The Development of Intelligence: Hope or Reality?

by José Luis Pinillos

Serial No. FMR/ED/SCM/80/177E

Paris, 1981
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Report prepared for the Government
of Venezuela by the United Nations
Educational, Scientific and Cultural
Organization (Unesco)
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INTRODUCTION

1. At the request of the Government of the Republic of Venezuela, the Director-General of Unesco arranged, under the Organization's Regular Programme for 1979-1980, for a consultant to accompany the Adviser designated by the Venezuelan Ministry for the Development of Intelligence on a series of visits in April 1980, to gather and evaluate information on the development of intelligence through psycho-pedagogical techniques, in France, the Union of Soviet Socialist Republics, the Federal Republic of Germany, Belgium, Switzerland and the United Kingdom, for the purpose of assessing whether Unesco could and should sponsor an expert meeting on this subject.

2. As the general aim of the mission was both extensive and complex it was broken down into a set of more specific questions which may be summarized as **Which methods to improve What, in Whom and By Whom, In What socio-economic and cultural conditions, For What purpose and With What results.** The set of questions was of course adjusted to the particular circumstances of each of the centres visited, but it broadly defined the scope of the mission's investigations. In other words, so far as possible we sought to determine:

   (a) whether the particular centre was in any way working on the promotion of intellectual development and, at all events, what opinions it held on the subject;
(b) if the centre was doing work in this area, which methods it was using to improve what, in what type of population, with what kinds of specialists or auxiliaries, in what settings, with what results, and for what purpose.

Finally, after examining as thoroughly as possible those points which were most relevant to our general aim, we sought to situate the centre's work in a basic frame of reference for evaluating the problem.

3. Frame of reference. As we see it, the subject may be tackled basically from three standpoints:

(a) a theoretical standpoint, clarifying the actual concepts of development and intelligence underlying the programmes run by the various centres;

(b) a differential standpoint, determining the attitudes towards measuring individual and/or group differences in intellectual performance, and towards variation factors related to heredity or environment;

(c) a pragmatic standpoint, clearly pinpointing the methods intended to foster the intellectual development of the subjects, together with the nature of the evaluation procedures and of the results themselves.

Interdependent though these three standpoints are, as a rule we attached prime interest to the final one.

4. Structure of the report. The body of the report falls into two main parts. Part One describes our visits to the centres, laying particular emphasis on the points most directly connected with our problem. Part Two is more systematic and endeavours to put forward reasonable answers to the questions raised in section 2(b) above. The report ends with a number of practical suggestions and conclusions.
Part One: Visits to the Centres

5. France. The mission was in Paris from 1 to 6 April, and carried out the programme of visits shown in Annex I. Our interview with Professor Bresson was extremely useful. We were informed about a substantial volume of current work and research on child development, dealing particularly with the perceptual-motor, motivational, linguistic and cognitive aspects, and reference was made to France's lack of a centre devoted specifically to the development of intelligence. There do not seem to be any programmes of compensatory education in the strict sense, although work is being done on preschool education, along similar lines. In addition, training programmes to develop specific skills or overall IQ do not appear to have any very enthusiastic supporters in France; at least, we did not meet any. The prevailing theoretical model of intellectual development is close, if we understood Professor Bresson correctly, to the Piagetian model, and so does not blend readily with intelligence-raising programmes based on training the components of psychometric intelligence, or with behaviourist programmes focussing on habit reinforcement. Moreover, the ideas of "compensation" and "handicap" did not appear to be viewed with much favour by the experts we visited.

The remainder of the contacts we had in Paris confirmed our impressions of the interview with Professor Bresson. Mr. Treffel, Deputy Director of Programming and Co-ordination in the Ministry of Education, gave us an interesting survey of technical facilities in the field of communications and data processing as applied to education; these have an indirect impact on pupils' intellectual performance, but they do not constitute a specific programme for the development of intelligence. It is quite possible, nevertheless, that
the general strategy of educational change outlined by Mr. Treffel may include features of importance for the Ministry headed by Dr. Luis Alberto Machado in Venezuela, and for similar bodies in other countries.

Our interview with Mr. Bacquet, Assistant Director of INETOP, dealt with vocational guidance problems. The doctoral thesis of F. Aubret, supervised by Professor M. Reuchlin, Director of the Laboratory of Differential Psychology in Rue Gay-Lussac, on the other hand, ties in closely with the aim of the mission. It is a painstaking empirical analysis of the impact which the interaction of family education practices and social environment has on the intellectual and school level of children in the first primary class. A comparison of this work with similar research conducted in other countries confirms the suspicions, very widely felt, that the influences which social environment and family exert on the intellectual and school development of pupils are both complex and relative. This is yet another of the many observations pointing towards the difficulty of establishing universally valid programmes for the development of intelligence.

Our discussions with Miss Levasseur of the Service for Data Processing and Statistical Studies in the Ministry of Education centred upon an analysis of methods for overcoming difficulties and speeding up mathematics and language learning. Her findings on this subject again show a complex interaction between the pupils' level and the method's degree of success: the best subjects advance 10 per cent, against only 2 per cent in the case of the least good. Even so, these findings cannot be generalised either, because publications in this field (Klauer, 1975)
show quite a number of exceptions to this rule, depending on a wide variety of factors to which we shall refer in Part Two of the report and in the section dealing with the Federal Republic of Germany. At all events, the "awakening" ("éveillement") programme which Miss Levasseur described is quite relevant to the basic concerns of the Ministry for the Development of Intelligence. It is virtually certain that faster and improved learning of language and mathematics, such as appears to some extent to have been achieved with this type of programme, will have effects on performance in intelligence tests, improving the results.

During our interviews we discussed many other topics with some bearing on the development of intelligence. These included measurement of skills, vocational counselling and guidance, arousing cultural interests and motivations, the relation between the notional systems of education and daily life, research on the causes of slow learning, differential education programmes, planning of education aims, strategies for transition from kindergarten to primary school and from primary to secondary school, training of teachers, the organisation of education, general strategy of educational change, and so on. Taken together these are quite certainly matters which can foster the intellectual and cultural development of a country's schoolchildren. But we heard next to nothing about programmes specifically devoted to the development of intellectual capabilities, along the lines of those run in the United States, Great Britain,
Belgium, the Federal Republic of Germany and the Scandinavian countries. Of course, this does not mean that there are no such programmes in France. We heard, for example, that Professor Florez is working on specific training at Nice University. Apparently there are others too, such as Mrs. Berthase with language training, Mr. Roger with cognitive development, Mr. Bourdoneis with changes in reading ability, and so on. However this may be, compensatory education programmes, the notion of handicap and methods of specific cognitive stimulation seem as we said earlier to have been critically received in France, on account of Piaget's influence but also due to sociocultural factors which go beyond the field of psychology, and may well be ideological (2).

6. The Union of Soviet Socialist Republics. The basic approach to education and psychology in the Soviet Union differs in quite a number of ways from the approaches current in the West, for instance as regards psychometrics and ability tests, differential psychology, the epistemological foundations of the human sciences and, of course, the question with which we are concerned here. All this, coupled with the language problem and the differences between our respective models of society, makes it no easy matter to assess what the Soviets are really doing in the field of intellectual development.

Admittedly, on the one hand the Moscow school's theoretical model on the development of intelligence

(2) It is doubtful, in fact, whether this critical attitude is due just to a delay in the compensation movement's arrival in France. The delay rather appears to be the result of a prior attitude.
displays definite similarities with that of the Geneva school and this, taken together with the rejection of psychological study of individual differences and the uniformity of the educational and social system, may account for Soviet lack of involvement in the programmes of compensatory education and cognitive stimulation found in Western societies. Indeed, we did not hear of any type of action which might belong in programmes of this kind during our stay in Moscow. In theory, they would not be required in a classless society.

