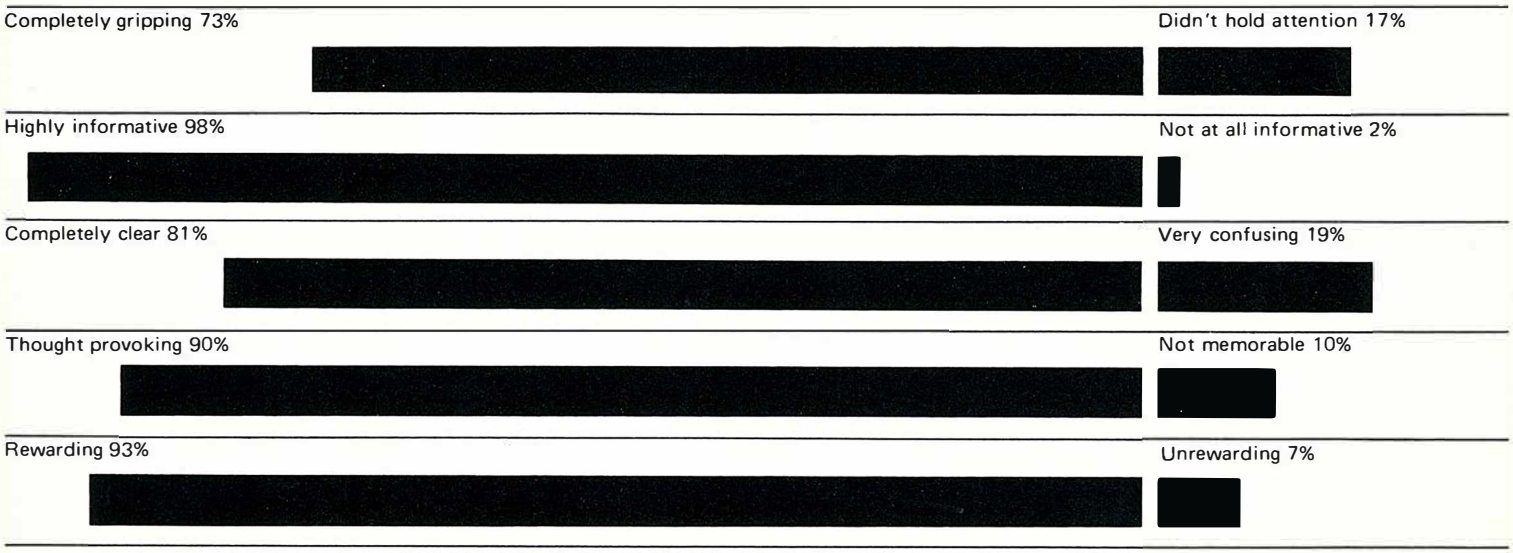
Before we first transmitted *The Forsyte Saga,* the sales of its central book *Man of Property* were running at 2,000 copies per year. After the series, the sales rose to 150,000 copies per year.
In the case of the programme *Civilisation,* a book based on the series has sold 100,000 copies in hard back and 100,000 in a paper back edition, in the United Kingdom. In the United States 200,000 copies of a hard back edition have been sold at a price of 15 dollars per copy! Recently, we made a two hour programme on the latest advances in astronomy called *The Violent Universe.* The book came out on the day of transmission and in ten days we had sold 15,000 copies. Sales now stand at 24,000 copies.

Broader correlations are more difficult to determine. Much of the information, the concepts, the delights and enthusiasms conveyed in this *general* programming must rub off on the audience. American advertisers (and our own, for that matter) would not spend billions of dollars and millions of pounds on television advertising if their commercials did not result in increased sales. Conversely, some fear that the depiction of violence in television might be responsible for an increase in anti-social aggresion, i.e. crimes of violence. There is a correlation that can be made between the growth of television and the increase of such crime. Proof is a different thing altogether. It is the subject of much inconclusive social research, in its way as hard and as tantalising as trying to prove the connections between some viruses and human cancers. All the signs are there, but the proof eludes the researchers.

There would seem to be no way out but to accept, at this moment, albeit intuitively, that television placed as it is, in nearly every living room, must be the most persuasive and socially aggressive medium yet known to mankind. Television must be a force, a universal educator, though whether for good or evil must depend on the attitudes reflected in the programming. Our society leans to the belief that the accepting of positive qualities tends to eliminate their opposites. 'We avoid hate by loving' says Herbert Read. 'We avoid sadism and masochism by community of feeling and action'. If negative attitudes are unthinkingly allowed to be used to give vicarious thrills night after night in programme after programme, if the images of affluence are for commercial gain, continually pumped into the homes of the impoverished, (especially when this sector watches more television than anyone else), then no wonder some of this rubs off into and affects our society. Yet although those in charge of television can only suspect that this is the case, many crusading pressure groups feel it is important to act now, even if the proof comes later. The person under suspicion always has more opprobrium cast in his direction than the person on trial - whether guilty or not!!

This *universality* and its possible effects have attracted some unwelcome (but perhaps deserved) attention in the direction of television. The role of television as *universal educator* in the sense that we have defined so carefully, is under scrutiny by Governments, politicians and pressure groups, the world over. It is at this moment particularly vulnerable. The small band of people who run news, factual and informational programmes for a general

BBC Audience Research
Reaction Profile
'Horizon - The Secret'



audience are particularly exposed. It would pay us at this stage to explore these pressures.

At this time, Public Service Television Networks are under considerable pressure due to rising costs. The cost of colour, world-wide inflation - the fact that in the *developed* countries television is no longer expanding, have led to a situation of static stringency. The only place from which support can come is from Government, and yet if television is to do its job properly and reflect society, it must air opinions which are contrary to Government policy. By definition, journalism and the reporting of events, tends to be in opposition to the Government of the day. Since no one has yet devised an insulated method of funding public service networks, free from the possibility of Government pressure, the Network Heads are faced with the problem of how to bite the hand that feeds them and still get their financial sustenance. 'They have the newspapers, I have television', said General de Gaulle at election time.

Not only money, but wavelengths and the number of channels, are strictly limited and regulated by Government - the most genuine and high-minded politician could not avoid yielding to the temptation of manipulating such patronage.
Networks therefore seek (no - are charged with seeking) the balanced and the politically safe, in the same way that a river follows the easiest course. If the politicians are unsatisfied with their efforts, then nothing is safer than *educational* programming, with its air of bland objectivity, and considerable pressure can be applied in that direction. Support which can only take place at the expense of the facilities, money, time and talent devoted to *general* programming.

With the increase in the amount of Educational programming (a five-fold increase over ten years), a form of Gresham's Law begins to prevail. The amount of talk and factual programming under the educational banner, goal and syllabus oriented as it is, the sheer amount of facts competing for attention - debases the value of the other.
The Educational Establishment can thus be said to operate the *protection racket* in the communications jungle. At one extreme, it can offer the politicians a cushion against the Networks' Public Affairs programmes (political and informational).
At the other extreme, it offers the Networks a worthiness that the politicians find hard to question. Furthermore, in its own right, the Educational Establishment is virtually unassailable, since it also controls the qualifications that ensure advancement in the meritocracy. Having won the race without crossing the start or finish line, the Educationalist makes sure that those who follow will run the course he has designed.

But not only is *general factual* programming threatened from without, this vital part of a libertarian democracy is its own worst enemy. There are two factors that erode its impact. The first is the 'metronome like' quality of television. The steady beat of the half hour and hour long time slot, produce over many programmes, an hypnotic predictability of pace and style which militates against programming effectiveness. Serious programming needs a serious consideration, which in turn needs sufficient time to allow the fresh and unpredictable to occur.

One of the most recent developments has been the mounting of programming on certain subjects up to two and a half hours in length. Recent co-productions have been devoted to such matters as the recent developments in astronomy - the latest advances in research into the human brain - there have been programmes on the common market or American responsibility in Vietnam. These have been powerful counters to this 'metronome' effect. They have given the *general* programming a new thrust and have significantly reinforced the view that if the subject matter is sufficiently important, even if very intellectually demanding, the audience will be appreciative of a chance to come to real grips with an argument.

The second factor - the second *enemy within* - is Tele-Journalism. The glib and *instant* opinion vitiates public affairs and factual television, just as surely as 'Journalism is the death of Literature'. *Instant* politics, *instant* art, *instant* science, built to the recipe of 'take journalist, add subject and stir' might be a means of satisfying viewers demands for topicality, but after a while its sheer glibness undermines credibility.

Both these pitfalls reinforce one another, but one way of avoiding them points anew direction. It lies in harnessing our television skills with those who have developed expertise, scholarship and style and become authorities in their own field. Lord Clark's view of *Civilisation* - ideosyncratic though it may have been - had an authority and solidarity to which no instant television, no producer's journalistic essay could aspire. To be an effective *universal educator* television must shake off some of its own inbred attitudes and have faith in the world outside.

Before ending this section of the *general* audience programme, the real *universal educator,* I ought to say that its survival depends on an act of faith. 'I shot an arrow into the air, it fell to earth I know not where', hardly seems a criterion on which to base the most crucial factor of television programming, yet through audience research and other indications we see (in Richard Hoggart's words) that 'the taste of today's audience is potentially more varied than Programme Planners are led to think or often lead themselves to think... They might decide to offer programmes which some people, though as yet not a large majority or even a sizeable minority, already find imaginatively exciting'.

So far, in this exploration of television as universal educator, in order to polarise the argument, I have taken a mildly polemical position in describing the *general* audience programme versus the *educational* programme. The world would be poorer without either form. It's a question of balance.

Of course, the trouble is that there is simply not enough television time or money to satisfy all demands. In this situation the seductive logic of the *educational* position is in sharp contrast to the vulnerability of the other. The weakness of the *general* programming has been most ably defined. Again I quote Richard Hoggart;

'We are told' he says 'that the mass media are the greatest organ for enlightenment the world has yet seen...it is true that never in modern history were so many people so often and so much exposed to so many intimations about societies, forms of life, attitudes other than those which obtain in their local societies. This kind of exposure may sometimes be a point of departure for acquiring important intellectual and imaginative qualities: width of judgement and a sense of the variety of possible attitudes. Yet in itself such exposure

does not bring those developments, it is no more than the masses of stone which lie around in a quarry and may build a cathedral. The mass media cannot build a cathedral and their way of showing the stones does not always prompt others to build'.

Hoggart defines well the essential flaw of the *disinterested* approach. The *educationalist* builds on just this flaw. He takes as his starting point Lord Brougham's honeyed words, 'Education makes a people easy to lead but difficult to drive, easy to govern, but impossible to enslave'.

This 19th Century liberal view to some extent mirrors Herbert Read's platonic viewpoint written in 1942 which I quoted earlier. But the sheer quantity of education needed to hold our civilisation together today has produced a change in quality.

The Educationalist has persuaded Governments that we can produce technology to order.
The Educationalist has convinced economists that it is not only a national asset to have a pool of qualified people, but even better if they can be kept off the labour market while they qualify.
The Educationalist has persuaded the under-developed world that if they want to catch up quickly he should be their first port of call. He has, in fact, become a main pillar of the ruling establishment the world over. Since the committed programme maker must by this very ethos question the ground rules and rock the boat, he finds himself in conflict, more often than not because he points out that the stated aims and ideals of the Educationalist are at variance with his methods of achieving them. The promised Utopia through teaching is nothing but a mirage.

Our world is a haunted place. The preservation of nuclear stalemate in the midst of an expanding population, steeped in inequality and fundamental tensions, is something we have all lived with for some twenty-five years. It is maintained that knowledge is the key to co-existence. Scientific knowledge to maintain the population and the balance of terror and all associated technologies. Medical knowledge to support an overcrowded world. Political knowledge to resist the blandishments of other ideologies. Knowledge of the Humanities (if any time is left over from the study of high priority areas) to expand self-awareness.

With all this knowledge, so the claim goes, will come understanding and with understanding, tolerance and the ability to live together.
It is under whose Aegis the knowledge should be disseminated that the argument is about, what should be the balance between goal-oriented and disinterested dissemination? Are the 'Tygers of Wrath wiser than the Horses of Instruction'?
The argument appears in other fields of endeavour. In science it is well known. It is the argument between pure (knowledge for its own sake) and applied (goal directed pursuit of answers) research. The *pure* scientist will argue that knowledge, being linked to discovery, can only increase at random, that the rates of discovery cannot be determined.
The *applied* scientist, on the other hand, says that although the rate of discovery must be random, it can be speeded up if enough men, material and thought are applied to any particular problem. Since our survival and a host of other things such as industrial profit depend on scientific discovery, the *applied* point of view has been gaining momentum at the expense of the *pure*.

Of course, in the end, this is to do with the politics of over-population. The under-developed countries urgently need technicians to give them a higher standard of living, to give them food, to give them medicine. 'Oh, if only we had just some of your pollution' is the cry that goes up from an Indian faced with an occidental discussion of environmental problems. The developed countries are also in a hurry. They need technicians and highly trained people in all walks of life to maintain their standard of living and the over-complex fabric of their society.

People in a hurry have little time for the niceties. Everything becomes subject to national aspiration. Democracy and freedom of speech earn their lip service only when they serve national ends. Thus India wants television and a satellite to spread it, in order to feed education to the villages. The Soviet Union uses television in the same way as it uses radio and film - as propaganda serving the ends of communism. Capitalist countries use television to advertise goods and stimulate their economies.

The mass media, cinema, radio, paperbacks, newspapers, records and my own medium, television, are the irrigation channels of our society's culture. Fail to maintain them, over-direct them, overload them, and the culture on the one hand withers and dies, on the other hand blossoms with an over-ripe bloom that rots on the bough.

Just as the *applied* sciences did not throw up the discoveries of an Einstein, Newton, Curie, Fleming, Rutherford, Bohr or Freud, so the great enrich-ments and excitements of television are unlikely to come from goal oriented programming - be it commercial, propaganda or educational. These new directions, new programme ideas, are much more likely to come from the Impresarios of Fact wheeling and dealing with the ideas and concepts of our age.

In this era, it is becoming too tempting, too seductively easy to sacrifice the free for the controlled, and as part of this process to elide the distinction between the *educator* and *educationalist*. Within the definition I have discussed at length, I am happy and proud to be in television if it is a *universal educator*, but God help those of us who work in it if it should ever become a *universal educationalist*.

Put it another way, and I make no apologies for repeating Mr Blake.

'The Tygers of Wrath are wiser than the Horses of Instruction', but our society is now ploughing up the forests where the tigers abound.

Visual study in teaching animation

Ion Popescu-Gopo

Ion Popescu-Gopo has been a painter, cartoonist, sculptor, journalist, film-producer and film director. From 1950 - 1960 he was Head of the Bucharest Studio for Animated Films. In 1969 he took up his present appointment as Film and Television Officer of the World Health Organisation.

God created man after his own image, so we are told, and endowed him with the gift of life. We are not told however, what was the first movement made by man after his arrival on earth. If, for instance, his first reaction after receiving the breath of life was to look at himself in a glass and say to his creator 'My God, you really have done a good job...Congratulations!' then he must have been human. If, however, he was content simply to bend his body around without any consciousness of his existence, then he was nothing but an animated object like the puppets one sees in animated films.

Imagine if there had been a camera-man present on the spot to record on film and sound the creation of man. How much paper, ink, toil and sweat would have been saved if we had in our possession an audio-visual witness to this miracle.

Let us then take prehistoric man as the basis of our discoveries and scientific knowledge. This man can be considered primitive to the extent that he is discovering his own civilisation, or as an uncivilised being who having destroyed a civilisation is trying to rediscover it. This man discovered the three-dimensional image; that is to say the perception in length, breadth and thickness of the forms which surrounded him. This perception was of immediate interest to him since he needed to identify a place where he could sleep, where he could drink water, the shape of the animals he had to hunt, etc. Then he discovered light, changes of colour, noises. He learned to understand the meaning of thunder, the noises made by animals, the cries of birds, etc.

He created his universe of knowledge around the weather, around the movements and sounds - to such an extent that an image without a sound or movement frightened him. For example, the living bison was for this man a natural thing, an animal to be hunted, indispensable for his survival. However, a bison sculptured or drawn was an incomprehensible object which mystified him completely.

Before creating images, man collected objects that were common to his surroundings; stone, bones, leaves, etc. Thus he has a means of communication; for example, by showing a bone he could communicate the idea of an animal. He also learned to differentiate the various objects surrounding him and created adjectives to describe these differences; big, bigger, bright, brighter, young, younger, etc.

Pride is a sentiment which stimulates the artist and incites him to become exceptional. One day a man took a stone and with it hit another stone. By cutting it to a special size he conceived a specific object. From then on, larger or smaller stones were of no interest, only stones that were cut by hand were of value. We arrive then at the first man-made object.

A prehistoric man leaves to visit a neighbouring tribe. Having forgotten his hewn stone at home he finds one almost identical at his neighbour's Unable to explain the slight differences between this and his own stone, with his finger he draws a picture of his own in the sand and thus, without knowing it, invents art, the two-dimensional representation of an image.
All the members of the tribe were delighted to see an abstract image of an object that was not present.
The chief of the tribe immediately gave orders that an enclosure be put around the drawing to prevent people walking on it...alas, it rained and the first drawing of the world disappeared!

Prehistoric man made many designs on walls of caves representing in abstract form, life, combat and human suffering. These drawings were always accompanied by cries, songs and dances. For instance, a man would hammer on the drawing of a bison with a stick in order to stimulate in his audience a desire to hunt.

Imagine the atmosphere in a prehistoric cave, lit by firelight, smoky, with the shadowy outlines of armed hunters dancing around and beating angrily the image of the beast, the cries of the children, the moaning of the sick and aged. Imagine this scene without the sound effects and you are left with only the stark poverty of a drawing in an art album.

Happily, we still have the image of the bison. This has been transformed, stylised, simplified again into signs which formed letters, thus enabling literature to reproduce an image and describe the movement and atmosphere. These elements are transmitted to us in the form of words which reflect the style and personality of the author, to which is added the feeling of the artist and the talent of the writer. Besides this personalisation by the writer, the description will be modified still further by each reader according to his own knowledge, his own feelings and his own imagination. Therefore, the image as received from the text will be more or less true to the original drawing of the bison which, thank God, we still have as evidence.

This humerous anecdote, which could very well provide the basis for an animated film, expresses the idea that one should always look to the sources of information, eliminating intermediaries and interpretations but taking into account the observations of others in order to form our own opinions. Audio-visual means today try to offer us this method of acquiring knowledge. Audio-visual, however, should not be interpreted as a method of presenting a reality stripped of all form of abstraction, which is superior as a quality of human intelligence.

If we show a flower to a group of people, each one will recognise it immediately as being a flower. Further impressions will differ according to the people concerned. One will see the species, one the colour, another will notice the composition and another will experience a sense of pleasure or indifference. Imagine that Picasso is among these people; he takes a pencil and paper and draws the flower after his own style. We show this drawing to the same people. It is not certain that everyone will recognise it as being a flower even though the personal observations regarding its beauty and form, etc., may be the same.

Therefore in teaching, one should take into account the information available and show the difference between this information and its interpretation. The information must be presented to the student in order to enrich his wealth of knowledge. For instance, we inform the student that a hand is made up of four fingers and a thumb, then during his own interpretation he can if he wishes represent it as having the form of a broom. The contrary is completely illogical; to inform him that the hand has the shape of a broom and then leave him to discover that it has four fingers and a thumb.

During courses in animated drawing in Bucharest, I presented my students with an example of abstract representation. Let us take for instance a spectator who arrives at the cinema. He sits down in a relaxed position. On studying his attitude we find that the general line of his body forms obtuse angles. If, during the film, his interest increases, he changes his position and the line of his body forms right angles. If the action reaches a point of suspense, the spectator leans forward and the angles formed by his body become acute, like those of spectators watching a football match or a horse race. As soon as the action arrives at a climax, he jumps up, changing the acute angles to make a straight line with his body. Let us look, for example, at the attitude of Rodin's 'thinker' - there are a large number of acute angles which express concentration of thought.
The relaxed position of biblical images is provided by obtuse angles (for example, the picture of Christ preaching). In Egyptian art the right angle is widely used. We can therefore ascertain that relaxation is expressed by obtuse angles, attention by right angles, and explosion by a straight line. Let us now try to associate these angles with sounds. When we find in a subject a dominance of obtuse angles, a slow calm music is indicated. If we look at this music we shall see that the general line connecting each note forms obtuse angles. The right angles correspond to the musical accident, syncopation, such as percussion, which shows as two lines which break into each other. The acute angles can be associated with accelerated sharp notes which pass from the broken line to the straight line.

Using this example, we gave our students exercises in composition in which they had to depict attitudes which corresponded to the angles and music described. The exercises were given simultaneously to two groups of students, one group having studies this *method of angles* and the other not.

The students of both groups produced almost the same results, the one group working with instruction, the other by intuition.

A student who produces his subject using the knowledge that he has gained is superior to one who produces it through intuition or talent only. An artist who is able to adapt knowledge to existing talent is the master of his skill.

This is one of our methods of teaching the relationship between sound and movement to student designers. We have also studied curved lines as representing the psychic state of an attitude, and studied the expression of forms such as the circle, the square, or the triangle, but this short article does not allow me to detail more than the *method of angles* described above.

I have pleaded the cause of teaching by audio-visual methods using, and please accept my apologies, used the written form. I am sure that if I could have put this onto the screen with sound, I could have been more expressive. If I had had the possibility of seeing my ideas expounded on the screen it would have been like looking into a mirror and I would have been able to gaze at myself and say 'My God, you really have done a good job... Congratulations!

Defining the goals of education

Asa Briggs

The article published below is a transcript of the opening address for VisCom 71 given by Professor Asa Briggs, Vice Chancellor of the University of Sussex

I count it a very great pleasure and a privilege to be invited to speak at the very beginning of this important international conference. I speak not only as a social scientist and a historian keenly concerned professionally in the communications revolution of the 20th Century, a revolution with world-wide implications for ways of seeing and feeling, as well as thinking, but as Vice Chancellor (Rector) of the first and biggest of Britain's cluster of new universities. These universities, like their counterparts overseas, came into existence during the hectic, always challenging decade of the 1960's when institutions of all kinds - economic, political, religious and academic - of all ages - ancient, middle-aged and young - were under strain in many places. If only a handful of universities had been created during the 1960's they would have been incremental to the system. There were enough of them, however, in Britain, at least the country I know best, to change the dynamics of the system as a whole.

All my own thinking about education begins with the premise that it must be prepared to innovate, not just to imitate. This does not mean pursuing reality for reality's sake, but being prepared to consider afresh both means and goals. For all the difficulties, the decade of the 1960's was a period of intense activity in education when educational policy was vigourously debated in most countries, developed and developing, and when there were interesting new departures and experiments in education during every stage - primary, secondary, tertiary, as it came to be called, continuing - or to use the expressive French term - *permanent* education. In no previous decade of modern times had there been such a strong expression of the sense of continuity and unity of education as a process through all its phases or such a strong conviction, even though it led to differing conclusions, that the key to social change lay in educational policy. Although there were marked differences from country to country in what actually happened, differences reflecting diverse economic, social, political and historical factors, there were many points in common between countries and there were many powerful cross-influences. The winds often blew not only from country to country but from continent to continent, even, and although there were sometimes stormy there were more usually favourable trade winds. People in different countries shared in the same debate.

If we probe a little deeper, we can trace two sets of changes during the 1960's which influenced the formulation of educational goals. First, there were changes within the map of learning itself and in the approach to learning. Second, there were social and cultural changes which influenced not only the language and tone of educational debate, but the substance of the argument. Within the map of learning more emphasis was placed on inter-disciplinary team work as an element in intellectual discovery. The rigid dividing lines between academic 'subjects' and 'disciplines' which were often a product of the development of specialisation in the 19th Century began to break down. This process was particularly apparent in the biological sciences, which began during the decade to be regarded as the strategic sciences of the future: it was apparent also however in the social sciences where more emphasis was placed on common or related concepts in different social sciences, on comparative procedures, and on the linking of social sciences together in order to facilitate problem-solving in such matters as economic growth or urban studies. Tendencies making for new forms of specialisation were not suppressed, but they were countered. At the same time, the development of computers, one of the most important features of the decade, was recognised as an essential element in academic development, and in the United States and Great Britain, to take two examples, influential official reports recommended that computer sciences should be taught to all students whether in sciences, social sciences or humanities. Given the rapid advancement of knowledge in many fields, the *knowledge explosion* as it was often called, the educational objective of the universities was seen increasingly to be something more than the transmission of existing knowledge modified only at the edges. Emphasis was placed rather on undergraduates' learning essentials on graduates exploring boundaries, on feedbacks between teaching and research within a developing knowledge system with open frontiers. There was far more talk of the need for the student to be an explorer - on the part of the students as well as of academic faculty - than there had been for many decades. The project method began to be seriously considered. Of course, these changes were neither universal nor universally accepted. There were some universities which changed their curricula and their methods of teaching and learning and examining more easily and more radically than others. Some found it difficult to innovate, even when some at least of their members saw the urgent need to do so. But here was a sense of ferment with the identification of new modal points of excitement in such diverse concerns as linguistics and cultural anthropology and cybernetics and molecular biology.

What I have said about university maps of learning applies also in varying measure to other educational establishments. There was increasing interest during the 1960's both in early learning processes in the primary stages of education and at the other end of the spectrum in so-called 'post-experience' courses for adults where the 'experience' factor itself was of cardinal importance in relation to what was being learned and how it was being learned. The effect of early specialisation at school, often premature specialisation, was studied, and there was growing concern for curricular reform, particularly in mathematics and the natural sciences. Professional education, perhaps the most stubborn kind of education in resistance to change in most countries - with medical education the most resistant of all - was itself showing signs of change. As far as engineering was concerned, for example, the dividing lines between mechanical, electrical and civil engineering began to seem less formidable as engineering began to be approached in terms of materials, structures, control, design and management. It became a commonplace that engineers of all types needed first to have a good understanding of natural phenomena and of their application, second a grasp of the relevance and utility of engineering to society, third the ability to organise ideas, to communicate (preferably in more than one language) and to assimilate new ideas, and fourth, the potential to deal with people, particularly in groups.

The social and cultural changes outside schools, polytechnics, universities, research establishments and other agencies of education - thought of more and more as a *network* within which there could and should be mobility - can be charted quickly. First, there was a growth in the number of students in higher education, in most European countries, amounting at least to a doubling in ten years, in some other parts of the world constituting a 'take-off' from nothing. This quantitative expansion reflected changes both in aspirations and in opportunities. It can be traced back to the family and the school and forward to the pressures of demand for graduates. The number of first-generation university students dramatically increased: they often took less for granted than *elite* groups of the past. Second, part cause, part consequence, government expenditures on higher education rose sharply in most countries until they became major items - and by the end of the decade often controversial items - in national budgeting. Shortages both of human and financial resources encouraged the drive for *cost-effectiveness* and the effort to plan not only for one single institution but for a system of institutions. There was more talk of avoiding proliferation and stimulating coordination. Third, graduates began to move into a wide variety of jobs and in some science-based industries became the main element in the organisation, the knowledge workers the base of what was thought of as a *post-industrial society*. Some of the increased flow of graduates were highly critical of the values of their own societies, particularly of the values of industry, and questioned the relationship, an intricate one, between university expansion and research provision and the politics of what they called the *system*. At the same time, those operating the system themselves began to reformulate the educational goals which they thought essential. They began to ask for more recruits with identifiable qualities of imagination, inventiveness, quick-wittedness and adaptability. In this context, therefore, as in the academic context there were counter-tendencies to those making for increased specialisation, even though in all countries there were growing demands, not always easy to forecast globally, for particular kinds of expertise. It was beginning to be recognised that enormous changes were needed in industry itself to meet the requirements of a new breed of graduates, to allow for their early advancement yet at the same time to recognise the fact that they would have to pass at first through what has been described as a 'de-frosting' period. It was also recognised that *refresher* education and *re-tooling* education were indispensible at least in industries or occupations with a high rate of technological change or with a close relationship to changing taste or fashion.

It would be foolish to pretend that there was anything like a consensus within the decade in relation either to the changes inside knowledge-making and knowledge-communicating - the changes related to the logic of the advancement of learning - or to the broader changes within society. Where quantitative expansion was not accompanied by qualitative changes there was often disillusionment and frustration. The expansion of provision can produce disaster if the object is simply turning out more and more people of the same kind. Where the provision of resources was inadequate to finance expansion, at least on the base of earlier standards, there were often breakdowns and disturbances. And there were deeper sources of conflict, psychological and social, though they were not ubiquitous. There was a clash, in many cases a dramatic clash, between the demand for individual self-expression, often extreme, and the claims of very large organisations while from the outside, universities were sometimes accused of providing sanctuary from 'the real world' or of institutionalizing the postponement of involvement with it. Given that the educational goal of universities

in many parts of the world was to encourage the asking of questions rather than to supply answers, there was scope for confrontation, to use one of the favourite terms at the end of the decade. It is impossible to generalise adequately about any of these matters, though it became highly fashionable to do so, not least about the so-called *generation gap.* I like Daniel Bell's summary in 1966:

Generation: A logical class term denoting a separation of age groups: once thought to be thirty years, then twenty, then ten, more recently five, and most recently six months'.

Fortunately there were many people in all societies who in an age of change followed the advice - though they usually did not know it - of the Athenian statesman-poet Solon: 'As I grow old, I keep on teaching myself many new things'.