On the other hand, however, the great emphasis that the Moscow school places on praxis, language and sociocultural and economic conditions as significant factors in the ontogeny of intelligence puts Soviet psychologists and educators at the very centre of action to foster intellectual development. We were given to understand that Soviet society apparently has no need to offset initial socioeducational deficits in any underprivileged group, or to make use of any special type of cognitive stimulation, for the simple reason that underprivileged groups do not exist, and because the whole education system incorporates the stimulant elements necessary to foster children's cognitive development.

In fact, what we saw in Moscow (Annex II) tallies roughly with this approach (3). At the Research Institute for Higher Education Problems the Director, Professor

(3) Inasmuch as there are no compensatory programmes; but not inasmuch as education efforts are concentrated on highly selected groups.
Tchetverikov, and his assistants gave us a general description of their activities and then left us with Professor Matuchkin, Head of the Psychology Section at the Institute. Professor Matuchkin replied to our questions by setting out his conception of personality development in terms of two models. One was an adaptive model, based on achievement motivation and regulated by the Yerkes-Dodson law, practice and reinforcement, which he called the training model. The other was a cognitive model, understanding without training, representative of human creative activity, with no limit on progress, which he called the production model. The psychopedagogic method stemming from the production model is a method of teaching using problems, based on joint action and discussion, thinking about the direction that is being taken, service to others, and conflict, being the moments which determine development crises and possibly the advent of a creative cognitive and motivational attitude. What we were told about Professor Bervistky's research on innovative experience also fits in with this line of psychopedagogic promotion of the cognitive attitude - always coupled with motivation and practice - which in some sense forms the Soviet pendant to Western programmes on the subject. As is usual in the Soviet Union (Bronfenbrenner, 1977), the validation of teaching through problems and innovative experience was described to us with little or no objective data, rather being supported by personal observations, anecdotes and probably well-founded, but subjective, judgements. At all events, we found the information supplied by Professor Matuchkin was of interest for the mission, for reasons which will appear later.
At the same Institute Professor Azarov explained the system of vocational guidance that applies in the Soviet Union, which is somewhat dirigiste and without any very clear connection with our problems. The Deputy Director of the Research Institute for Education Content and Methods, Professor Monakhov, addressed himself largely to the subject of the renewal of schoolbooks, accompanied by a "teacher's book" which was not being well received by educators with considerable practical experience. When talking about mathematics teaching, where inductive methods are apparently employed as well as deductive ones, Professor Monakhov mentioned some cases of people with exceptional gifts for mathematics, and gave us to understand that in these cases the best thing was to disregard methods and leave them to develop in their own way. Obviously, the egalitarian context of Soviet education contrasted with the Centre's concern with detecting and fostering exceptional talents in the mathematics field. We found the same concern at the Energy Institute, to which we shall refer shortly.

At the Institute for Psychological Research of the Academy of Pedagogic Science the Director, Mr. Davidov, received us most warmly, and brought the conversation on to general problems of Soviet psychology, especially in contradistinction to the Geneva school. The stress that he laid on the difficulties of providing a dialectic foundation for psychology, not just outside the Soviet Union but there as well, and on minimising the significance of Pavlov for the problems concerning us, was of particular interest. For further discussion of our problems he referred us to Professor Galperin's Department, where we were subsequently to meet Mrs. Talysina, the senior lecturer.
At the Lenin Education Institute we were received by the Rector and by Professor Sokolova, who showed us seminar work in small groups as well as some publications in which the effects of various methodologies were evaluated quantitatively, in percentage terms. A teacher at the Institute, whose name unfortunately we have mislaid, showed us an appliance of his own invention for recording various types of pupils' answers to problems and questions put to them collectively.

At the Energy Institute, whose Vice-Rector, Mr. Sleptsov, received us most kindly with his assistants, our interest lay in the fact that this establishment conducts extremely stringent screening of trainees for the Moscow Polytechnic Institute. Selection depends on the Secondary Education Certificate and three examinations (language and literature, 6 hours; mathematics, 4 hours; physics, 4 hours) which are then carefully evaluated. They do not use tests, of course, but assess individual differences in knowledge - which naturally entail differences in ability - against selective criteria which are just as strict, if not stricter, than those applied in Western countries. In these circumstances the question left hanging in the air, of course, was whether a good part of these individual differences might not be due to an education handicap, which preschool education or programmes of cognitive stimulation could have offset, or to heredity.

Lastly, at Moscow University we were received by the Dean of the Psychology Faculty, Professor Bodalev, and by Mrs. Talysina, Associate Professor in the Department of Professor Galperin. Mrs. Talysina
was at pains to make it clear to us that her psycho-
pedagogic research to assist the cognitive develop-
ment of schoolchildren - most especially in the area
of physical science and mathematics, as well as in
language - were situated not so much on the plane of
the logic or didactics of the assignments as in the
order of the strictly psychological processes and
operations of the individual. The relevance of Mrs.
Talysina's methods for stimulating schoolchildren's
cognitive attitudes and enrich their intellectual
strategies seemed to us beyond doubt. Nevertheless,
a detailed analysis of her publications - and those
of Professor Galperin, her mentor - would be required
to assess the reality of the results achieved with
these methods, while we were quite unable to establish
the exact nature of the methods during our interview.

To sum up, the research being carried out by
Professor Matuchkin and Professor Talysina represent
the closest approximation to the problem before us
that we were able to identify in Moscow.

7. - Federal Republic of Germany. Our activities in the
Federal Republic of Germany (Annex III) are more easily
summarised than those in the Soviet Union. To begin
with, our visit was shorter; second, the basic stances
are closer to those current in education and psychology
elsewhere in the West; finally, the two professors we
met were concerned with questions related to the mission
and were working on clearly defined programmes.
From the outset of our visit to the Research Institute on Intelligence Testing in Bonn it was plain that this centre's work was focused on problems far removed from our own. The same was clear with the Adenauer Foundation. A short visit to Professor Rüppell of the Department of Developmental Psychology at Bonn University, on the other hand, proved of greater interest. Professor Rüppell is carrying out research directly concerned with stimulating the cognitive development of primary schoolchildren. In this connection he has devised a highly ingenious problem table with a translucent panel on which problems are projected to be solved by four children as a group. The problem table apparently generates a high degree of motivation among the children and arouses significant cognitive activity in the group, which works together and shares discoveries and the solution-finding process. This seems a very promising method for training children in problem solving, and could be incorporated in programmes for intelligence development. Our attention was also held by a video method for training children — by means of projections of geometrical figures in motion — in the imaginary representation of figure rotation and change that is needed to solve certain geometrical problems.

In Aachen we visited Professor K.J. Klauer, of the Faculty of Education, who has published a number of research papers on intelligence training in childhood to which we shall refer in greater detail in Part Two of the report. Professor Klauer, who holds
that the level of intelligence can be improved both globally and specifically through appropriate training, nonetheless emphasised that the effects of cognitive training of this kind are still too unpredictable, and frequently short-lived, to recommend the indiscriminate use of standard programmes in schools. Professor Klauer's position appeared most sensible and realistic to us. His learning in this field, through highly detailed surveys of relevant publications and his own experiments, make him particularly suitable for consultancy on projects such as those with which we are concerned.

8. Belgium. The opinions that we were able to gather in Ghent are also extremely relevant to intellectual development. For more than ten years the Van Leer Foundation in The Hague has promoted a series of experiments in various Belgian towns on improving education for disadvantaged children, and these experiments have yielded a wealth of valuable pointers for our own problem (cf. Bernard Van Leer Foundation, 1977; De Coster, 1975; Council of Europe, 1974) which we shall discuss in Part Two of the report.

During our stay in Ghent we had the opportunity of visiting the crèche for children of university staff, directed by Professor De Coster, and the City of Ghent Education Centre, which is particularly concerned with producing stimulation programmes for disadvantaged children. Here Professor De Meyer explained the reasons which had led them to replace the initial compensatory programmes by more global
ones which included family participation and establishing an education climate where personalised pupil-teacher interaction is the norm. Visits to the Laboratory of Experimental Psychology and Education, with Professor Verbist, and to the Laboratory of Didactics, with Professor De Bock and Dr. Heene, and conversations with Professor Verhofstadt and Professor De Coster, enabled us to form an idea of the approaches taken by these research teams at Ghent University (Annex IV).