I have concentrated so far on the experience of the 1960's since in certain respects I believe that this experience was different from what had gone before and what is now happening. Before I turn in conclusion to the 1970's, I would like to relate more directly what I have been saying about educational change to the continuing communications revolution which contributed to the identity of the decade and gave it much of its enhanced sense of immediacy and ferment. I want to make four points, all of which are directly related to the question of educational goals:

1
In most parts of the world the new communications technology, a transitional technology, was associated more with the conveying of information, the tactics of persuasion and the provision of entertainment than with education. Not surprisingly some of the methods of learning and teaching in schools and universities began to look increasingly outmoded;

2
What was not taught formally or even informally in educational establishments but was communicated through the different media of communication was itself educative, if not educational, in that it shaped attitudes, not least to time, place and techniques. We know relatively little, despite a considerable research effort, about the implications of all this, including television, for successive cohorts of schoolchildren, but we do know that in some countries at least, one of the manifestations of the new communications set-up was a narrowing of the gulf in habits and tastes between those engaged in higher education and those outside;

3
A number of very specific kinds of opportunity emerged in relation to the development of educational technology. First, the moves towards what is often called, in my view misleadingly, 'mass education' left the way open for technological innovation. Given shortages, both of teachers and physical resources, including in some cases the right kind of space, there was scope for employing new techniques through, for example, closed circuit television. There were many universities and other institutions where the employment of new techniques was pushed ahead. In Britain, for instance, a number of universities were designated as *high activity centres* where experiments would be carried out and their results communicated to other people. The fact that there was some concern expressed during the decade that the advance of educational technology would put teachers out of work, was effectively countered by such prominent writers on education as Sir Eric Ashby, who placed the secrets of the decade in longtime perspective, pointing to four intellectual revolutions in the history of education, occurring among different people at different times - the switch from the home to the organised centre of education; the adoption of the printed word as a tool of education, supplementing if never replacing, the oral tradition; the invention of printing; and (fourth) the development in the 1960's of new 'technologies' which would transform the whole process of education. Seeking to exorcise any fears, Sir Eric went on to argue that as five centuries of the printed book had not diminished the need for the lecture, the seminar and the tutorial, so the new means of education would liberate teachers and enable them to concentrate on what they could do best, rather than reduce their role. In most fields of knowledge - even in science and technology - the intuitive value judgement, the leap of the imagination, the processing of data by analogy rather than by deducation, are characteristics of the best kind of education. We know no way to elicit these except through dialogue between teacher and pupil. The most precious qualities transmitted from teacher to pupil are not facts and theories, but attitudes of mind and styles of thinking. I have quoted Ashby's words uttered in 1966 in some length because powerful though they were even when they were uttered, they never quite converted the sceptical.

There were reasons why all the educational opportunities of the decade were not taken, and one was a physical gulf between the main body of teachers and the enthusiastic minority prepared to try out new things. A second, of course, was a reluctance of administrators and planners to invest scarce resources in developments which had an obvious element of risk about whatever gains it promised in the long run. Even though the way was open for technological innovation, it was often approached charily rather than wholeheartedly.

4
Whatever the anxieties and the lags (some of them from the supply side rather than from the side of educational users) there was a growing sense, as I cited at the beginning of this address that educational objectives had to be stated in a new language, as immense new possibilities were being opened up. I can do no better than refer to an article written by one of the Deputy-Director-General's of UNESCO at the end of the decade and the beginning of a new decade in 1970. 'Lifelong education' he puts it at the start of the *International Education Year,* 'provides a radical change in the overall concept of education'. In a certain sense, of course, lifelong education is no novelty. There have been men who, driven by a thirst for knowledge and enlightenment, have achieved intellectual and moral progress throughout their lives. What is new is the practical recognition that this ought to be the time of all people and not of an elite, of the entire society and not of a segment. Education, under this concept, is not something which begins at the age of five or six and continues until the tribal rites of examinations and diplomas concluding secondary school, or university life, but a continuous process which lasts as long as life itself. Education is not the gateway to society. It is in the centre of society. Education is not a preparation for life, it is part of life. For life-long education it is obviously impossible to continue with the traditional systems. The whole field of education must be re-examined and re-orientated both in its contents and methods. This kind of approach pointed to a new conception after school, even a new design of a school; it also pointed in the decade when so much was made of the *generation gap,* to universities becoming over the years more of multi-age institutions. It also (going back to the very first educational revolution to which Ashby referred) suggested that these could be a new place for the home. It was not merely in Britain, where the desire about the founding of an *Open university* gave way to its practical planning, that this last suggestion began to take root and lead to new thoughts.

I have identified four aspects of change during the 1960's.
I want in conclusion to look ahead. Much of this conference will be concerned with technological forecasting, with questions of research and development, above all with questions of design. I would like to concentrate on goals and the ways of achieving them. Educational expansion will, I believe, continue although not every country will choose the Californian model of resource allocation and choose to pour money into educating a bigger and bigger sector of the age group in years from 17-20, either in universities or in after institutions of higher education. There will be a more varied strategy. More attention may well be paid during the decade to primary education and to the development of it.... There will be more research into individual and group motivation. Given the provision of educational facilities, how will they be efficiently employed? Allowing people to develop their skills and to pursue their changing interests at different ages will turn attention to the relationship between self-education and institutional education, in a more profound way, I believe than has been the case since the 18th Century. The changing balance between work and leisure will turn the spotlight on this range of questions. So too, will the continuing and growing need to balance the needs of individuals and organisations.

It is within this setting that the new resources of educational technology will be considered. Their most effective use will depend not only on the capacity of the innovators and those sponsoring innovation to persuade educational planners - themselves a new trend - to take them up, but on an interchange of ideas and experience. Between innovators and sponsors on the one hand and those engaged directly in what may be called educational work, situated in the other. The operational side of development is as important during this decade as the planning side. There will also be a growing need for more of a meeting of minds between those who are working on the academic frontiers - developing new insights into their own subjects or moving over into adjacent subjects, individually and in teams - and those who are providing the means of educating larger groups of people. In the field of educational technology, whatever may be the case elsewhere, the medium is *not* the message. What is said, what is seen, what is felt, counts.

Visual communication and education

Henry R Cassirer

Henry R Cassirer joined UNESCO in 1952 and is Director of the Division of Use of Mass Media in Out-of-School Education. He has written several books on the development of television and radio throughout the world and their use in education.

To make the case for visual communication seems almost like running in through open doors. Are we not bombarded daily by television and films, by posters and photographs, by road symbols and advertisements? But in the world of education and learning, the visual still has to find its full place and significance.

Based on the scholastic tradition, grounded in the rules of logic, structured around the printed and written word, education struggles to reconcile its own past with the needs of the present and the future. The visual is now largely accepted as illustration, as enrichment and amplification of verbal instruction and expression. But it is more than an aid, it is a language in its own right, which may be reinforced, explained and more clearly defined by the word, but which stands on its own as a means of conceptualisation, expression and communication. This calls for new attitudes and skills not only by educators in and out of school, but also by the designers and producers of hardware. And since education prepares the youth of today for the communication society of tomorrow, education in the critical assessment of communication media, and creative expression through them, is essential not only for the citizen but equally for the producer of media who cannot be too far ahead of his public if he wishes to be understood and accepted.

Permit me to begin with my own personal experience, long before I joined UNESCO, when I set up the first television news department at the Columbia Broadcasting System in New York during the fumbling and creative years at the end of World War II. We had no precedent to go by, no formula to follow in television news and as yet no mass audience, The task was to translate into the audio-visual medium of TV the verbal reports received over the news ticker. Our visual tools were as yet very restricted news photos, some film shot locally, the human personality and graphics. In an effort to step forward from radio news into the television medium, our emphasis was from the start and, perhaps even excessively, on the visual. I say 'excessively', because at first we had the notion that the spoken word, the announcer and interviewed personality, were not really telegenic. It was only after some time that the human face established itself as a primary medium of visual communication. To see the speaker, to feel his emotions, to observe his hands and gestures, to respond to his smile or suffer with his suffering, is an experience which deepens the impact of the words he speaks. Television revealed itself as a powerful and frequently cruel search-light on the personality of politician and entertainer, scientist and citizen.

The first lesson was that visual communication, far from being contrary or divorced from verbal communication, is an essential complement.

The second awareness to which we arrived is that the visual was not illustration or secondary to the verbal, but that on the contrary, the verbal passed across the screen to the viewer's comprehension only if the visual was understood and absorbed. The tendency of verbally-trained script writers to pack the commentary full with information against more or less relevant visual images falls flat in the process of communication. Many tests showed that the verbal is heard and understood only after the visual has been absorbed; in other words, the visual document can stand on its own with few verbal explanations but the verbal information is still-born if it goes counter to the visual impact.

The third and in many ways most disconcerting discovery concerned the role of graphics. Inevitably, much of the information which must be given in a news programme is not visual per se. Abstract ideas and the relationship of political forces, military movements and economic decisions become visual only when translated into the graphic medium, from maps to graphs, from animated charts to symbolic forms. But here we encountered major obstacles which continue to be the cause for the relative paucity of graphic communication in most television programmes. First of all, it is difficult to symbolise visually, and in a very short time, the maze of lengthy verbal reports, to focus on the essential without losing oneself in excessive detail which cannot be seen on the screen nor absorbed by the audience during the short time it is shown. The lack of training in the process of translating verbally conceived concepts into visual symbols prevents the television journalist from expressing himself in graphic form. Secondly, it was not easy to devise methods of graphic visualisation which made it possible to produce graphics of professional quality within a few hours. Thirdly, and this is the major problem, comprehension and acceptance by the audience for the graphic language was - and is largely still today - so underdeveloped that producers for the public at large resist inclusion of graphics in popular programmes.

I have gone back to these early experiences because they highlight the importance of visual education to the visual communicator. Education is concerned with visual communication not only as a tool of instruction but as a field of training and expression so that tomorrow people in all professions and walks of life may know how to communicate through the visual media and how to understand and absorb their messages. Just as the educator of tomorrow depends on the quality of audio-visual media which can serve his purpose, the communicator depends in turn on the schooling and awareness which education has instilled in the audience of the future.

Visual communication plays, therefore, a number of roles in education. First of all it is a *modern tool of instruction,* generally not as mere visual communication, but as audio-visual teaching media. So that the potential of these media, and in particular their visual dimension, may be fully utilised it is important that the visual element be more than an incidental adjunct or illustration, and that the media play a crucial role in the educational process. Visual expression and modern media of communication are expensive. If they are mere gadgets, if education may proceed almost as well without them, and if they are cast into a traditional pattern of instruction in which their innovative power is curtailed, they are not likely to be truly accepted and widely used. How to design educational structures and methods so that the media play a significant essential role is one of the first conditions for the use of modern communication. The planning of education, and of communication, so that it may be innovative in methods, content and structure is a primary concern of UNESCO.

To enable the media to play their role in the innovation of education, both in formal education and for the adult population at large, requires a *new look at hardware development.* Here it is necessary to find the optimum combination between the tools, their relative cost, simplicity of operation, and maintenance or general sturdiness. Educators, especially in the developing countries, are reluctant to serve as guinea pigs for hardware operators and to involve themselves in major investments which may only be of short duration and require major recurring budgets. Standardisation of equipment, decentralisation of its production and maintenance, so that many countries may dispose of them within their own resources, as well as flexibility in use are among the criteria which call for close scrutiny of what the market has to offer. Here again, the planning of education and communication plays a major role to assure that investments serve the greatest possible number over the longest period of time, at the lowest possible cost, and with the greatest educational effectiveness.

The restructuring of education is opening up entirely new perspectives for the use of hardware, and hardware developments in turn are pacemakers in the reorientation of education. For instance, it is now far more feasible to produce and utilise materials at the local level, to make them flexible to the point where they can respond immediately to the individual needs of teacher and student. On the other hand, the introduction of satellite communication, cable networks and the many forms of distribution for recorded programmes open up perspectives for large-scale operations which herald both economies and threats to cultural autonomy. UNESCO is studying the relative advantages and limitations of such wide distribution networks, especially through satellite communications, as a guide to producers as well as educational administrators.

The use of visual communication in instruction is, however, only one of the roles which concern us here, and I shall not dwell on them too long. I would rather stress another aspect which receives less attention though it is, perhaps, of greater fundamental significance; *visual communication as a way of expression.* I am convinced that there is no educational subject which could not benefit from the challenge of translation from verbal concepts into visual forms. In history, the social sciences, geography and the arts, as well as the sciences, there are innumerable opportunities to express in visual, especially in graphic form, what is normally taught as verbal logical concepts. The task is not easy, not so much because visual expression in itself is difficult - anyone can visualise an image even if he cannot draw it - but because visualisation presupposes an understanding of the essentials. A cartoon is effective when it expresses a single key idea and conveys it largely through the image. A graph is instructive when it reveals the basic trend rather than confuses through a multiplicity of information. The need for simplification which is inherent in the visual may be a pitfall for shallowness; more generally it is a challenge for comprehension in depth which cannot be easily mastered. There is an old argument whether Latin or Mathematics are more meaningful in training of a logical mind. I would suggest that translation into visualisation is on a par with both of them, and that a generation trained in this manner would be able to master more effectively not only the modern language of visual communication but get an understanding of natural as well as social phenomena.

Translation into the visual does not imply the artistic ability to execute the rough design. On the other hand, opportunities for visual expression are themselves most valuable educational tools. The photographic 8mm camera, the drawing board and video tape

recorder are today becoming so widely accesible that it is quite feasible to give assignments and tests in the form of modern media of expression, just as it was required to give answers in written or verbal form. Even if none of the technological tools are available, the mere drawing of images or graphs and the collage of photographs and visual symbols can be a valuable learning experience. It is in this way that the media audience of the future is prepared to take the media into its own hands. Those who place their hands on the media of communication will largely control society; are we preparing youth for this task? Or, to put it from another point of view; is not youth more interested and concerned with expression through the media than with expression and testing through the written word?

Education for expression through the media is intimately linked with *education for the critical analysis of the media.* We include in education criticism of literature and music. We also include art, but curiously we stop such art criticism when it comes to contemporary expression, not only of *Art* in its sophisticated form, but of graphic art, advertising, and film or television media. Nor do we normally include in education the analysis of the media of mass-communication, their social function as well as forms of presentation. The field is by no means barren, however, Media criticism is becoming an ever more important field of study in schools and universities, intimately linked to greater concern with contemporary society. UNESCO has sponsored seminars and study courses on *screen education* and is working with member states in the promotion of media criticism and expression as a way to enhance the *media literacy* of the mass public of tomorrow. Evidently, the designer has a role to play with respect to all these activities and fields of concern.

Educators will never be able to *incorporate visual communication and expression into education* - and here I am not speaking of the specific field of art education - *unless they themselves are prepared for this language and ready to accept it as a working basis.* There is need, therefore, *for designers to work closely with educators* in their training, for instance in teacher training programmes, and in the elaboration of teaching methods and examinations. You may know better than we do at UNESCO whether anywhere in the world, designers have made a systematic effort to define the place of visual communication in the educational process, and to translate such definition into teaching methods. My impression is that efforts have been rather spotty, with gifted teachers in biology or geography, history or the sciences using the visual as illustration and assignment. But what I have in mind goes much further than this - *what is needed is a comprehensive policy for the incorporation of the visual language into education and its practical application in many different subject areas.*

Closely related to this is another field which has already received much attention by both media specialists and enthusiastic educators; this is *education in media appreciation, criticism and expression.* In the Scandinavian countries and the United Kingdom, in Czechoslovakia and other countries of Eastern Europe, as well as in the United States and Canada - to cite only some examples - media criticism, the study of mass-communication, film courses and screen education in the larger sense, have found their place in the curriculum of both secondary schools and universities. One of the most complete programmes for mass-communication education has been elaborated for the Finnish Comprehensive School. I am not aware, however, that designers have been particularly involved in such efforts. Yet there seems little doubt that they, too, have a clear stake in promoting such education. If they elaborate their own specific contribution, UNESCO might be the vehicle for putting them into touch with related efforts elsewhere.

A second field of activity *where designers have an obvious role to play is in the preparation of instructional materials themselves.* Films and television programmes, books and other printed materials, slides and posters are widely used; But do they speak a clear and incisive visual language? Are they using the media for what they may give best? *Education in visual appreciation is not a separate subject but an integral part of the use of media.* Good quality presentations create a desire among young people for good quality productions elsewhere. Unfortunately educational budgets and educational priorities in media organizations are such that the best artists are rarely used in productions for use in classrooms or by adult students. *High quality of visual expression is not just a matter of artistic talent but of clear thinking.* If there is a need for such clarity, it is in education. By improving the design of educational materials of every kind, designers may make a precious contribution, not just to the presentation, but to the comprehension and quality of educational materials. It is in their very own interest, as a profession, if not as individuals, to give the best to education, since their own acceptance by the public depends on the taste and preparation given to young people today.

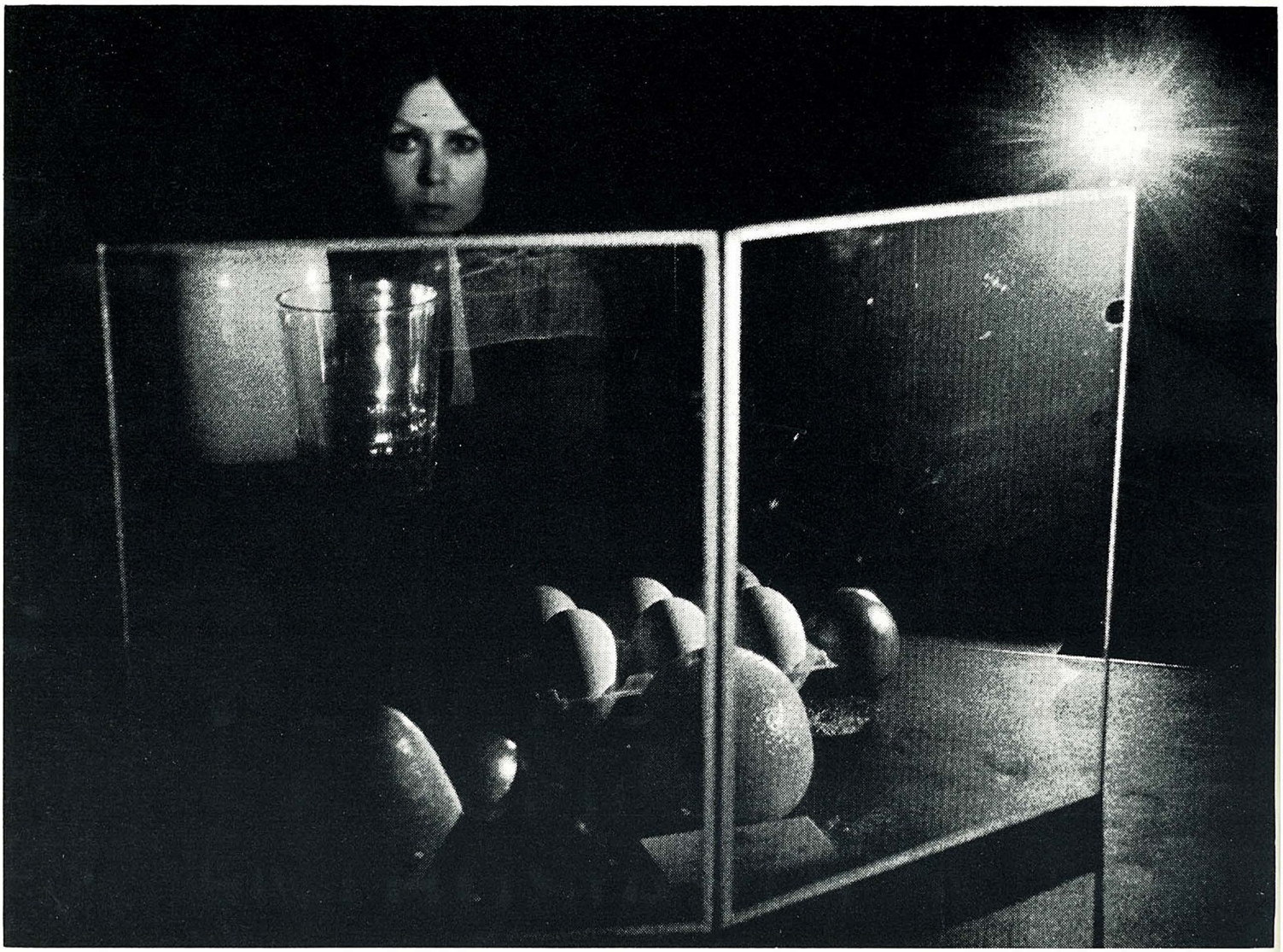
A major obstacle to the integration of visual communication into education is, however, *the cost and complicated nature of the materials* required. It is difficult to ask a low-budget educational television programme to incorporate good graphics unless simple methods to produce them are available. There is a lack of designers everywhere for such methods as silk-screen printing or cut-out animation. I recall the case of an African country which set up an audio-visual centre to serve its rural population but was not able to find sufficiently trained artists in its country to produce the posters. An educational television programme in a developing country which was addressed especially to illiterates, had great need to use graphics for literacy instruction and the explanation of simple work techniques; but it lacked both the equipment and the skilled designers to do the job. Hence the need to train personnel and to provide them with the facilities which are within practical and financial reach. Sophisticated animation techniques, computer animations and other applications of design to modern communication are of pioneering value. But in developing countries, the needs and resources are far simpler and it is here that guidance and experience is much needed. Nor should graphics be exclusively the domain of the professional - equipment should be sufficiently flexible so that anyone trained in the basics of good design may quickly translate them into the medium in which he works.

This one area where *close cooperation between the designers of software and hardware* is vital. Hardware should be able to serve man rather than subject him to its limitations and costs. The experienced designer who is conscious of the needs of education may make a major contribution to the hardware industry by indicating practical directions in which it could move.

A particular field of concern to UNESCO is the *teaching of functional literacy*. Quite understandably, initial concentration has been on developing teaching methods and preparing teaching materials. But today, there is a major need for reading materials produced locally and available at low cost. Is literacy teaching going to go back, once more, to the print-oriented civilization which masters little more than good layout of sequential paragraphs? This would, indeed, be an ironic step in an era in which young people in the most highly developed societies having been pioneering in 'psychedelic' papers which integrate imaginatively design and print. It would be most regrettable if ancient civilizations based on the spoken word and the visual form of expression were to make their transition into the print age by losing all the qualities of their traditional culture. Just like the radio should respond to the oral tradition, print should link itself with the visual tradition of these people, and materials for new literates should inspire themselves from the visual culture which is still alive. This involves more than drawing an African farmer rather than a European; showing native fruits and vegetables rather than faraway cities. It is a creative process which has not yet begun anywhere, to my knowledge. There is a new style of book production and periodical literature which could do well for the printed page what music has been doing for the ear - linking the past with the present, steeping itself in popular culture for wider communication through the modern forms of communication.

The designer, therefore, has his place in teacher-training and literacy projects, in adult education and vocational training, in the building of schools and the promotion of new forms of art and culture. UNESCO does already recruit designers for some of these purposes. But it is not merely a matter of expanding job opportunities; it is a task of defining the role and contribution of designers in a practical way through pilot projects and study programmes so that educators and policy makers administrators and publishers will more readily open their doors to them, thanks to the conviction that design means greater quality and enjoyment of learning without excessive costs and practical obstacles.

To close, I would like to stress what I would call the *'bridge-building' role of the designers,* a role which is to me more significant than any other. Not only education, but our entire civilization suffers from the atomization into specialisations, from break-up and conflict. Science and the arts, the concrete and the abstract, nationalism and international civilization, the simple and the complex, intellectual and popular culture - these are antipodes rather than complements in our world. Focus on the visual creates a common denominator which permits at least a minimum of understanding and communication. This is why I attach such importance to what I have called the 'translation' of the verbal into the visual. This process compells concretisation, a search for the common denominator and the communicable basic content. All of us use paper and pencil to draw out in simple lines, relationships which we could not express except in long sentences. Design as a language to bring out the essence in its dynamic interrelated pattern is the oldest language of man. We may call it art, when we look at the past, but it is functional art...it is communication.



Margaret Benyon with one of her holograms

Laser holography as a new medium for visual communication

Margaret Benyon and
Jonathan Benthall

This article has been based on a paper prepared by Margaret Benyon for the VisCom 71 Congress. Use has also been made of some extracts from an introductory note by Jonathan Benthall for a recent exhibition of Miss Benyon's work.

A hologram is a three-dimensional photograph. The viewer looks through what appears to be an almost clear piece of glass, as if through a window, to see on the other side a scene which appears to be exactly as it was in the original instance, with all the parallax parameters, except that it has no mass, and one can pass one's hand through it. By movement of the head it is possible to see round and behind objects, as far as the size of the plate will allow. It is the photographic recording of all the details of the light coming from an object or scene, and it is only realisable through the use of laser light. Because the information is all over the plate, if it is broken into pieces each piece will reconstruct the whole image.

Holography can be regarded as a method of lensless photography by means of which three-dimensional images can be reconstructed. The holographic process is divided into two stages. To make a hologram of an object, a laser beam is split into two, and both beams are spread out by a lens. One beam (the reference beam) falls straight onto the holographic plate; the other (the object beam) falls onto the object and the light is scattered on to the plate. The holographic plate is coated with an emulsion which is photosensitive, and records the interference pattern from the two beams falling onto it. The plate is processed like an ordinary photographic film. To view the hologram, the plate is illuminated with a spread laser beam directed at the plate at the same angle and distance from the plate as the original reference beam. The light is diffracted to produce a three-dimensional image of the same size as the original object. The interference pattern in the emulsion directs the reconstructing beam to travel on as in the first instance, and to the eye there is no difference.

Holography, which Margaret Benyon uses as an art medium, is probably a more radical development than photography. Photography depended principally on new chemical techniques, but its optical properties had been familiar since the Renaissance.

The theoretical concepts of holography were stated by Dennis Gabor in 1947, though they would have been intelligible to nineteenth century physicists. Practical implementation was made possible later by the development of the laser - a source of light all of whose waves are *coherent,* or in step. Laser holography was first achieved by Leith and Upatnieks in 1963. Holographic techniques have since been developed which do not require lasers.

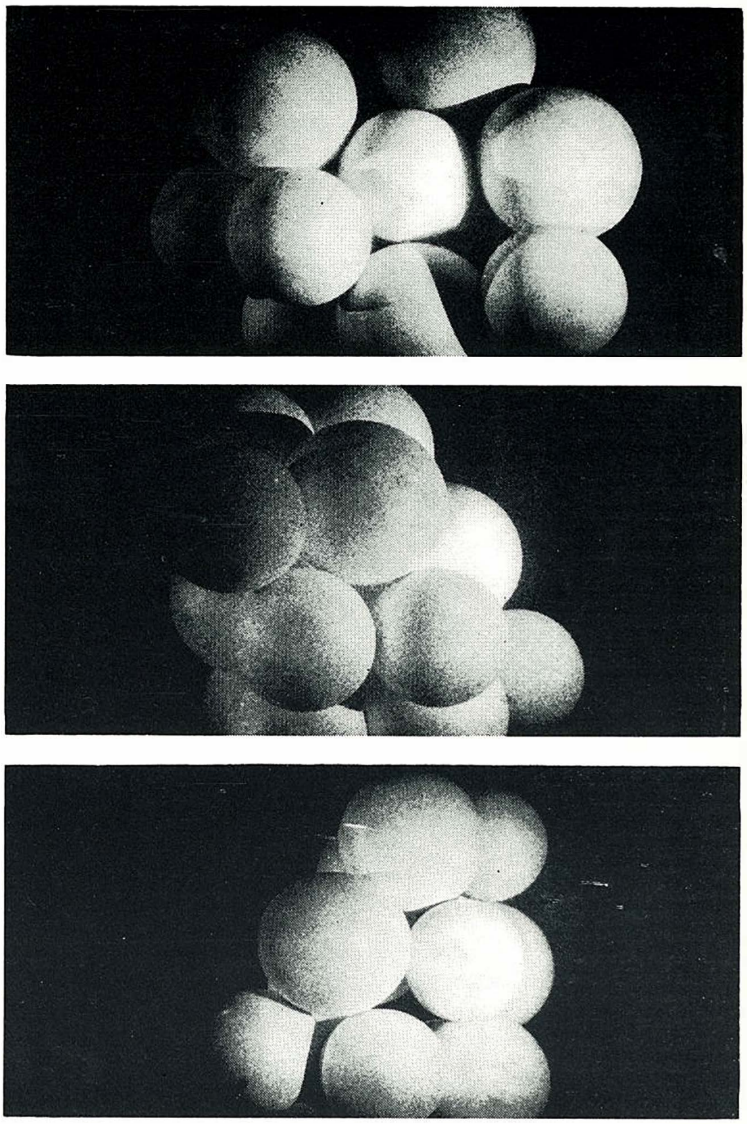
Although holography still has no major industrial applications its future applications are thought to be numerous; they include special testing and analysis, information processing and storage, and three-dimensional movies, television, X-rays and microscopy.

Jonathan Benthall has argued that the importance of holography as a medium is a by-product of a far more fundamental principle, that of interference patterning. He points out that his view finds support in a speculative, as yet unpublished paper *Quantum theory as an indication of a new order in physics,* by David Bohm, Professor of Theoretical Physics at Birkbeck College, London. Professor Bohm believes that the optical lens was a key factor in the development of modern scientific thought, since it brought into sharp relief the (approximate) one-to-one correspondence between points in an object and points in its image. This strengthened man's awareness of the relationships between parts of an object, and encouraged the enormous extension of analysis and synthesis as a method of enquiry.