In the first place we were much impressed by the scale and continuity of the programmes, which proceed in graduated stages from the crèche via kindergarten to primary school; the structure is highly practical, and reflects deep scientific knowledge of the problem and stringent controls. This all lends considerable weight to the observations of these teams, who appear to incline towards a Gestalt rather than a mechanistic conception of intellectual development in which pupil interaction, methods involving dialogue with the teacher, family support and, more generally, a significant atmosphere of motivation and participation in schooling of a high standard, all of which is sustained over a period of years, take priority over piecemeal, short-lived programmes designed to stimulate specific processes or secure temporary compensation. The system here in fact consists of programmes of cognitive stimulation.

The atmosphere of cognitive stimulation which we observed in the primary school that we visited gave us the impression that environmental action of this kind, sustained with the help of well-prepared and motivated
teaching staff, could advantageously take the place of specific training in more rigidly and elementarily defined cognitive operations, such as learning rules of syntax, classification, alertness exercises and so on, whose use would at all events be relegated to individual cases. The fact that the decision was taken after a number of years' research which led ultimately "From Compensation to Educational Innovation" is bound to invite profound consideration of this approach. In our view the Van Leer Foundation's report cited earlier, Improving Education for Disadvantaged Children, is highly recommended reading as a counterpoint to the more psychometric and behaviourist approaches to which writers from the English-speaking world have accustomed us.

One very obvious remark, however, is that the "new education" practised by the Belgian teams calls, it hardly needs saying, for a very strong economic and sociocultural background both in the families concerned and in the education system and teaching staff. As a result it is doubtful whether the Belgian programmes, excellent as they are, can simply be transplanted to countries with a different social and cultural structure. We feel this comment may be a pertinent one for the programmes of countries where economic and sociocultural patterns are different.

9. Switzerland. Our contacts in Switzerland were basically with the Centre for Educational Psychology Research in Geneva, directed by Professor Métraux,
and just briefly with Professor Inhelder of Geneva University (Annex V). The prevalent model in Geneva is of course the Piagetian model, which is more concerned with verifying the universal existence of clearly distinguishable stages of development, invariable at all latitudes and hierarchically ranked in order of appearance, than with changing or controlling such development through educational psychology methods. While there is undoubtedly copious research evidence on the impact of socio-economic, cultural and educational factors on the Piagetian stages and the operations that define them, the Geneva school has not focused primarily on this class of questions.

Among the research projects that were described at the Centre for Educational Psychology Research, our attention was taken by the fact that in the transition from concrete to formal operations, with children aged 12 to 15, efforts were made to assist the pupils by means of a problem-solving approach, similar to the problem teaching that Professor Matuchkin had mentioned to us in Moscow. In practice this method took the form of pupil dialogue participation, guided by the teacher's questions and supported by subject matter previously covered in connection with a specific question. In this connection we were most favourably impressed by the material which Professor Schapira had programmed for the study of Prehistory and Classical Greece in the secondary
orientation cycle, even though these programmes of course have only an indirect bearing on our problem. A group experiment designed to arrive at the laws of the pendulum appeared more directly relevant. Largely non-directive intervention by the teacher, in the form of questions, helped the pupils to discover on their own where the problem lay, and the intellectual steps—correct and incorrect—that led to its solution. It is reasonably clear that this method can teach pupils how to think in a given area of knowledge, though objective data were not available to prove that the process could be generalised to other orders of phenomena apart from the problem solved in the experiment. Problem verbalisation was also used in Moscow.

Other research, such as Professor Lehman's project on the educational advantages of global systematic organisation for biology teaching, was too far removed from the aim of the mission to be included in this report. The work coming closest to our own interests was perhaps the research centred upon discovery strategy, which to some extent brings to mind the experiments of Gestalt psychologists on productive thinking and problem solving.

The reticent attitude of the Geneva school towards attempts to speed up intellectual development or train intelligence and its psychometric components were quite apparent in our interview with Professor Barbe Inhelder. She asserted that the attempts made in this
area during the 1960s with compensation and cognitive training programmes were outmoded, and declared that she had never had much faith in them. In the context of our talks Professor Inhelder did not go into detail about the reasons for her scepticism, though we feel they would be worth discussing at a meeting of experts on the matter. When we referred to the experiments by Professor Rüppell, in Bonn, on objectifying mental images in the form of drawings projected on a screen, she reaffirmed her earlier scepticism about the possibility of training subjects' mental processes by these methods. Her version of the problem took the form of the discovery strategy we have already mentioned, which is at the core of the Institute's research at present. Confronting the subject with problematic, contradictory situations, observing his behaviour, determining the steps which his calculations and reasoning follow, helping him to become aware of correct and incorrect routes, all within a fluid, motivating situation: that is the approach Professor Inhelder considered should be taken to foster the subject's access to the particular operating model for his stage. In effect, in Moscow, Ghent and Geneva we encountered a strategy of intellectual promotion to some degree akin to that postulated by Gestalt psychology half a century ago. In our opinion this move backwards, or if preferred this retrieval of such respectable propositions as those of Gestalt psychology, though reformulated and updated in modern terms,
should be taken closely into account together with the conventional approaches, presumably influenced more by the psychometric and behaviourist approaches of North American psychology than by the European tradition of education and psychology. While there is no necessity to try and achieve a synthesis of these two lines of thought, much less raise them up as mutual exclusives, there may well be some advantage in not ruling this other class of cognitive stimulation out when the time comes to programme the development of intelligence.

10. United Kingdom. Our visits to the University of London Education Institute (Annex VI) brought a note of empiricism, pragmatic yet rigorous, to our mission. Situated halfway between continental Europe and the United States, our English colleagues offered a balanced view of the problem, by no means ingenuous of course but not sceptical either.

Our initial discussions took place at the Institute itself, with Professor Versey and Professor Worall. They supplied us with very recent papers on the reassessment of the Head Start project and other experiments in cognitive stimulation which had been written off prematurely and somewhat lightly perhaps by many critics of compensatory education. In this connection the article by A.H. Halsey ("Education can compensate", New Society, 24 January 1980) expresses quite accurately the climate of reappraisal that appears to be gaining ground in Great Britain about the effects of compensatory education, in circles
responsible for education and the human sciences. This attitude, equidistant from the optimism of a De Bono or Bruner and the scepticism of Professor Inhelder, proved to be shared by the majority of the teachers whom we saw in the centres attached to the Institute, and was not just the view of Dr. Versey and Dr. Worall. Dropping the use of IQ, in the Eleven Plus, as the decisive basis for classifying pupils on entry to the secondary sector also seemed to confirm this impression that we gained in the course of discussions and our examination of the documentation we were given.

Dr. Phil Salmon is in charge of a collaborative learning project resting on the conviction that conventional education is incapable of coping properly with the educational demands of contemporary society. Somewhat on the line taken by Barnes (1977), this project understands collaboration in learning to consist basically of joint pupil participation in defining problems, comparing interpretations and proposed solutions, identifying divergences and developing alternative ways of reaching the solution and, in the final instance, fostering flexible group interaction not so very different from that suggested in Moscow, Ghent and Geneva. These results of this experiment, which have still to be evaluated, are expected in the cognitive area to lie in extending personal comprehension experience, fostering learning potential, and increasing reflective awareness. Social effects and
dyadic interpersonal relations also fall within the area of the anticipated findings. It is still too soon, of course, to evaluate the project, but it shows at least that interest in experiments to foster human development has not waned in Great Britain. Alongside this programme, operating at secondary (middle school) level, are others which focus on infancy and childhood. The Thomas Coram Research Unit, which we also visited, has run many research projects of this kind. For example, a programme for parents to help their children learn to read is under way at present.