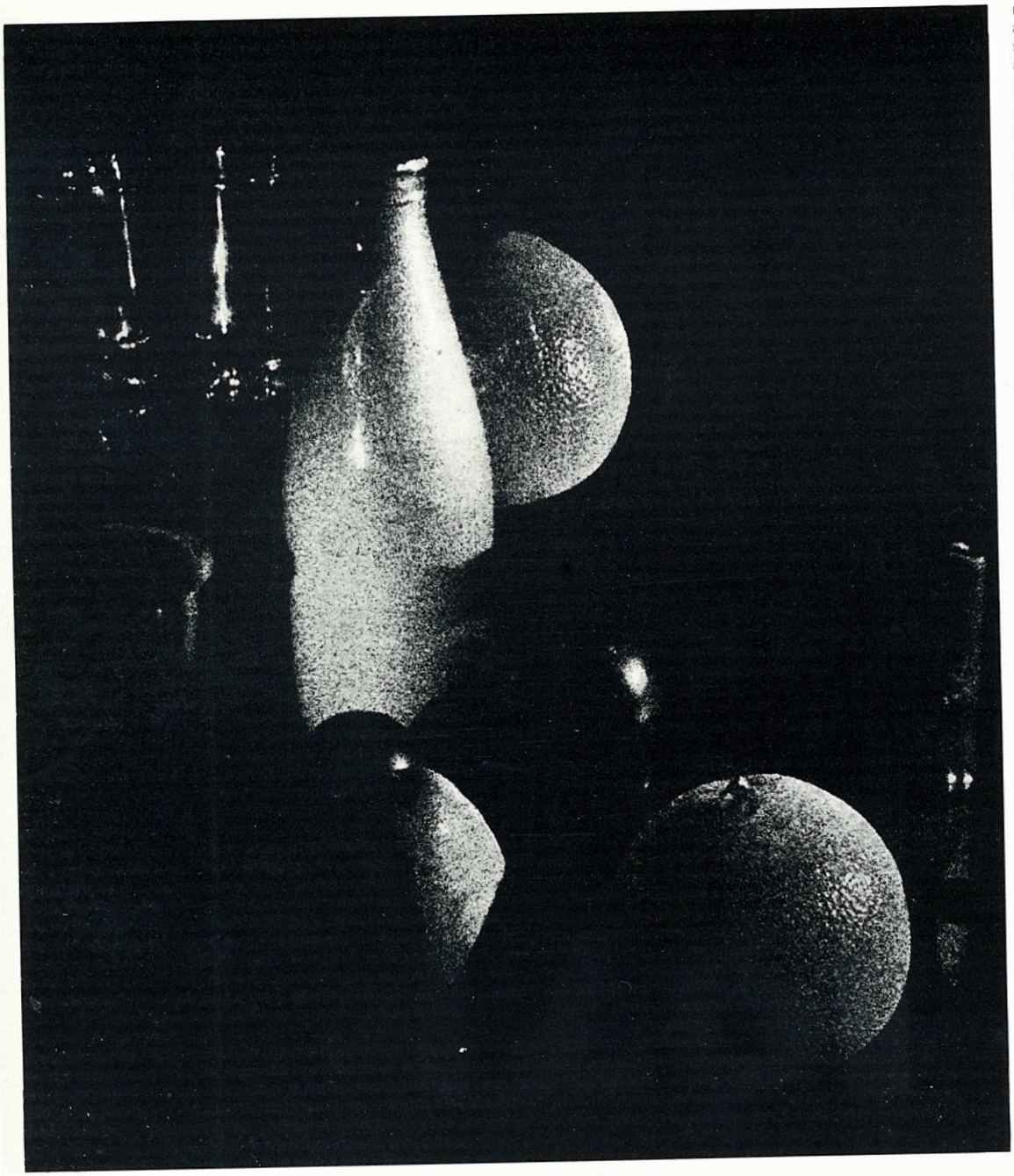
But now, according to Bohm, 'relativity and quantum theory imply undivided wholeness, in which analysis into distinct and well-defined parts is no longer relevant'. The laser hologram is a technique which can give an immediate perceptual insight into what can be meant by undivided wholeness in science, as the lens did for the notion of analysis of a system into parts. This is because there is no one-to-one relationship between parts of the illuminated *object* and parts of the *image of this object* on the holographic plate. 'Rather, the interference pattern in each region... of the plate is relevant to the whole of the interference pattern on the plate'. But the interference patterns are not *only* on the plate, whose function is merely to make a relatively permanent 'written record' of the interference pattern of the light *that is present in each region of space.* Bohm goes on to argue that holography suggests the germ of a new notion of physical order as a total order contained or *implicated* in each region of space and time. His arguments are of great interest, since it is often complained that one of the reasons why science has become so esoteric is that since Einstein there have been no easily understood visual models of physics.

It is true that an effort of imagination is needed, when one looks at a hologram, to grasp what is happening in time and space before one's eyes. A similar effort would have been needed in the 1840's to guess some of the implications of daguerrotypes and calotypes.

Margaret Benyon's major interest in holography is with 'phenomena that are peculiar to the holographic medium'. She has experimented with



A triple-exposure hologram. Three separate images can be seen as the plate is turned through 60°. The hologram gives more information than is possible with a two-dimensional photograph, since one is able to look round the sides of the object.



Photograph above shows a double-exposure hologram. By exposing the plate to two different set-ups it is possible to achieve the appearance of 'weightlessness'. The glass appears to hang in space above the fruit, and the orange seems to float through the bottle of milk

Photograph at top of facing page shows a detail from a hologram in which there appears a 'non-hologram' of a hand. Anything that moves more than a fraction of a wavelength of light (about 1/10,000mm) will not record. The hand in the hologram has not recorded, and appears paradoxically as a solid 'hole' or three-dimensional silhouette

multi-exposure holograms, heat trails and other effects. In a recent paper she sets out some of the limitations and potentials of the holographic process.

Factors which can present problems in the practice of holography are concerned with size, coherence and stability requirements, expense, and the need for a particular light source for viewing.

The size and coherence limitations are linked in that the distance over which the coherence of the laser can be relied on is short. For instance, the helium-neon laser commonly used in holography has a coherence length of approximately 30cms, and the length of the reference beam and the object beam must not differ by more than this by the time they reach the plate, which means that objects are restricted to sizes not over 30cms. Recently, however, coherence extenders have been added to lasers to increase coherence to lengths of several metres. Stability problems arise from the fact that one is recording an interference pattern of light waves, and if the object moves more than a fraction of a light wave (about 1/10,000th mm) the hologram is ruined. These stability problems can be overcome by 'flash' holography involving the use of pulsed lasers. An American company has produced holograms of live human scenes fitting into an area 8 ft tall, 10ft wide and 10ft deep, by using a pulsed laser developed by themselves.

The expense involves mainly the cost of equipment, such as the laser. The price of lasers is expected to drop during the next five years. There has been a steady decline in the price of lasers since 1967. RCA plans to produce lasers in large quantities and at low prices. They propose a cost of 70 dollars each for a 1mW laser on sales exceeding 2000. A 1mW laser would be sufficient to make and illuminate a 9x12cm hologram. An 8mW laser would provide approximately the power required to make an 8x10in hologram. This kind of laser would, at present, cost about £700. With the additional expense of optical equipment, it would cost a little under £1,000 to establish a basic holographic studio/workshop. For a commercial enterprise, lasers larger than 8mW would be necessary.

The special light sources for viewing are monochromatic, in the case of transmission holograms. Optimum viewing conditions for this type of hologram are by means of laser, and in a darkened environment, but a mercury arc lamp with a narrow band filter can provide an image comparable with a laser reconstruction, and is less expensive. In fact, any compact white-light source is suitable, provided that an absorption filter with a bandwidth of 300A is available,

as for reconstruction, spatial coherence is required only over the area subtended by the eye at the hologram plane. A brighter hologram can be obtained by bleaching the plate, thus improving the optical efficiency by 50% Unbleached, or amplitude holograms have an efficiency of about 6%. A low efficiency 8x10in hologram can be reconstructed in daylight with a standard mercury arc source. Many of the materials giving high reconstruction efficiencies are not yet commercially available, though this will change. It might be possible to record a hologram on sensitive material, and then copy it onto one with a high diffraction efficiency. An inexpensive light source is the sodium lamp, the yellow light used in street lighting. This provides a reasonable reconstruction but with a loss of detail, because there are two yellow lines of light close together, which provides slightly different reconstructions.

It is possible to make a hologram which can be reconstructed in ordinary white light by putting the reference beam and the object beam on opposite sides of the plate in the recording stage. This has the effect of recording the interference fringes in the thickness of the emulsion, hence the designation 'volume' hologram. The hologram can be viewed in sunlight, or with a torch, the emulsion selecting only the wavelengths it needs from the colours in the white light to reconstruct the image. White-light reflection film holograms have been produced on a large scale in the United States.

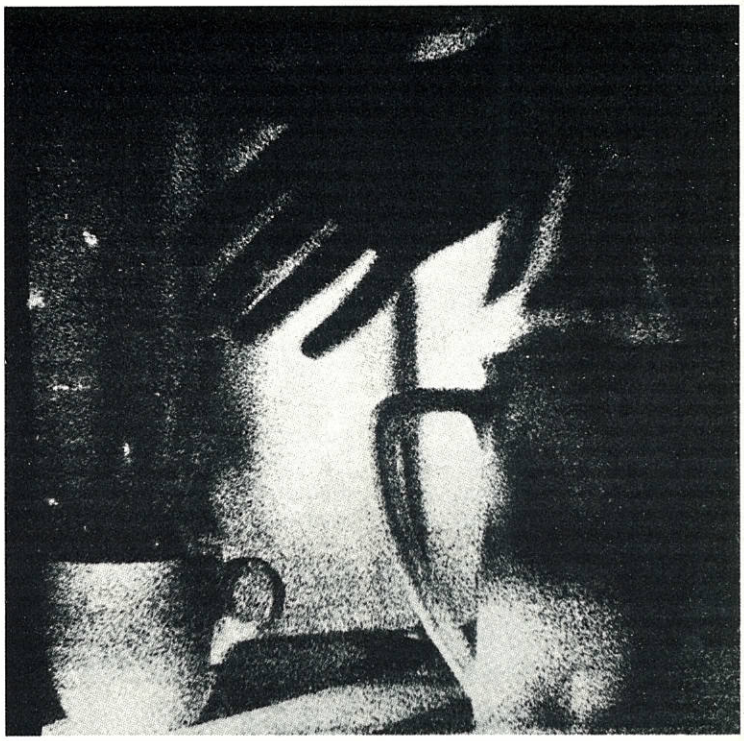
Full colour holography involves a similar process to white-light holography, in that each wavelength of colour is recorded in the depth of the emulsion, so like white-light holography, it also suffers from a lack of suitable material. There is cross-talk between the colours, and the colours change due to emulsion shrinkage. Large scale displays of colour holograms may be hindered by the lack of a blue laser with sufficiently high output.

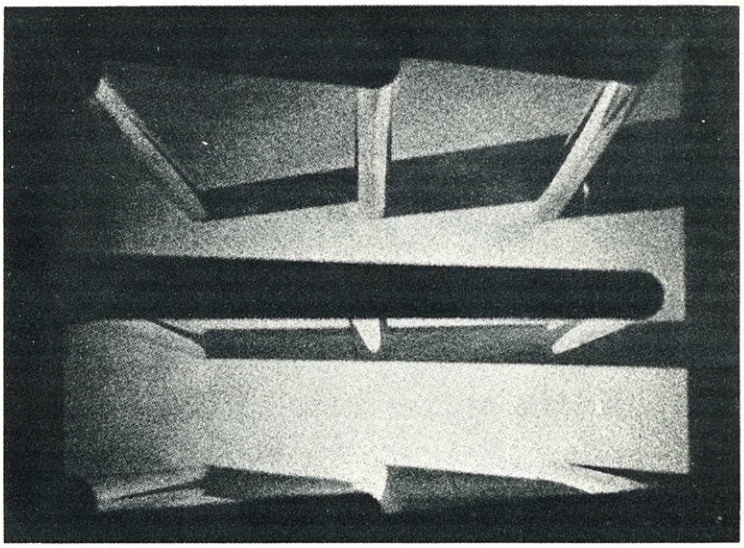
An American company has produced holograms for educational purposes. They describe a hologram designed to teach children about height and width. The image is made up of several blue blocks, one of which is the same size as the actual block that has been given to a child. The other block images are either too tall or too short. The child is asked to fit the real block into the image which he thinks is the same size. If he fits the real block into an image that is too high, the top of the image remains blue. This idea for a holographic template lends itself to assembly-line inspection techniques for industry. In biological research, holograms can be taken of micro-organisms. They contain the entire visible depth of the specimen and can then be viewed under a microscope. Specimens can be studied which do not last long emough for usual microscopic analysis. This can be of obvious benefit to educational problems, as can be holograms of 3-dimensional models, such as molecular structures. Holograms of three-dimensional models might one day provide space-saving, convenient and inexpensive substitutes for actual models. The National Committee for Audio-Visual Aids considers that three-dimensional maps would be welcomed by geography teachers who at present use expensive terrain models. The Department of Cartography at the Royal College of Art, London, is investigating the possibility of hologram maps in conjunction with Imperial College, London.

The advantage of being able to move across the front of a small display to obtain different views of the same scene would be partially lost with a large stationary audience and a large projection screen, which is one of the problems in the development of holographic motion pictures. The other problems are the development of a camera, and the increase in power required in a pulsed laser system, both of which make the method unattractive for scenes of the size of a large garden and upwards. Holographic stills cameras are likely to precede holographic movie cameras. Holographic cameras at present in use are little more than a small laboratory set-up with a cover, allowing holograms to be taken of objects not more than a few inches in size. The hologram camera is too complex and expensive at this moment and is likely to find a limited market in specialist industrial and photographic organizations. Large scale motion picture holography is likely in the next twenty ot thirty years, rather than in the next decade, but small screen three-dimensional motion pictures have been demonstrated, and may represent the first step.

Three-dimensional real-time television is also presented with many technical difficulties, the most prominent of which are the low resolution of current camera and display devices, and also the formidable bandwidth required.

But as Jonathan Benthall has pointed out, the bald prospect for holography is unexciting, even nostalgic if one recalls the brief boom in 3-D movies during the early 1950's. But if holography is as radically a new medium as is suggested, it will develop not only in ways that are predictable, but also in new and unpredictable ways. It will, over the years, influence our art, our everyday perception, our language, our reality.





Photograph above shows the image of metal rods coming right up against the holographic plate. Parallax motion is emphasised in viewing the plate. The hologram measures space in its own terms and does not apply borrowed or artificial standards from outside

Some research into sign perception

Ryszard Otreba

Doctor Ryszard Otreba's article is a summary of some research that he carried out in connection with a recently published paper entitled 'variability of sign perception in horizontal motion'. Doctor Otreba is at present working at the Crakow Academy of Fine Art

This sequence of experiments was carried out by using a specially designed device. Essentially this consisted of a pair of drums, each rotating about a vertical axis, around them being positioned a black belt 50cm wide and with a perimeter of 2.4m.

Objects to be viewed were positioned on this belt and when the device was set in motion, these could be seen through a small aperture as moving from right to left. This was to allow for the fact that the various subjects taking part in the tests were drawn from cultural groups who normally read from left to right.

In the experiments, objects under observation consisted solely of numerals in various combinations. These numerals were shown as white on a black background and having a luminescence contrast of about 97%. The numerals were illuminated by a 150W bulb (Philips Attralux) from a distance of 2.4m. To obtain a better distribution of results, the brightness was varied.

The numerals were viewed at varying speeds of horizontal motion and with varying viewing angles. The width of the aperture in which the symbols appeared could be set so as to give a viewing angle that varied from 0° to 8°.

If all the numerals have to be read, one after each other, they cannot follow each other at a rate that exceeds two exposures per second. The previous stimulus-impression has some influence on this shortening of reaction time. Experiments carried out have shown that when the anticipation time was from 0,25 to 0.75 seconds, the precision of the answers was better. But that when anticipation time was progressively increased, no improvement was noted.

The reading of symbols takes place at a glance. Symbols that we see often are read faster than others. This is why, when investigating the legibility of symbols in horizontal motion, I made use of numerals in a random order. In my ivestigations I used, to begin with, a constant thickness design of numerals (Univers 65) which had good legibility in static conditions. When I began to increase the spaces (or gaps) between the individual figures, I obtained improved legibility, but after enlarging this space to a certain degree, the legibility lessened. Photographs were made of the symbols as they moved at reduced speed (0.70m/sec) and with various exposure times (1/10, 1/5 and 1/2sec).

It needs saying that photographs cannot illustrate the sensations which a human being receives whilst perceiving symbols in horizontal motion. Unfortunately, at this moment, we have no way of photographing the psycho-physiological processes that take place during visual perception. Photographs can show us only the technical phases of the experiment and they can explain some typical phenomena.