Professor Hazel Francis has been working for some time with children aged 6 to 8 from immigrant families, on reading-related problems. In her opinion one of the best publications on fostering cognitive activity in the area of concept formation is Halsey's work dealing with Dundee, Scotland (EPA, 1972-1975, vol. V). The research by Professor Klaus Wedell on the cognitive components of basic educational performance is also relevant for the rehabilitation of children with specific deficits or handicaps.

Professor Colin Hindley, Director of the Department of Child Development Psychology in the Education Institute, laid emphasis, backed by references to very recent and significant publications, on the mood of reappraisal now coming to the fore in Great Britain and the United States - in spite of Coleman's latest report - about the relative
effectiveness of the compensatory programmes launched in the mid 1960s. At the same time he made it clear that the matter was still being treated empirically, and really acceptable answers had not yet been given to the major questions here, i.e. what intellectual development is, how it can be gauged, and how it can be improved. Dr. Versey, whose knowledge of the Piagetian perspective on cognitive development in children is very considerable, was also present at this meeting and he concurred with the present writer in acknowledging that the rules for transition from one stage to another, as formulated by Piaget, are "difficult to operate", which in our view would account for Professor Inhelder's reticent attitude towards the problem of "speeding up" cognitive development.

Lastly the Director of the Institute, Dr. W. Taylor, who is an education sociologist, reaffirmed the importance of family and social support for programmes designed to foster intellectual development, and underlined the need for them to be continuing, global programmes. Taken as a whole, our visit to the Education Institute proved quite encouraging for our purposes.

11. Summary. To sum up, the view of the problem offered by Professors Matuchkin and Talysina in Moscow, by Professor De Coster's team in Ghent, by some of the research of Professor Métraux's group in Geneva, and by the work of Professors Salmon and Francis and the Thomas Coram Research Unit and the
opinions of Professors Hindley, Versey and Taylor of the University of London Education Institute, is cautiously favourable about the possibilities of cognitive stimulation, understood in a more global, continuing and flexible form than in the early programmes of some fifteen years ago. The most operative and empirically founded contributions here come, in our view, from Ghent and London. We find the approach of the Moscow school highly invigorating for the inclination towards involving subjects actively in their own education process, but it is harder to assess for language reasons - almost all the papers and documents that we obtained were in Russian - and also because the methods of evaluation that the projects employ seem somewhat imprecise to us.

In Germany Professor Klauer, combining analysis of publications and his own experiments, has made an evaluation of compensatory education and other conventional programmes of intelligence training which we consider to be of sound scientific value, and together with other reviews this may provide a good definition of what can - and cannot - be expected from this class of American programmes, which it seems advisable to blend with the European line of approach.

Lastly, it seems likely that we failed to draw all the benefit that we might have from our visit to Paris, perhaps because it coincided with the start of the Easter vacation and also because we were just
setting out on our mission and still lacked practice in conducting interviews. Within these limitations we are nonetheless of the opinion that reasons of theory, and perhaps of ideology in some cases, have drawn a good part of French educators and psychologists away from the conventional compensatory theses, for which they find structural replacements.

In any case, the overall balance of the mission is a favourable one. We found a positive response almost everywhere, in widely various forms and with all due shades of difference, to the basic purpose of our mission. Once the initial difficulties of understanding - very small in Great Britain, Belgium and Germany, a little greater in France, Switzerland and the Soviet Union - had been overcome we found a wealth of opinions, theories, publications and practical research of undoubted relevance to our aim. In widely various ways, it must be stressed, we found that many groups working in this area shared the same fundamental conviction, i.e. a founded, not gratuitous, belief in the possibility of alleviating the intellectual handicaps of many children with social disadvantages or other life-situation problems, and in the real and effective possibility of speeding up or promoting the improvement of IQ and/or its specific components in children of normal education levels and family and social backgrounds.

This basic conviction, however, is far from being as optimistic as the opinions advanced by De Bono (1976)
or Bruner (1975) in some of their recent publications. As we shall show in detail in Part Two of this report, the variables that affect the problem are so numerous and so hard to identify, and many of the results – not all positive – are so relative and surprising, that the greatest caution will barely suffice when it comes to establishing intelligence development programmes in the day-to-day practice of education. Yet a psychologist as little inclined towards environmental approaches of this kind as Professor H.J. Eysenck agreed, in a private conversation a few days ago in Barcelona, that within the limits set in his view by IQ inheritability, the development of intellectual levels was a basically proven reality, although there were problems of theoretical interpretation and practical implementation which restricted its effectiveness to around 20 per cent of the variance measured by intelligence tests.

So, taken overall, we emphasise that the balance of the mission is basically positive. Intelligence and the specific cognitive processes which make it up are capable of being improved to a certain extent, i.e. within moderate limits set by heredity and the family and sociocultural background but also by the relatively imperfect state of the methods as yet to hand. The thesis that intelligence can be improved in some way by educational psychology methods was
confirmed, in our view, by the information obtained at the various centres that we visited. This conclusion can be taken as correct. Nevertheless, the insufficient scientific knowledge that we have on the subject today, and the unpredictable nature of quite a lot of empirical results, argue for the utmost caution in establishing programmes and above all demand that research should continue and that our current knowledge should be brought together. A mass of knowledge is indeed available, but it is scattered widely, varies much in quality, contains results that do not all hold together, and of course is written in extremely diverse scientific language.

In spite of all the difficulties, what has been achieved so far and the incalculable consequences of what could be achieved if current programmes were somewhat more perfected merit a further effort by the scientific and educational communities involved in the development of human intelligence. That is the position of the majority of the specialists whom we consulted.
Part Two: The State of the Question

After outlining the positions of the centres that we visited and mentioning some of their research, ideas and opinions on the question, we consider it appropriate to analyse the problems from a more systematic and technical standpoint. Here we shall endeavour to deal as thoroughly as possible with those aspects that we consider essential for putting the various programmes into practice. We accordingly define the most solidly established facts in the area of intelligence development, analyse the main types of programmes, and seek to evaluate their effectiveness and the factors which, in principle, may determine it.

12. The fundamental facts. A number of facts are, in our opinion, fundamental to this project, and our report must seek to establish them clearly.

In the first place, human intelligence is improvable or, put in other terms, is capable of being stimulated and developed scientifically. This blunt assertion does not reflect a mere possibility; it is based on facts verified time and again by independent researchers who have operated in very varied populations and circumstances over more than a quarter of a century. Justifying it in detail clearly goes beyond the scope of this report, in which we confine ourselves to referring the reader to a brief list of publications that nonetheless are representative of opinion gaining ever more ground among experts (Halsey, 1980; Klauer, 1975; Osterrieth, De Coster et al., 1977).
In the second place, methods of stimulating the development of intelligence are heterogeneous and imperfectly defined, and their results are not always predictable and as a rule are moderate. This means that although the perfectibility of human intelligence has been broadly proved the problem is so complex, and our knowledge still so inadequate, that any "ameliorist" optimism is premature at present. The existing criticism of compensatory education and programmes of cognitive stimulation is frequently based on real and undeniable flaws and negative results that have to be recognised. The same applies to IQ training.

Consequently, the basic optimism - justified by the fact that human intelligence is improvable - must be tempered with critical analysis of the theories and methods involved in the improvement process, which are still far from infallible. The pages that follow are an attempt to strike this balance.

13. The compensatory programmes. These programmes, whose origin can probably be traced back to Maria Montessori and Decroly, assume the existence of an early sociocultural handicap which is responsible for the intellectual and educational deficits that appear later on, and whose cumulative character may lead to irreversible inferiority in adulthood. The idea common to practically all preschool programmes, and central to compensatory education in particular, is that if
these disadvantaged children had the opportunity of participating early on in a richer cultural environment and were assisted by educational psychology methods that offset the initial deficits, they would be able to overcome these handicaps and join the ordinary school process quite normally. Once they had done so, these children would progress at the same pace as their "normal" companions, ultimately attaining the same level of occupational and social competence as the majority.

Of course, extensive criticism has been levelled at these programmes in the last ten or fifteen years, much of it quite severe. But the broad title of compensatory programmes has been used to cover extremely disparate projects which cannot simply be lumped together as one single entity to which all criticism applies indiscriminately. As Stanley's book pointed out nearly ten years back, in 1972, some of these programmes have consisted simply of putting children into nurseries, without any precise educational objectives. Other programmes, on the other hand, have involved social workers, child psychologists and medical assistance, as well as very diverse programmes of intervention in family life. Some have been child-centred, others have been learning-centred. Some have been non-specific and flexible, while others have had a rigid structure and highly specific aims. The programmes' duration, too, has varied as much as their nature, if not more:
some have run for years, and others have lasted only a few weeks. Parental collaboration has been sought on some occasions, and not on many others. Some project leaders have devoted considerable attention to training the teachers involved with the programme, while many more have given this point less attention, or have lacked the resources to do so. In some programmes the subjects were in early childhood, but others have covered children of primary school age, or even adolescents. Some teams have based their projects on Piagetian theories of development; by contrast, many others have based their work on a typically Skinnerian approach to learning psychology, and have operated with a psychometric concept of intelligence. The range of conception and implementation has been so vast, in fact, that it is somewhat crude to speak of compensatory education in the abstract and simply reject it as a whole.

The fact is that in recent years a number of writers - we may cite Beller, Darlington, De Coster, Gordon, Gray, Halsey, Hebar, Kagan, Klauser, Levenstein, Miller, Palmer, Wall and Weinkart among others - have undertaken a painstaking review of the results of a great many compensatory programmes, taking their particular features into account and employing more stringent methods of analysis than usual. Contrary to what one would expect if compensatory education were really as ineffective as has been asserted, the greater refinement of the methods of analysis has had a favourable impact on the assessments.
Halsey (1980), for example, has presented quite convincing proof that the reduction in school failures is greater than among children who took part in compensatory programmes with a sound experimental design than among children who took part in projects with a quasi-experimental design, while both types of compensatory programmes, experimental and quasi-experimental show a greater reduction in school failure than in the control groups that had not attended any project.

Again, Professor Richard B. Darlington of Cornell University has recently analysed the school records of over 1,500 children from disadvantaged families, and likewise found a significant difference in the school competence of those who had attended preschool programmes as against those who had not. With reference to the effect of such programmes on pupils' IQ Darlington confirmed earlier findings elsewhere, showing that increases in IQ observed immediately after programme attendance did in fact taper off appreciably three or four years later. On the other hand, this may in Darlington's view be taken as an argument in favour of the programmes, since if one year of preschool "enrichment" is capable of producing intellectual improvements that persist for three or four years, it may be supposed that twelve years of similar schooling may produce IQ increases with lifelong effects (Science, April 1980) (4).

(4) The argument is not necessarily correct, since intermittent programmes might prove more effective than unbroken ones.
In short, we consider that this type of analysis supports our two earlier assertions, viz. that human intelligence is improvable, and that at the same time the methods available in this field are still very uneven and imperfectly defined. Apart from this, a careful reading of some of the criticisms levelled at compensatory education shows them to be less radical than those who have popularised them make out. For instance, when Bernstein is cited - and he did state that we should stop thinking in terms of compensatory education - it is usually overlooked that at the same time he recommended, let it be noted, very serious and extremely systematic consideration of the conditions and context of the education environment (Bernstein, 1970). In the end, this is very similar to what Sarason (1978) suggested recently when he pointed out that compensatory education could be used as a gimmick for not improving education.

However this may be, what seems clear to us is that, properly conducted, compensatory education tends to promote a reduction in school failures and to improve pupils' intellectual levels, albeit in moderate and transient form. That is not as much as we should like, of course, but it is a good start and makes it worthwhile to proceed further.

Leaving this kind of overall evaluation of compensatory education to one side, we shall now endeavour to analyse in more detail some specific aspects of the development of intellectual skills in the strict sense.
14. The improvement of intelligence. Whatever their nature may be, the best estimate that we can obtain today of the individual differences in human intelligence is provided by intelligence tests. To put it one way, we normally refer to the findings of such tests in the last instance as an empirical check on the possible intellectual improvement of subjects who have attended compensatory or similar programmes. Admittedly, culture-free tests are an unattainable ideal if the expression is taken literally, and even the more modest aspiration of culture-fair tests is quite debatable. It is true that there is no means of entirely separating skill from performance, or intellectual capability from acquired knowledge. Equally, however, there is no denying that certain non-verbal tests with high factor 'g' saturation, or high saturation in other more specific mental factors, allow fairly accurate measurement of a type of convergent thinking, relatively independent of school performance. So our problem is to determine whether compensatory programmes or other methods of cognitive training are capable of influencing the intellectual level of subjects and, if so, how.

Of course, sound programmes as well as sound intelligence tests are needed if proper comparisons are to be made. Clearly, it is not yet possible to state unequivocally what constitutes a good programme, and it is not our purpose to put forward any "original" model to this end. For our purposes of evaluation
we simply take good programmes to be ones with a well-structured design, not just allowing accurate comparisons to be drawn between pre- and post-programme skill readings but providing information on the actual process of intellectual change, and also describing the content and methods of the programmes in detail and collating the relevant follow-up studies. In our opinion, analysing reports of this kind is the way to identify those aspects or elements of programmes which account for their success or failure.

More specifically, a careful study of some of the documents obtained during the mission suggests a series of observations that may perhaps serve to define, analytically, a well-grounded position on the subject of the improvement of intelligence.

(a) Recent studies (Hindley and Owen, 1978, 1979) have made it clear that between ages 3 and 17 individual IQs change considerably. 50 per cent of subjects show changes of 10 points or less, but the remainder show changes of over 10 points, and in 25 per cent of subjects the variations exceed 20 IQ points. Bearing in mind that these individual changes are extremely hard to predict, since one cannot even tell if they are going to be positive or negative, it is very hazardous to interpret IQ in terms of a hereditary structure that cannot be
altered by environment. Each individual's IQ can be altered at least partly by environmental changes (Clarke and Clarke, 1974). If the environment is unfavourable, IQ falls, and it improves when environmental conditions are favourable (Clark et al., 1958; Koluchova, 1976). On the other hand, there is evidence that a programme of continuous intervention can maintain a relatively high IQ level in socially disadvantaged children. In his monograph Intelligenztraining im Kindesalter, K.J.Klauer (1975) provides copious experimental evidence that confirms these points. As a result, the margin of intellectual variability that is not preset from birth and the sensitivity of IQ to environmental variations both argue for improvable intelligence. The debate is not about the possibility of improvement but about the specific nature of the actual conditions that can promote or hamper it, and about the character of the intellectual functions that we are seeking to change.

(b) In connection with the last point, more than half a century of factoral analysis has succeeded in defining certain components of intelligence which, at least at the level of surface structure, seem to be fairly consistent. Starting from this, which though not beyond argument has a far from insubstantial psychometric foundation, Klauer (1975) distinguished three different classes of effects in the "trainability" (Trainierbarkeit) of intelligence:
global effects on IQ (Niveaueffekte), differential effects on the components of IQ (Profiländerungen) and structural effects (Struktureffekte).

The global or level effects are the ones most clearly demonstrated. IQ can be altered by changes in cultural and educational environment, as we said earlier, or by a transfer process by which the learning and practice gained in tasks other than those required by the test have a positive influence in solving the items in the test, i.e. they transfer to the functions which the test measures.