Photographic sequence 1-2

Three identical figures shown with a viewing angle of 6° with a speed of motion of 2.80m/sec. Enlargement of the viewing angle, as well as increased time of exposure, improved legibility.

Photographic sequence 2-1

Improved legibility was also obtained by changing the proportions of the signs. When these numerals were observed in motion they underwent certain distortions, similar to those shown by the original 'Univers 65', with the vertical elements tending to disappear.

Photographic sequence 2-2

In this version, enlargement of the vertical elements eliminated the effect of their disappearance when in motion.

Consideration of the legibility of signs having different spacings between them, indicated that the best legibility was in the middle row. In the top row, the figures run into one another, whilst in the bottom row, the figures could not be read at a glance because of their size. When exceeding a speed of motion of 2.8m/sec, reading errors began to be registered, although the viewing angle was unchanged at 6°. The image became blurred and horizontal trails of various intensities of brightness became more and more apparent.

I have made efforts to take advantage of these trails and to design symbols which would have features similar to those of static symbols. In general it was sufficient to break up the horizontal lines in some places in order to reduce their brightness in relation to the vertical elements.

Photographic sequence 2-4

I have also experimented with symbols constructed of vertical units only. As can be seen from the left hand photograph, the symbols in the second, third and fourth rows have height-to-width ratios of 1:1, 1:2 and 1:3 respectively. When the symbol in row four (height-to-width 1:3) was observed at a speed of 2.80m/sec. and with a viewing angle of 1° it was identified as a square. Now, if the process of perception takes place according to the previously stated rules, then the discussed square will have an inner field. Although the human eye is often compared to a photographic camera and the retina to a photographic film, the receptors can only focus the image which is being signalled into the brain, along the optic nerve. This causes some delay which probably accounts for some of the intermediate images that we see.

Alphanumeric symbols are built up from vertical, horizontal and diagonal elements, as well as of circles and parts of circles. When a symbol is seen in motion some of these elements (acting as stimuli) are *summed-up* and thus intensify the brightness of the horizontal unit. Any sign which is produced in the brain by single stimuli joined up when in motion, at the time of visual perception, is called a *summed-up* sign. The legibility of a sign depends upon its speed of movement and upon its height-to-width ratio. The greater the speed, the wider the sign.

Photographic sequence 2-6

Shows designs of five symbols that were readily identified at a viewing angle of 2° and whilst moving at a speed of 2.80m/sec. The sequences of various sized dots are *summed-up* to give mono-element signs, similar to those of 'Univers 65'.
These same signs have also been readily identified with a very small viewing angle of only 1° and an exposure time of only 0,02 seconds.

Photographic sequence 2-8

If we examine the figure "7" moving at a speed of 2.80m/sec. it will tend to increase the angle between its elements. In other words, the diagonal element will tend to approach the vertical one.
(when the same diagonal element in the figure "7" was viewed at a speed of 4.80m/sec. it was read as a vertical one).

To make the task easier, the figures were exposed individually. Symbols constructed from groups of dots were observed, starting with a viewing angle of 10° down to one of 2°. When the viewing angle exceeded 10° the legibility was extremely poor because of the excessive width of the sign.

Photographic sequence 2-9

The top row shows a figure "9" of the *summed-up* type which was correctly identified when observed at a speed of 4.80m/sec. and with a viewing angle of 4°. The next two rows show two variations of a figure "2". The upper one attempts to differentiate the elements that form the horizontal and diagonal segments, by means of varying the size of the dot used in its construction. In both designs the visual effect was similar, in both cases the figure was easily identified. However, the figure "2" made up of different size dots could only be read in the viewing angle for which it was designed, whereas the one using uniform dots could be perceived readily through a greater range of experimental variables. For example, at a speed of 2.8m/sec. it could be read through a viewing angle of from 2° to 8° In the fourth row a figure "9" from 'Univers 65' has been included in order to make direct comparison of the legibility of a sign designed only for static viewing. When the speed of motion was 4.80 m/sec. the observer saw only a flash of light. To identify it correctly, the speed of motion had to be reduced from 4.8m/sec. down to only 1.0 m/sec.

Photographic sequence 2-10

A symbol having a height-to-width ratio of 1:10 ought to be identified on the creen at a viewing angle of 4° and at a speed of about 7.50m/sec. (see figure 1)
The legibility of successive numerals was investigated at a speed of 4.80 m/sec. Figures "9", "5" and "8" were correctly read by the observers.

Photographic sequence 2-11

A figure "9" of the *summed-up* type was constructed in five versions, each having different height-to-width ratios. From the top row to the bottom row these were 1:6, 1:7, 1:8, 1:9 and 1:10. This group of signs were exposed simultaneously at a speed of 7.50m/sec. and the observers were asked to select the best read' from the point of view of so-called 'visual comfort'. The figure "9" in the top row and in the next below were the most frequently mentioned. In other words, those having a height-to-width ratio of 1:6 and 1:7 respectively.


1 2
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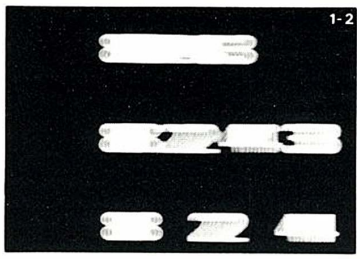
8 2 4 3
8 2 4 3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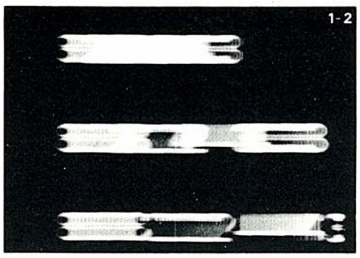
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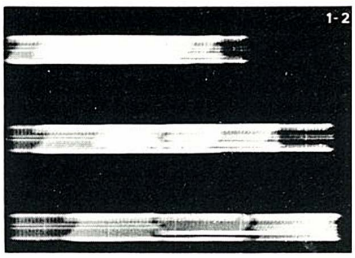
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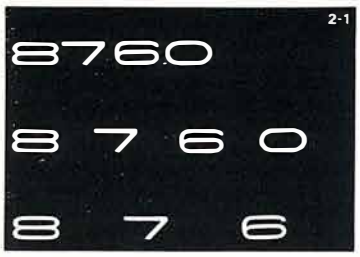
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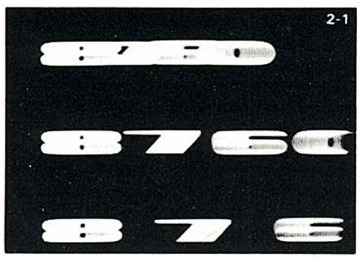
8 7 6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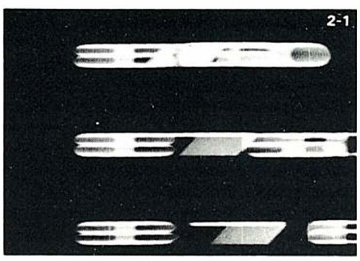
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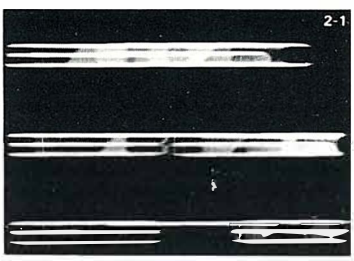
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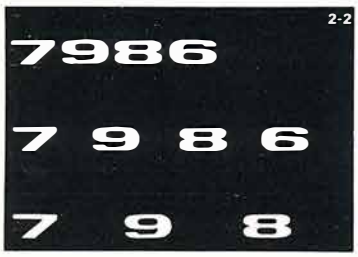
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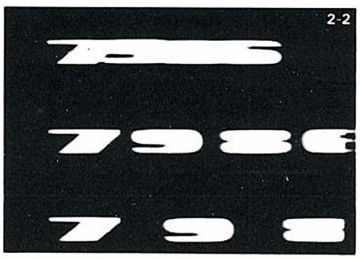
7 9 8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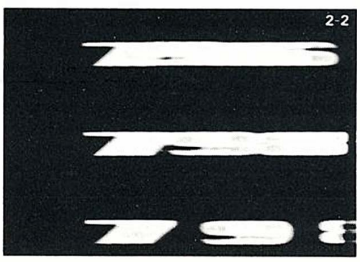
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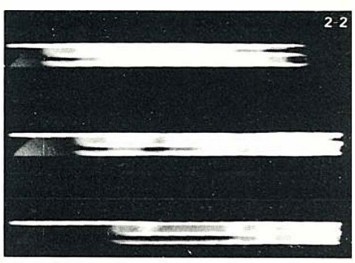
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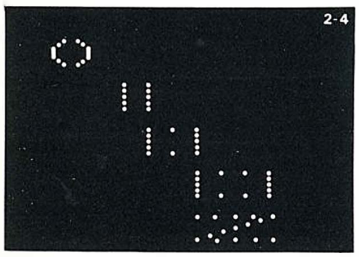
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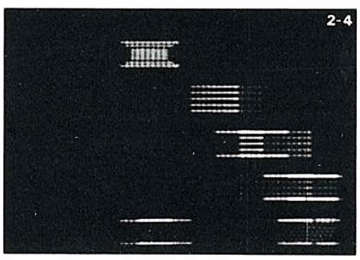
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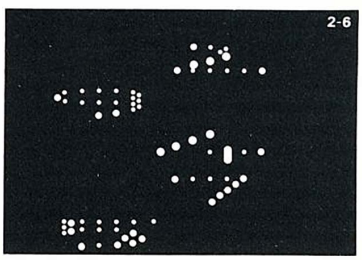
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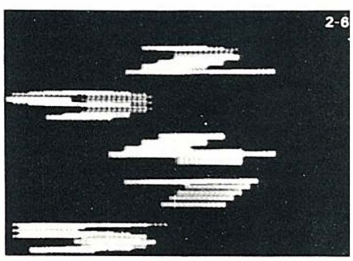
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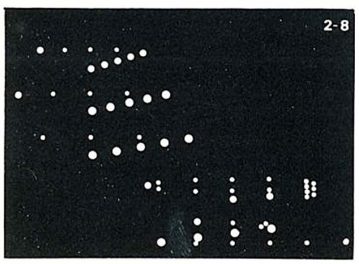
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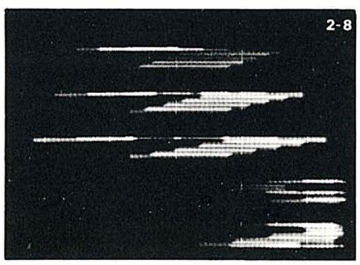
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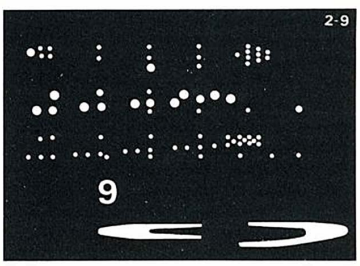
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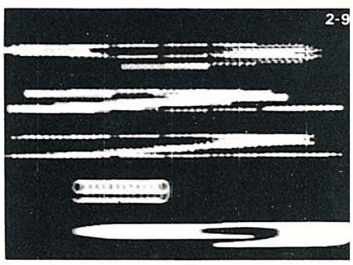
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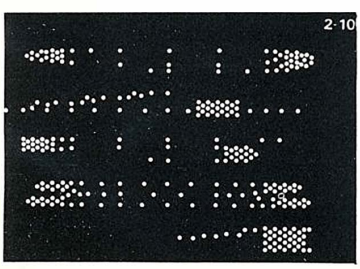
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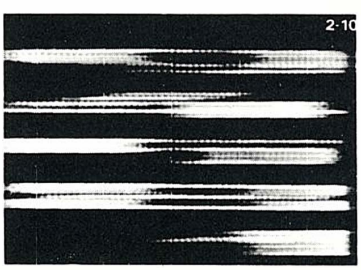
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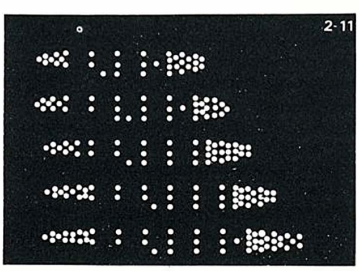
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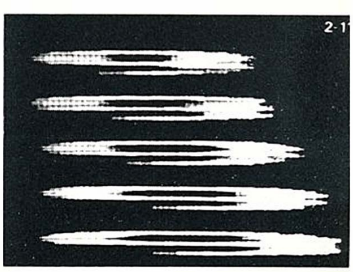
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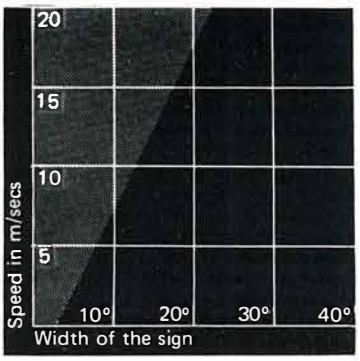


Figure 1

The graph shows the influence of the speed of motion upon the change of width of the *summed-up* sign.
The plotted values are arithmetic means of the results obtained by five observers. The width of the sign in degrees is given in the axis of the abscisae. The sign was observed with a viewing angle of 4°

Remarks:

The normal viewing angle=30-60° from the visual axis. The limit of symbol recognition=5-30° from the visual axis. The visual working area =5-10° from the visual axis. The area of accurate visibility is contained in the viewing angle=1°

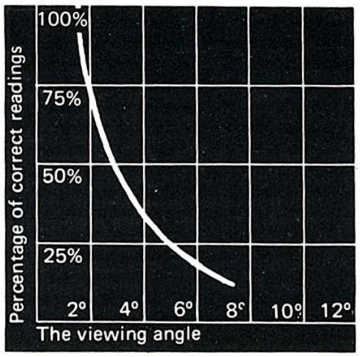


Figure 2

The graph shows the legibility of the *summed-up* sign in horizontal movement.
The size of the sign with a viewing angle of 4° and a speed of 2.8m/sec. (the complete width of the sign being 20cms.)

Factors involved in increasing or decreasing legibility are, among others, the arrangement of elements covering the objective disposition of stimuli, as well as the ability of the observer to discern a definite form in the structure. But apart from these factors there is still one further important point - that of previous learning.
So, in order to obtain more conclusive results, I introduced rotation in the exposure of the various signs. Observers were shown the signs according to the following order: 2, 9, 4, 7, 5, then 9, 4, 7, 5, 2 and so on.

When testing (in horizontal motion), the legibility of signs designed for use in static viewing (such as Univers 65), I found that they gave results which were the *inverse* of the *summed-up* signs. Their legibility increased as the viewing angle became longer and longer.

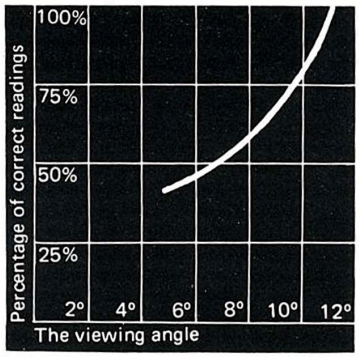


Figure 3

The graph shows the legibility of symbols designed for static viewing with a viewing angle of 0.5° and with a speed of 2.80m/sec.
A four-numeral figure was exposed in motion at a speed of 2.80m/sec. The exposures were begun with the aperture giving only a viewing angle of 1°. Then the size of the opening was gradually increased - one degree each time - until the legibility had increased to 100%.
When the viewing angles were small, the observer was able to identify the first and last signs, and some of the intermediate ones. The last sign in each row was the one which each observer saw best.
(a visual image with a short exposure time has to be anticipated by some kind of internal signal that allows the eye mechanism to be set in motion - the viewer can then produce an eye movement similar to, or the same as, the moving sign).