Changes in an individual's intellectual profile, reflected in changes in performance in the various subtests (verbal, spatial, etc.) of an intelligence test, have been demonstrated less than changes in level; ultimately, however, this too has been proved in a great many programmes concerned with training specific processes. Paradoxically, changes in intellectual profile are not necessarily reflected in changes in level, since the sum of positive and negative effects in profile change may be, and often is, zero. As a result it is quite possible that programmes that apparently have failed to yield any effect owe their lack of success to the fact that only the overall results of the intelligence tests were analysed, not the profiles defined by the subtests.
Finally, it is clear that structural changes, which can be measured from the correlations between the various factorial scores in a test, may occur without either the level or the profile altering. All this to some extent accounts for the complex range of effects that may be obtained from compensatory programmes or training experiments. The unpredictability of results that undeniably afflicts these programmes is no doubt due largely, we believe, to our lack of knowledge about the real structure of intelligence, hence the importance of empirical discoveries such as the ones to which we have just referred. But the origin of this unpredictability probably lies also in other factors which interact with those mentioned above.

(c) The data of which we are aware show (Klauer, 1975; Osterrieth et al., 1977) that the results of intelligence improvement programmes have a rather low reliability factor, in the sense that they are unpredictable on a number of important points. At any rate, while the proportion of serious experiments which have proved successful is, overall, significantly higher than would be expected with random probability - for example, 31 out of 36 research projects reported by Klauer show an appreciable intellectual gain - the changes do not always occur where they were expected, or in the right direction. In some cases no significant changes are found in
the test results, either after completion of the programme or during it. In others the results are statistically significant but contrary to what was desired, that is, show a negative change; the scores in intelligence tests drop after the subjects have attended an intelligence training programme. In addition, training in one type of skills (e.g., verbal ones) results in an improvement in skills of another type (e.g., non-verbal ones). Klauer in fact stresses some interesting cross-effects, where linguistic-conceptual training raises scores in the area of non-verbal skills and improves IQ in execution tests ("Handlungs-IQ") while training related to spatial and numerical skills and comprehension of forms is reflected in verbal IQ but not in non-verbal IQ. The illustration below brings out clearly the paradox of these cross-effects, which apparently recur with some frequency and are not easy to account for.

![Diagram showing cross-effects between verbal and non-verbal IQs and training types](image)

Put in another way, the effects of intelligence training programmes are certainly somewhat unpredictable more often than is desirable. The outcome of training in operations which apparently belong to a given area of skills — for instance, learning new terms and rules of syntax — is an increase in non-verbal IQ in execution tests, while motor learning, or simply playing sport, is accompanied by an increase in verbal IQ.
The explanation for these paradoxical effects— and they are not confined to the ones we have mentioned—is no doubt far from clear. It does seem that the mental operations which the subject performs in solving the items of intelligence tests, a spatial subtest, for instance, are not the same as those he employs in practice and training in this area. The same problems are tackled using different skills or methods in the test qua test and the test qua practice. However, this interesting theory clearly does not suffice to account for the surprising effects that are found in the field of intelligence development.

Klauer, indeed, with his very constructive attitude towards programmes of intelligence training, nonetheless acknowledges that undisputably positive effects, that is effects whose statistical significance has been adequately demonstrated, occur less frequently than would be expected if the process were properly mastered, and that results are somewhat unpredictable and the impact quantitatively moderate. Specifically, this means that the standard gains fluctuate between 0.20 and 0.40 z or, putting the question in other terms, that for a test with a mean of 100 and a typical deviation of 15 the gains usually range between 5 and 10 points when all goes well (5). Adding in the fact that

(5) More spectacular increases do occur, of course, but infrequently. Cf. the classic monograph by Skeels (1966).
these gains usually disappear over the summer holidays, though on occasion they may persist for several years, it can be seen that the experts' pleas for caution, or for moderate and realistic optimism, are justified.

These observations suggest, in short, that the problem is still far from being mastered, and that the basic variables on which improvements in intellectual capability depend are still not known or controlled satisfactorily. In any case, many other variables interfere with, or modulate, these basic variables, and it seems appropriate to consider some of them, briefly at least.

15. The variants in the problem. There are of course far more variants than we shall examine here, but some of the foremost do call for comment.

In the first place, the very notion of intelligence "training" has to be distinguished from simple "coaching" or practice in intelligence tests. Coaching teaches subjects to solve given tests, or classes of more or less typical tests, which naturally are dealt with more successfully afterwards. But the gains achieved through practice of this kind are highly specific, that is to say they are improvements in particular skills and not improvements in capabilities or aptitudes, and they do not correspond to the concept of deep transfer that is expected of programmes to train — in the
proper sense - intellectual capabilities. Intelligence training programmes do not teach subjects to solve certain given problems but rather to master the mental operations through which much more extensive areas of problems can be tackled. In other words, they seek a more widespread effect based on the development of problem-solving skills or the cognitive processes involved in problem-solving activities. This is the distinction that Klauer (1975) makes with the expressions 'trivial transfer', simple practice with the typical items in a class of tests, and 'deep or non-trivial transfer', which may perhaps be termed 'learning to solve'.

Intelligence training programmes are of course different from cognitive stimulation programmes, but as we shall be dealing with this distinction further on we will not go into it here. It may be suggested that stimulation programmes are more comprehensive, and at the same time less specific, than training programmes, and consequently incorporate motivational, interpersonal and cultural aspects which are given less attention in training.

The method variable clearly has numerous significant variants. Since the time allowed for training is limited, a small number of specific operations have to be selected for the programme. For instance, in the 1970-1973 compensatory programme run in Ghent the exercises concentrated fundamentally on two areas, one perceptual-motor and the other linguistic-cognitive. Five classes
of skills were chosen in the perceptual-motor area, eight classes of activities in the linguistic field, and five in the cognitive field. This gave a total of eighteen quite specific activities which were assumed to provide reasonable coverage of the basic processes and skills involved in the development of intelligence (Osterrieth et al., 1977).

However, the problem lies in the fact that this assumption is theoretically questionable - other activities could have been chosen with similar justification - and that in practice the gains observed in the post-tests, after two training courses of 15 or 20 weeks' practice per course, are extremely modest when set against the control groups. The case, we have to repeat, is that the variables basically responsible for mental activity, insofar as we are dealing with definite variables and not aggregated structures or sets (6), are not well known, or are not adequately reflected in the specific activities that the training may cover, or else their action is modulated by other extremely diverse variables and parameters which probably introduce a large number of variants into the problem. The following variables which may modulate the process may be cited by way of example:

(6) By this we do not mean to assert that the case for structures is now made, merely that they constitute another reasonable alternative.
(i) **The age of the subjects.** Independent of whether Bloom's classic estimate is entirely correct, i.e. regardless of whether 80 per cent of IQ variance has crystallised by the age of 8, early training does seem more likely to be effective than training at a later age. Yet in the Ghent programme mentioned above, which was started when the children were aged 4, the effects were minimal. The reason is not known; perhaps other different factors came into play and interfered with the training.

(ii) **The previous intellectual level of the subjects.** Here again the results are somewhat disconcerting. It would be reasonable to suppose that when the programmes have a cognitive bias the outcome will be "the more you have the more you get", whereas when the processes involved are eminently associative, i.e. with training strictly based on repetition and reinforcement, the outcome will be "to each according to his needs". That is what Professor Klauer thinks, and I believe that Professor Matuchkin would also agree. In any case, this important point has yet to be clarified, so far as we know. Those whose need is greatest do not always improve, and on the other hand the most gifted do not show more improvement; it depends.
(iii) The degree of sociocultural disadvantage. In principle, the most disadvantaged subjects seem the ones who ought to benefit most from programmes to improve intelligence. In practice, raising the IQ of subjects already living in a favourable environment is usually more difficult than raising the IQ of disadvantaged children. However, improvement with disadvantaged subjects raises complications of various kinds. The first is that excessive impoverishment of the environment can produce deficits that are irreversible or very largely so. A further complication comes from the fact that, since the significant variables in the environment are not clearly known, as far as their value as intellectual stimuli is concerned, the interaction between the sociocultural, economic and family context on the one hand, and the various dimensions of intelligence on the other, are hard to determine.

(iv) Environment and family. The human context is so complicated and relative in reality that scientific definition of it, and any experimental control, is still extremely defective. Much the same applies to the family unit, which is not confined to being a mere reflection of the social class or economic group to which it apparently belongs. This means that the ways in which environment and family may exert
influence on intellectual development - and we do not know very much about the latter's structure either - are still far from clear. In these circumstances it is not surprising that programmes designed to speed up or enhance development in this area at times throw up incomprehensible results.

(v) Experimental effects. Twenty years of social psychology relating to experiments in the human sciences ought to have prepared us to see that the personalities and attitudes of the teaching staff on the programmes, the "demand characteristics" of the subject group, the settings and countless other similar factors are bound to influence the results of intellectual improvement schemes in many ways, both obvious and hidden. To take an example, the lack of satisfactory results from some of the compensatory programmes in Ghent seems to have been largely attributable to a lack of motivation among the teachers in charge of the training.

(vi) Other effects. Of the numberless factors which may presumably affect programmes to enhance educational performance and intelligence, the following at least must be singled out: quantity and quality of practice (number of hours, type of practice, distribution over time,
timetable, curriculum in which it is included), motivation of subjects and teaching staff, types of reinforcement, methods and criteria for evaluating the results, both immediate and longer-term, or the gains, if any, which are obtained during and after the programme, and of course the nature of the activities which the programme covers. Regarding these activities, the hereditary component is smaller with verbal skills, which are consequently most open to change; at the same time they are the least culture-free of all. Apart from verbal skills, the ones most often selected for training are logical and mathematical reasoning, spatial and perceptual-motor factors, imagination and memory. But the effects of this training - generally modest and transitory - frequently transfer from one area of skills to another, for reasons that are poorly understood as yet. The new cognitive movements, at Berkeley for instance, believe this to be because conventional mental tests operate with intellectual performance and not with processes. At all events, the situation is still rather confused (7).

(7) Typically trainable operations are learning rules of syntax or morphology, classifications, causal relations, contradictions, and problem solving in the broad sense, an area which links up with the more Gestalt approach of cognitive stimulation.
16. The validity of the programmes. Despite all these unsolved questions, there is no reason for conclusions to be negative. The weight of evidence points clearly to a fairly tentative stage at which the effects are usually moderate. Our purpose now is to examine the matter somewhat more closely, insofar as we can, and determine whether in spite of everything we can speak of validity.

We have stressed several times that the effects of training programmes are not very predictable. Put in numerical terms, this statement means that the percentage of training experiments or programmes which achieve significant results in the direction expected is not normally as much as 50 per cent. In fact, in a series of 36 experiments conducted by Klauer (op. cit., p. 159) only 11 yielded statistically significant results. Admittedly, the fact that one-third of the experiments were significant indicates more than just random operation; but the fact that two-thirds failed to reach a sufficient degree of statistical significance also indicates a considerable level of uncertainty in the methods and theories through which the problem is being tackled. Reviewing the trainability of psycholinguistic abilities, Hammill and Larsen (1974) focused on the Illinois Test of Psycholinguistic Abilities and analysed the results of 38 relevant research projects. Even though the training managed to improve the various skills
measured by the test in many cases, the proportion of successes still did not reach .50, the level which the writers took as the yardstick of reliable effectiveness.

This was the kind of data to which we were referring when we said that the results of intelligence improvement programmes were unpredictable, also bearing in mind that the effects of compensatory education do not seem to meet reasonable requirements for practical action that will be successful in at least 50 per cent of cases. Obviously, the fact that a significant proportion of cases demonstrate that intelligence can in some measure be enhanced proves that the operation is feasible. The fact that the programmes fail in a higher proportion of cases also proves that many problems have still to be settled and perhaps that these programmes are as yet at an experimental stage. In principle, their validity has been proved. But it would be premature to apply them throughout the education system.

17. Cognitive stimulation. So far we have looked chiefly at structured compensatory programmes and at training programmes which are sometimes part of compensatory education and are sometimes run separately. But our report has referred at several points to another type of programme, based on concepts of educational psychology.
which differ from earlier programmes in a number of important ways (8).

This new orientation - of which the current Belgian experiments form a striking example - does not assume that the whole burden of education deficits has to be laid at the door of environment and family, or of the pupil's individual weaknesses. It is also thought that the school itself may be implicated, and attempts are accordingly being made to renew education, instead of just "enriching" the environment and "compensating" the defects that it produces. Quite conceivably, not every society is in a position to shoulder such an ambitious project; but the idea, shared in various ways by other modern educators and psychologists, really deserves careful consideration.

In the second place this type of programme, which seems to be spreading across Europe and forming a sort of second generation of projects to enhance intelligence, postulates that the path of intellectual development runs unfailingly via a series of predetermined stages more or less as described by Piaget. In this conception, processes rank above content, reflection above reflex, comprehension above simple extrinsically reinforced practice, and overall structures above isolated components. In

(8) By earlier programmes we mean those of the Headstart generation, based on the ideas of handicap, compensation and training and of relatively short duration.
addition, it is obvious that the orthogenetic nature of cognitive development postulated in this fresh alternative hardly lends itself to attempts to change its true course by means of extrinsic actions, i.e. it does not square with inorganic outside control of the process but does marry quite well with what we may term stimulation or organic encouragement of the cognitive steps which make up the ontogeny of intelligence. In this conception, which needless to say is environmental but not environmentalist, intellectual development may be stimulated or even somewhat speeded up, but not controlled as if it were simply a set of superadded habits (Bundersohn, 1967). Roughly, it is more a question of assisting nature, if this expression may be allowed, than of forcing it.

To paraphrase Bacon's maxim, Intelligentia parendo vicitur might be taken as the motto of this orientation: intelligence is mastered by obeying its laws. And foremost among these laws, no doubt, is the requirement for totalisation, i.e. integrating the maximum relationships in the minimum structures.

Looking at it in another way, this means adopting or at least approaching a Gestalt rather than associationist standpoint; it means giving preference to programmes which organically stimulate the whole of intellectual life rather than seeking
to change intelligence part by part. As opposed to what may be termed piecemeal development ("le développement en miettes"), the aim here is full development of mental life as a whole, which of course includes the desire for knowledge, pure cognitive motivation. The most suitable means of achieving this aim is taken to be placing pupils, from early childhood, in a sociocultural, family and - let us not forget - educational climate that facilitates dialogue, collaborative learning, reflection and personal initiative, makes the individual aware of himself as an agent (instead of reducing him to an agential state), extends the scope of his social and intellectual relations, stimulates his cognitive motivation and critical sense, and ultimately brings him to a level of personal plenitude in which he gives of himself all that his capability and historical situation allow.

Lastly, it should be noted that these programmes of overall cognitive stimulation differ from earlier compensatory education not just in seeking to make compensation superfluous through a renewal of education itself and schools, and in starting from an orthogenetic and totalist conception of mental development that is opposed to the mechanicism of the associationists; they also differ in including a critical awareness of the final object of intelligence
as a definitive ingredient of the individual's cognitive plenitude, and this awareness can only be aroused by stimulating to the utmost the individual's relations with the environment of which he forms an active part. This inclusion of the wherefor of intellectual development at the very heart of overall cognitive stimulation is a further, highly distinctive and praiseworthy, differential aspect of the new generation of projects. This is so quite apart from obvious social and ethical reasons, because unless this aspect is included the intrinsic cognitive motivation for development is very greatly diminished. In addition, it is clear that scientific confirmation of the results is far less concrete and immediate in these long-term programmes with overall objectives than in short-term specific training.