Conclusions

Symbols were designed that could be successfully read in horizontal motion. They consisted of single dots and could be identified when moving at much greater speeds than was possible with signs designed for static use - an average of about 80% greater speeds.

Their reading is conditioned by the following factors:

1
The size of the viewing angle in which the symbol appears (from 2%to 12%)

2
The exposure time of the symbol (from 0.02 to 0.1sec.)

3
The height-to-width ratio of the symbol (e.g. symbols with a height-to width ratio of 1:6 and 1:7 seen at speeds of 2.80m/sec. belonged to the best perceived signs in a viewing angle from 2%to 6%

4
Taking into consideration the thickness change of the symbol elements in order to produce - after *summing-up* - a mono-element sign.

5
The adequate proportion of the symbol in relation to the viewing angle (about 2:1).

6
The frequency of the appearance of the symbols (a maximum of two exposures per second).

7
Suitable luminescence contrast (to avoid dazzle)

8
Correct intensity of illumination in relation to 'visual comfort' (from 200-2000lx - Luckiesh and Taylor).

9
Designation of the direction and displacement of the symbol (from right to left).

10
The correct construction of the symbols (important with regard to the *summing-up* effect).

11
Designation of the size ratio of the individual dots to the height of the symbol (about 7:1).

The book in an audio-visual world

F Borden Mace

F Borden Mace takes a cool look at the so-called 'communications explosion'. Mr Mace is Communications Consultant to Doubleday Multimedia (USA).

In the past months I've received a number of threatening communications (printed ones, that is), whose message is that I am required to address you on a very broad range of topics that fall within the publishing and communications worlds. But what frightened me most was the suggestion, within the list of topics, that the *book* might be on its way out - a victim of the rising tide of TV, audio-visual, videotape, and graphic materials utilised today in the communications industry.

As you know, publishing is an amateur, haphazard, traditionally hidebound and highly fragmented *endeavour* which has resisted being labelled an *industry*. Publishers are staunchly individualistic entrepreneurs who have all the best and worst characteristics of cavalry colonels and club members. No single publisher can hope to speak for the group. My first move, then, to answer the question about the future of the book within the wider context of other communications devices was to interrogate the computer. 'What is the future of the book?' I typed on the console. 'What makes you think it has a future - and why do you want to know?' replied the machine.
'I have to discuss it at a meeting and my mother always advised me to address the question directly,' was my reply. 'Why do you hate your father?' responded the machine... At this point I began to doubt whether publishers could form effective alliances with computers and signed off.

To remark, then, on some key considerations and trends.

One phrase in the programme notes caught my eye. That phrase is 'The aristocracy of the printed word'.
I would like to comment on this before I discuss whether or not this aristocracy has ended. As I see things, the printed word, whether recorded on film, tape or paper, is the foundation on which every other form of communication rests. Let me provide a few examples. Every step of my journey here, every stage of my involvement with the conference, was accomplished through the printed word. I will not deny for a moment that travel films, illustrated brochures, and graphic representations of many kinds had a powerful effect on the development of my conception of what I might see and do on this particular trip to Europe. But I maintain that the necessary efficiency in the making of arrangements, the sequencing of stages and location within the trip could only have been accomplished by careful use of the printed word. For those of you who might protest that much can be done by telephone, let me add this caution - confirmations of reservations are in writing - for which I am grateful.
However, I would like to move to broader topics and discuss some of the points which reflect the unique and, I think, unchallengeable value of printed books, particularly when well written, designed and illustrated.
And lest you think I am the leading chauvinist of the publishing world, I will then suggest those areas in which I feel the other media rightfully hold the primacy.

The book is - and will remain for quite some time yet - the most readily accessible, easily utilizable, economic and efficient means of organising information and of communicating ideas. It requires no support system. I have had this availability proved to me a dozen times in the week preceding this conference. Time restrictions have prevented me from seeing films, accidents of location have prevented my watching TV, voltage differences have prevented me from running filmstrips or projecting slides in my hotel room. But every custome halt, every lunch-time break, every airport wait, has enabled me to read. And the reading that I have done has reinforced in me my awareness of the significant advantage of a book. Its contents can be a distillation of intangibles that film, TV and graphics cannot easily present.
Consider the Hofburg Palace in which this conference is being held. I am glad to have seen quality photographs of the building, its architectural details and its contents. But these cannot bring to me an understanding of the philosophical tenets that underlay Hapsburg rule of Hapsburg collapse. The physical battlefields can be brilliantly presented by maps, photographs and other audio-visual aids. But can the varying states of mind of Austrians, Serbs, Poles and other fiercely nationalistic imperial citizens be captured as successfully? I think not. It is the book, drawing upon letters, diaries, newspaper reports and so on, that most richly cultivates the student's mind. Could we more easily penetrate Freud's thought by *film* than by *book?* I think not.

I suspect that many will disagree with me. Key texts, key quotations, and supporting illustrations can surely be presented through other media. Churchill is reputed to have dictated his *History of the English Speaking Peoples* and, presumably without ever putting the words into print, we could play the tapes whenever we wish *if* the equipment is available. This availability question is a key one for the future, especially in terms of the more sophisticated developments which are going to leave books far behind in the scheme of things. I refer now to the computerised data banks which can be queried, and then will display via a cathode-ray tube, or print out in hard copy, the material required, or refer the questioner to a cassette, disc, microfilm in roll form or as ultra microfiche - postcard size

film cards containing as many as 3,200 pages each. Micrographics - we are assured - will eventually be held in central depositories and, by the use of the household phone, be dialled on to our familiar and universal friend - the TV screen. What price then the printed book? But a word of caution. Judging by the present state of telephone services in many major cities, any additional service utilising telephone cables and equipment will be a long time in becoming widely available. Capital costs have soared, data transmissions are hogging existing trunk lines, and ever-increasing numbers of would-be subscribers cry out for basic services. New York, as you may know, is turning down the *Picturephone* service - in which you see on a TV style screen the person you are talking to. It is frustrating enough to get cut off voice-to-voice, but are we prepared to be told regularly that our faces have been temporarily disconnected?

So far, I have made a traditional stand for the future of the book, and suggested caution as to the practicality of some of the more optimistic projections made for the electronic revolution. This is a new position for me. I hope that it is not seen as a complete reversal from a long-time effort to help visualise the curriculum. For in many ways, to imagine is to visualise, and to see can mean to understand. What I am struggling for in my own mind is perspective. Let us not abandon the book just because we live in an electronic age.

William V Shannon in a *New York Times* piece on the 8th of July, 1971, commented on the ever-accelerating inhuman pace of technology invading every domain of life;

'Television replaced books and radio as the dominant cultural force. It is often criticised for its violence and banality. But television's most subtle debilitating influence is that it makes audiences passive and accustoms them to expect instant gratifications. There is not the investment of mental effort and of time which a serious book or a good newspaper requires'.

What William Shannon has wisely observed and written, I believe to be true and pertinent to our topic. Perhaps, however, we grow by continually becoming disgusted with ourselves. Civil rights legislation took much less time for enactment in America, for instance, once the public saw on TV how the rights of others were being abused.

As a student of cinema I have long admired the work of master film makers, abroad and in North America, the work of D W Griffith, Ernest Lubitsch, Charlie Chaplin, John Ford, Orson Welles, Louis de Rochement, Norman McLaren, Saul Bass and Mike Nichols, among others. These highly individualistic talents extended cinematic dimensions, often by going against the system. Hollywood's *dream factory* is collapsing today, probably because it saw itself primarily as a business to be run on an assembly line in its own restricted studios. Young independent film makers the world over, often with limited means, are beginning to use the camera and sound recorder as other artists use the pencil, brush, paint and clay. It is significant, I think, that in 1971 cinematic art finally made its way into the Louvre. And at an entrance fee of six francs it is quite a bargain.

It is often said that the printed book is in trouble, too long in production, despised by the young, and publishers are being bought up by, or being merged with electronic concerns. Even so, new publishers enter the field - and survive!

Overall, the outlook for the printed word on paper, tape and film is still very attractive; the number of scientific and industrial journals is doubling about every fifteen years. The US government alone is the source of over 100,000 major reports and more than 450,000 books, articles, papers and other printed items per year. Now these are not works of fiction, poetry, or trade books, but they indicate the ability of the printed word to transmit vital knowledge to interested persons. They answer a need to know. This information could, of course, be stored in a data bank, and progressively it is. Perhaps we are asking ourselves about the future of literature when we ask about the future of publishing. It can be argued that people do not choose to read fiction because they are required to read so much fact for business purposes. In the context of this last remark, some other observations might be in order. They were made by Robert Bernstein, speaking to a recent meeting of American publishers;

'Books are emerging more and more as the movers of our society, as the information source of most integrity, as the only ideas moving slowly enough and solidly enough so you can get hold of them'.

I think that the recent episode concerning the Vietnam secret history bears this out. And a final thought. Whenever I talk about books, my mind slips into an awareness of just three of them - *The Bible, The Torah* and *The Koran* - in themselves repositories of a very large part of the dynamo and the mirror of civilisation.

Now I would like to comment upon the current state of the 'learning industry' and, subsequently discuss what the future markets look like, and how best the media industry can cooperate to fulfill these markets.

Audio-visual aids and equipment

This was, of course, the *explosive growth* area, in which all of the ground floor entrepreneurs were to have made their fortunes. But just as traditional publishing has refused to fade away on schedule, so has the audio-visual industry refused to grow on schedule. Audio-visual aids got their first big boost during World War 11 and the need to train large numbers of troops in a variety of straightforward tasks and skills. The success of the undertaking was such that the audio-visual approach and the materials that were developed were heralded as the new wave of the future - the advance that would revolutionise educational methodology and change the school beyond recognition. Early growth was encouraging, about 1,000,000 dollars spent by United States schools in 1945. But by 1969 total sales were only 135,000,000 dollars and they have been levelling off ever since. Sales of audio-visual equipment only represent a fifth of the textbook sales volume.

What are the reasons? Many have been offered, among them:

Projector sales (16mm) has remained static for some five years. Sales that do little more than supply units for the 750,000 or so projectors currently in use in American schools.

The high cost of prints (even though bought with government funding).

The ordering, accounting and scheduling problems met with when rental libraries are used.

In the case of 8mm films, spoken of as the *paperbacks* of the film world, lack of standardisation of projectors, cartridges, and sound systems have proved a major deterrent.

A valuable point of view has been expressed by Marion Patterson, a leading photographer, artist, designer, concerned with the use of visually-oriented materials in education. She says, 'There are at least two areas of concern to the photographer looking at education. One is the overwhelming reliance of educators upon the written word, and the second, is the most uniformly poor quality of those visual materials which are to be found in our schools. I do not believe that insufficient budgets necessitate the purchase of second-rate materials, or that materials of professional quality and contemporary design are indeed too expensive for our children'.
A necessary statement and an interesting application of Gresham's Law. I am almost tempted to add that the right picture can be worth a thousand words, but New York's ghetto children - now in the throes of a new and valuable passion to write poetry - have made us realise that the right poem can be worth a thousand pictures.

Educational television

Here, as an American, I have to hang my head in shame. A simple comparison of the British and American approaches to television as an educational tool, leaves my country far behind. Fortunately, we can and do import the BBC programmes for adults. In the United Kingdom, 10% of all television programming is undertaken for children. Either no commercials are shown (BBC TV), or not more than 8 minutes per hour (Commercial TV). Early afternoon programming is aimed at the under fives, late afternoon programming at the five to nine year age group. Other programmes cater, but less regularly, for the nine to twelve year age group. Once over twelve, a child has to do his own picking and choosing among adult programmes. American television suffers badly by comparison. No prime time programmes for children, a high percentage of all time devoted to cartoons, and sixteen minutes of advertising per hour. Miss Monica Sims, Head of Children's Programming for the BBC, stated that TV should stimulate individual thought and action and should respect the child's intelligence through realistic treatment of childhood and the outside world. Until recently it would have been hard to find any comment for American children's television, other than it amuses them and keeps them quiet... Though I pass from this topic, I will have a few further comments to make, especially as to the possible (and hoped for) future of the medium. One aspect of this hoped for future is dual-audio, whereby the child viewer can tune into an audio channel that carries a discursive commentary on the regular TV programme (*Batman, I love Lucy, Gunsmoke)* its characters, their actions, reactions, and the situations they have to handle. This concept, which does not demand massively expensive hardware, could convert the child from being a passive viewer into an active participant.

Computer assisted instruction

This is a development that was much heralded but has scarcely lived up to the promises and projections made on its behalf. The high costs of equipment, installation, teacher-training, and maintenance, together with the bewildering variety of programmes now ready, being tested, or soon to appear, suggest that too much emphasis has been given to promotion and sales and too little to support services. If we say, and it is often said by educators, that it is too early to say what the real promise of *computer assisted instruction* is, then are we not admitting a too hasty

approach? In addition, to what extent has the teaching profession equipped itself to utilise entirely new methods of making information available, teaching students how to use it, and creating a learning environment? A recent speaker noted, whilst discussing textbook changes, that curriculum development and teaching techniques are, and generally have been, far behind the needs of the student and of society as a whole. Educators talk glibly about innovations in both curriculum and techniques of teaching but, the speaker added, the pathetic thing was that most of the profession had done little but talk, while resisting change as only those involved in higher education can... Now, if these remarks were aimed largely at the unwillingness to accept innovations in printed materials, how much more appropriate they are in terms of unwillingness to accept advances in *computer assisted instruction.* However, since CAI offers enormous opportunity for personal and private interaction between student and learning material, as well as for self-pacing, we owe this field very careful consideration, followed by in-depth support.

Video-record possibilities

Here we reach even stickier ground. Few of us could enumerate all of the new devices that are now available, let alone intelligently appraise their marketability, educational usefulness and, to return to my basic topic, their effect on the vitality of the printed word. I have done a certain amount of homework on the video-record, tape, disc and cassette phenomenon and can report over fourteen different systems, some of which are as follows;

Electronic Video Recorder (EVR) using film to capture audio and visual signals for playback.

RCA is offering *Selectavision,* using low-energy lasers and vinyl ribbon to capture audio and visual signals for playback.

Ampex, Avco, Sony and Panasonic are individually offering *Cassette Videotape Recording,* probably giving recording and playback capabilities.

West Germany is offering *Cartridge Film for Television,* using Super-8mm film scanned electronically during playback.

Telefunken has recently announced a *Video Disc* development that will allow for colour playback.

Obviously a bewildering variety of possibilities exist in terms of the contribution these devices can make in the transfer of information and the processes of learning. Single frame usage, cueing, reversing, and slow-motion usage, increase the range of these devices in the learning situation. Yet when the total range of peripherals as well as the necessary basic components is considered, in terms of cost, available materials, and flexible instructional packages, each educator is going to have a lot of thinking to do. Increasingly, behavioural objectives will have to be clearly stated and validation-through testing provided, before expensive learning materials will be purchased in large quantities.

Having discussed in general terms four of the contenders that are thought to threaten the aristocracy of the printed word, I will close my remarks by discussing the future media mix. So far I have spoken in terms of *competition;* what might outstrip what; where the rewards are and where the disappointments might lie in this exploding world of media. It is significant, but also distressing, that my topic was couched in those terms. Far more important for all of us is the capacity to put narrow commercial concerns aside and ask ourselves what media should do in the society of the future, and how they can best meet those requirements. Cooperation, not competition, is our true topic.

As I see it, the most important use of media of any kind is the facilitation and furtherance of education - if only because the youth of any generation must be equipped to become useful citizens in a world of ever-increasing complexity. If this is achieved, then the use of the media in specialised education projects becomes a viable activity. So basically what we are faced with is not *which medium* can dominate the classroom, community centre or home, but *what sort of mix* is most appropriate. This we can only determine if we decide on a module by module unit of instruction and on a topic by topic basis what can best be learned through the use of one or more of the several available media.

Just as philosophical abstractions may prove intractable to filmstrip treatment, first-aid techniques or the use of a lathe can be dramatically taught through film. Just as some in-plant instruction on a large scale may be best achieved through audio-visually oriented instructional techniques, the senior executive, plane-bound to some distant meeting or a motel prisoner for a couple of nights, might benefit most from a book. Nor can we forget that TV is very often a shared experience, whilst the printed word is a solitary one. Significant, too, is the fact that the typed and mimeographed or xeroxed word enables every man to become a publisher, whilst film-makers have to be a somewhat richer, more patient, and more connected breed. The problems and the possibilities do not end here either. We know that in America, children spend more time with TV than with parents or teachers, some 20,000 hours before the age of twelve. Yet - and I think of the crowded lecture halls of big-city schools and colleges - is a one-to-one relationship with a machine better than a one- to one hundred relationship with a teacher, remote but alive? It could be.

In speaking in concrete terms, as I largely have - I owe it to the scientists and thinkers (perhaps more accurately described as psychologists and physiologists) within the educational world to point out their findings in the perceptual and cognitive development of children, and as these must be considered as we media people offer our various mixes to the educational market. We should be more concerned with how children learn and how we can help them to learn than to promote one medium against the others simply for commercial reasons. At this moment there is a battle royal being waged between print-oriented and visually-oriented factions. Visual literacy is being demanded today as a child's right, in much the same way as we have traditionally demanded print literacy. Perhaps we require both!

A second battle is also being waged. Learning is moving away from the almost passive process in which the teacher explained a text and children followed it. Interactive systems promoting inquiry and discovery will become the foundation on which most future educational materials will be built. Because the electronic media will play an enormous role in the future of education we owe it to those about to be educated to select for them the best means of wiring them in and, since interaction can be basic to such media, of securing the most effective means of utilising feedback. And education has, at the upper levels, to do much more than simply utilise feedback. Feed-forward has also to be sought and the external world adjusted, just as we adjust educational materials as a result of feedback. U Thant suggested to the UN that the advanced economies of the world can have the kind and scale of resources that they choose. In fact, we are the designers of our own and the world's future, to an unprecedented degree. Obviously, the more we feel at home in designing and responding to our own educational experiences, the better we will be able to play meaningful participatory roles in the design of our lives and the physical, economic, and aesthetic contexts in which we live them.

As my final remark, let me say this. I have spoken in what may be a highly fragmentary manner, touching upon many bases lightly, skipping from present problems to future possibilities. But this approach, partly caused by the size of my topic is, perhaps, an accurate reflection of the state of the media; more fragmented, more promising than ever before. But of one thing I feel quite certain. Education will become both more intensive and longer in its time span, as the century advances. The media of instruction will undoubtedly become more varied and the mix more flexible. The process will become universal, until whoever eats in this world will also be engaged in continuing education. The most popular image of this process is the one in which there is a TV screen in one corner, a manipulative device in the other, a computer terminal readily available and printed materials on the table. In fact, partnership among the media sources to provide the means and materials of education is vital in securing a peaceful future for the world. In this connection, I want to mention a proven success and an ongoing hope. The *Network for Continuing Medical Education* is a free service linking some 500 medical schools and hospitals in the USA and Canada with the best in televised medical education. Videotapes in any format desired, plus supplementary texts and printed TV guides, are provided through the mails. A success in itself it will, I hope, prove to be the forerunner of a *General Network of Continuing Education* which, in time, could be a worldwide resource utilising the technology and the content of all the media. Let us neither promote or demote the particular medium of our immediate concern, but move towards a greater degree of cooperation and a greater distribution to the future wellbeing of the world's peoples.

The Austtian Ptesident, Ftanz Jonas, deliveting an addtess of welcome to the delegates attending the VisCom 71 Congtess held in the Hofbutg Congtess Centte, Vienna. Photogtaph by Foto Schikola.

Some views on VisCom 71

Lord Snow

I believe that VisCom 71 has something to give to an issue which I have been talking about at least and, I hope, thinking about for quite a long time. And I've just been thinking a little bit more. I believe that there are two essential ways of knowledge in the whole of human experience. One is traditional - it isn't cumulative, it doesn't add automatically to itself. You have always to start from the beginning. And the other is scientific, in which, in fact, you're building on an edifice where one piece of work is incorporated in another, where the whole thing grows like a living organism. No-one, for instance, will ever read a paper of Newton in order to do physics; it is part of the edifice. This is quite different from the other way of knowledge where you have to read a play of Shakespeare if you're going to understand Shakespeare. And these two methods are both important, both have to learn from the other. But they are essentially different, and the more one thinks of them, the non-incorporative and the incorporating, the more you realise this is a concept which we have to get across in the process of education. And here, I believe, visual communication has something very active to do, which it can do, perhaps, in some ways better than any other means. One method, in the present jargon we call synchronic; one is diachronic, and moves through time - that is why scientists believe in progress. All this I believe can at least be helped to be got across by the aids of visual communication.

Sir Alfred Ayer

I think your congress is very important because it seems to me that the possibilities of visual education are only just beginning to be developed. I see it as being of the greatest utility in the field of primary education. It's true of the vast majority of children that their thinking is concrete, rather than abstract. And for concrete thinking, visual imagery is of primary importance. This is obvious in the case of the sciences. If you want to introduce children to biology, to natural history, clearly visual presentation is paramount. I think the same is true in physics, even in mathematics. I think that mathematics which is a great stumbling block for many children would be made much easier if you have proper visual aids - even in the illustration of abstract theorems and, of course, quite clearly in the application of mathematics. This extends also, obviously to art but also to history; even to literature. Browning asked, 'Did you once see Shelley plain?' This is no longer possible, but you could now see Auden plain, and many other literary figures. And seeing these people, combined indeed with hearing them talk, will make an enormous difference to one's understanding and appreciation of literature. It is, of course, very important that this shouldn't be passive - you want the teacher to associate this visual education with discussion and so on. But the combination of the two, seems to me to be able to produce an advanced education hitherto unparalleled.
And this is not merely true of primary education. I think it could extend even to the universities.
A great deal of university lecturing now is very mechanical, people having to give lectures. If you can get a few lectures given by experts, widely diffused by these visual means, and then discussed in classes, you have a great advance at all levels.

Asa Briggs

I hope that ICOGRADA will think carefully about what it will do between this conference and the next one, because quite clearly we cannot really hope to pursue the learning process once every three years for four days. The forms of verbal and visual communication across the different countries are things that ICOGRADA is very much concerned with, and this continuous activity is essential.

There are some questions which have been raised at this conference, for example, the way in which visual understanding is essential to the understanding of certain kinds of things. There are some issues of this sort which I hope can be pursued in depth between now and the next conference, with whatever working groups, or in whatever places, ICOGRADA will feel to be right for these activities to go on.

When we talk about any of the questions with which we have been concerned during the last four days, we are in the front line as far as thinking and feeling are concerned. Front lines are always exciting, but they are never comfortable places to be in. I hope that the mood of this conference is such that it will assimilate the various kinds of things that we have learned, not to be dominated in a specialised way with any single part of it, but to look at it as a whole, to let it all, to some extent, come together. I believe that the media have got to come together - treating them separately is nonsense. Their interpenetration is the essential thing.

Philips TELL Project

At the exhibition which accompanied the VisCom 71 congress, Philips showed the results that they have achieved so far in their development of the TELL (Teacher-aiding Electronic Learning Links) Project.

The TELL communication system allows the teacher to transmit video-taped material to monitors on the pupil's desk from a central rostrum with a battery of controls, not unlike that of a motor car dashboard.
The system allows for the splitting up of a class into different groups according to the number of cassette docks in the teaching rostrum. The teacher can also make use of a built-in camera which will transmit his own comments or observations together with a screen image into the pupil's monitor. He can also transmit materials from textbooks on his desk, or his own writings or drawings.

The teacher will also have at his disposal a direct two-way audio and visual link with each of his pupil's desks for the purpose of questions and answers. An associated computer follows the progress of the learner, deciding whether the answer is right before the student is allowed to proceed to the next step. This, it is claimed, will have psychological advantages for the shy or timid pupil, since his or her answers are seen only by the teacher and registered by the computer. The main advantage, however, would seem to be that the teacher is free to leave his desk and move among his pupils, assisting and guiding them individually.
The pupil can make use of a simple keyboard in front of him. As pre-programmed and individualised learning units come to him through earphones, the student can interact with the screened images being demonstrated. By means of a lever or joystick, the pupil can move a light point as an answering device when called from the teacher's desk.

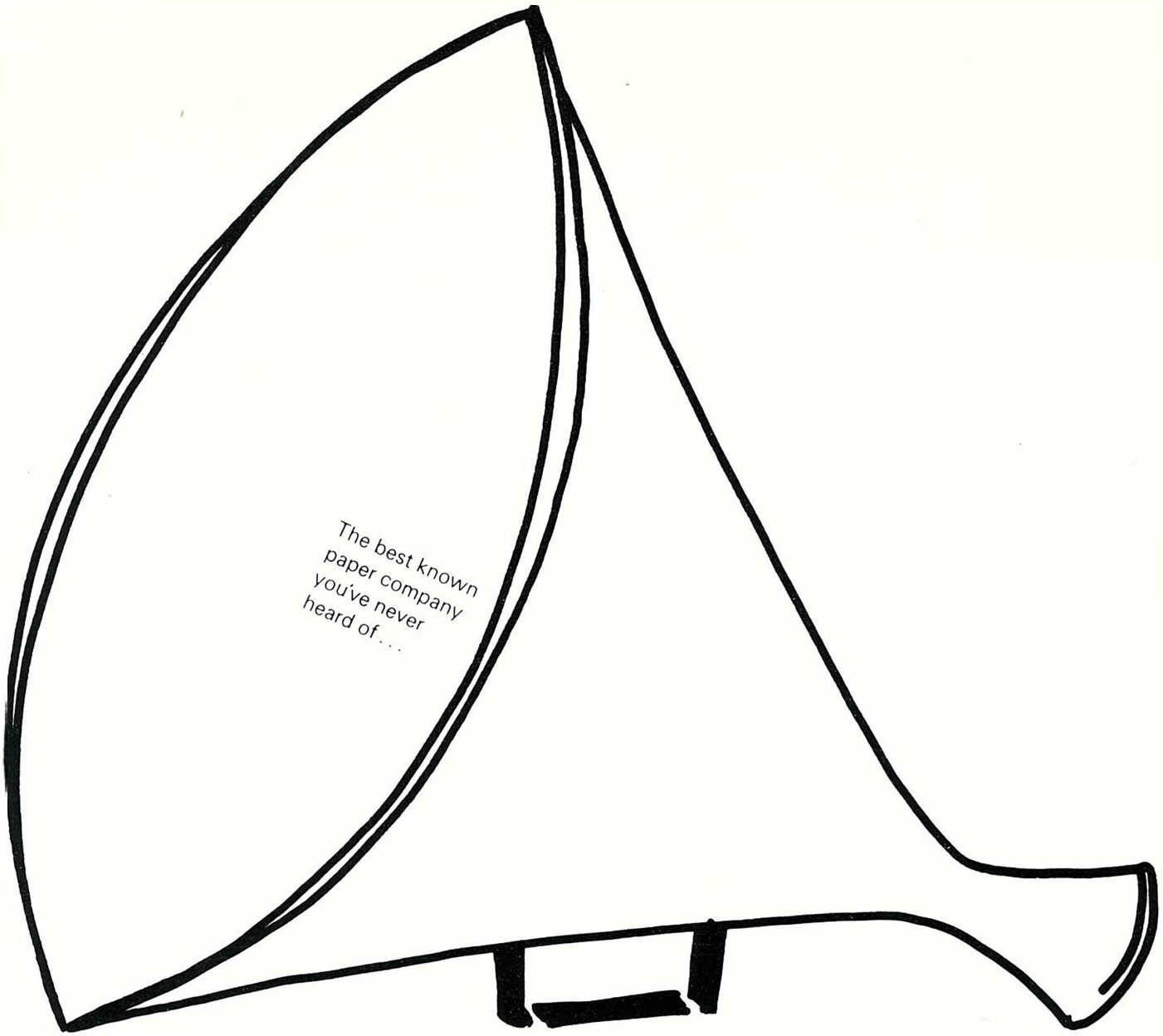
Philips state that they have tried to focus their attention on the immediate future, rather than produce some kind of experimental fantasy. They have studied existing school systems with a view to finding ways of using currently available technology to help improve the efficiency of both teaching and learning.

Photograph shows the pupil's unit in the system. It is ergonomically adjustable to different age groups.

Ampex Instavideo System

Ampex have introduced a new generation of miniature videotape recorders and players featuring automatic cartridge loading and designed both for the use of serious closed circuit television and home recording and playback markets.

The new Ampex Instavideo videotape recorder/player system includes a miniature videotape recorder, a hand held camera and a cartridge using half-inch-wide video tape. It is claimed to be the smallest cartridge-loading video recorder or player system to date. Pictures may be played back for viewing on a standard television set. The manufacturers state that initially, the entire system (less monitor) will be priced at under 1,500 US dollars. Tape cartridges giving up to one hour's recording will cost under 13 US dollars.
The system may be operated by batteries or household current, in colour or black and white.



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ICOGRADA

The International Council of Graphic Design Associations was founded in London in April 1963. Its headquarters are in Amsterdam. ICOGRADA is an association of independent Member Associations. Membership is open to societies of professional graphic designers and organisations concerned with the training of designers and/or the raising of graphic design standards. Member associations are elected at the biennial General Assembly, which elects also the Executive Board, determines policy and overall activities and agrees financial arrangements.

The aims of ICOGRADA are:

1
to raise internationally the standards of graphic design and professional practice by all practicable means.
2
to collect and exchange information on professional, educational and technical matters.
3
to improve graphic design training and to assist the interchange between countries of graphic designers, teachers and students.
4
to organise exhibitions, international assemblies, congresses and symposia and publish documentation on graphic design and visual communications technology, including a News Bulletin.
5
to act as an international forum for co-operation and exchange of views between designers, organisations representing professionals from allied and other fields and those of commerce and industry.
6
to encourage the better use of graphic design and visual communication as a means to improve understanding between people everywhere.

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