Generally speaking, this seems to be the model of programmes or actions that is tending to prevail in Europe: in Belgium above all, in Switzerland as well, and in the Soviet Union in their way, judging from what we learnt during the mission. This orientation of course presupposes that considerable socioeconomic and cultural resources are available, and it cannot be carried through without the assistance of teachers of a high standard and support from the whole education
system and families. The aims of this alternative cover a longer span than those of the specific programmes, and they are also vaguer and more difficult to evaluate. The methods are also more flexible, and hence less stringent or rigorous than those, let us say, of a training programme for linguistic ability. But in the world of human development too much rigour may end in rigor mortis. When the time comes for decisions to be made, perhaps this should be taken into account as well.
Conclusions and Suggestions

18. **Intelligence can and should be improved.** It is a solidly established fact that human intelligence can improve, or deteriorate, depending on the socio-economic, cultural, family and education context in which individuals grow up. In a gloss on Ortega, we can say that intelligence is itself and its circumstances, and if the latter are not overcome deterioration occurs. On the other hand, an improvement in the conditions of intellectual development is reflected in an improvement in intelligence. In short, human intelligence is improvable; it can, and hence should, be improved.

19. **The methods of enhancement are still imperfect.** Very varied means are used to promote this improvement, and they are - again it is well proven - far from infallible. Failures still outnumber successes, even with reasonable precautions when planning and carrying out the programmes. We consequently feel caution, not premature optimism, is the proper attitude. Although recent studies are to some degree rehabilitating the serious compensatory programmes from the first generation of projects and training programmes focusing on particular skills have shown themselves to be relatively effective, results are still too unpredictable, moderate and transitory, as a rule, to think of extending these programmes widely and making them part of ordinary education practice. The scientific risk, and the economic and human cost, would probably be too high. In such circumstances the operation might turn against itself, and destroy possibilities which we would not hesitate to describe as promising.
20. **Programmes have proved more effective in reducing education deficits than in increasing IQ.** Compensatory programmes have largely switched towards countering the socioeconomic and cultural deprivation of lower-class children of preschool age (though they have been applied to primary school pupils as well) without taking much account of the possibility that the school itself may need "compensation". The fullest programmes have also included training in particular skills and used methods of education catch-up. The most effective results have been achieved in this last area. Gains in IQ or particular skills, when they occur, tend to disappear after a few months, generally during the summer vacation, although there are noteworthy exceptions where improvements have persisted for years. Negative results also appear occasionally. Training programmes covering specific abilities and skills share all these features.

21. **Less than 50 per cent of programmes effectively enhance levels of intelligence.** The proportion of intelligence improvement programmes where the results are statistically significant seems, by and large, to be under 50 per cent. The estimates that we have seen are in the range of one-third of all programmes, though quite a lot more results approach significance. The use of small samples may have made it harder to obtain probabilities with a level of significance of 5 per cent or 1 per cent, as usually accepted in psychological experiments. On the other hand, virtually anything can be significant with large samples, so we prefer a conservative stance and hold to the view that only a moderate proportion of the programmes have in fact achieved significant success to date.
22. **Reasons which may account for these findings.** In our opinion, the reasons why the projects are only moderately effective lie largely in the still imperfect state of the programmes. The relatively small and short-lived gains that are observed in the post-tests - after allowing for improvement due to greater maturity or further schooling - can be explained less satisfactorily by statistical factors, whose importance we do not discount, than by the scant causal influence that the experimental variables probably exert on the process of intellectual development. To judge from the bulk of the results obtained to date, the specific training methods - and still more the non-specific ones - have failed with any great degree of effectiveness to reach their respective dependent variables, i.e. IQ or the factors gauged by intelligence subtests. Whether because of this, or because maturity carries great weight in the development of intelligence, or for whatever other reason, the fact is that the fundamental dependence between the supposedly meliorative variables and the scores in intelligence tests is still slight and subject to many exceptions. It has yet to be convincingly shown whether this state of affairs is due to the imperfect state of the methods or to the lack of any direct relation between the variables operated upon and intelligence, or because the process of intellectual development is unamenable to change. However this may be, the case is that gains are indeed achieved but they are as a rule modest, liable to disappear, unpredictable and expensive.
23. **Improvement of psychometric intelligence and fuller use of individual gifts.** In any case, none of this is sufficient to recommend abandoning such a valuable quest. Paris was worth a mass, and so is human intelligence. Gaining ten or so IQ points can be decisive for a child's future. Whether psychometric intelligence improves or not, involvement in a stimulating educational and family atmosphere will in itself lead the child to make fuller use of his or her intelligence. Now, making better use of intelligence is undoubtedly another way — by no means to be scorned — of being more intelligent.

The new education now taking shape in some European countries seems to have opted for this path, after having experimented with the training and compensatory programmes of the early days. Ultimately, however, we may have to pick and choose, and perhaps to make suitable use of the most efficient components of the variety of alternatives that have been tried to date. But a fresh impetus will be needed to launch such an undertaking, and our closing suggestions are concerned with this.

24. **A seminar of specialists to draw up plans for a study centre on the development of intelligence.** Quite obviously, information bearing directly or indirectly on the enhancement of intelligence is available in great quantity. But the standard and results of this research are uneven; its aims are
multifarious; many of the findings are disparate and even contradictory; the methods, experimental designs and conditions of application are highly varied; and it is expressed in diverse theoretical language, sometimes to hard to reconcile. To cap it all, it is scattered among the most various publications and papers.

Accordingly, the first step in bringing some order and clarity to the field concerns information. An information centre appears to be needed, to collect and classify the body of research and then submit it to the most minute and objective scientific analysis. Of these two functions the second would be more complex, and would call for high-level specialists in education, psychology and sociology. A Foundation sponsored by the Venezuelan Ministry for the Development of Intelligence and given technical assistance by UNESCO would be an ideal place to conduct this task. Quite possibly the co-operation of Venezuelan experts with specialists from other countries and the backing of a world organisation such as UNESCO might also help to overcome the natural opposition that, we venture to suppose, a scheme so revolutionary as this Ministry is bound to have aroused.

A Foundation of this kind, sheltered from political fluctuations, could perform an extremely important function in clarifying a problem that is as interesting as it is complex. A preliminary step in this direction would be for UNESCO to convene a
seminar of acknowledged specialists from a number
of countries, in order to evaluate the possibilities
which they see in intelligence development programmes
and, if they consider the project worthwhile, to
draw up guidelines for a centre of the kind we have
proposed. To conclude on this point, we wish to
report that all the centres we visited during the
mission were consulted on this subject, and indicated
their readiness to take part in a seminar on the
development of intelligence. We believe that Professors
Bresson and Reuchlin (Paris), Talysina and Matuchkin
(Moscow), Klauer (Federal Republic of Germany), De Coşter
(Ghent), Inhelder (Geneva), and Hindley and Versey (London)
would be particularly suitable people to launch the
organisation of a seminar of this kind.

25. Final conclusion. To close, the final conclusion
that we believe we have reached is that the improvement
of intelligence is inseparable from the development
of education. Methods of training designed to enhance
skills, processes or specific operations probably need
to be incorporated in an overall framework of cognitive
stimulation if the subjects are to benefit organically
and in a lasting manner. How these two dimensions of the
problem can be combined is a question that further
research alone can answer. In the meantime, promoting
a sort of action research that couples political
cautions with scientific boldness may be a reasonable
course at present.

Madrid, July 1980. José Luis Pinillos
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<td>Bernard van Leer Foundation</td>
<td>see Osterrieth et al.</td>
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Klauer, K.J.  


## ANNEX I

### Experts and Centres visited in Paris, 1 - 4 April 1980

<table>
<thead>
<tr>
<th>Day</th>
<th>Visited by and Place</th>
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| Tuesday, April 1 | Professor Bresson. Maison des Sciences de l'Homme.  
                 | Mr. Treffel. Direction Générale de la Programmation et de la Coordination, Ministry of Education. |
| Wednesday, April 2 | Mr. Bacquet. Institut National d'Etudes du Travail et d'Orientaion Professionnelle (INETOP).  
                     | Mrs. Demangeon. Research Service, INETOP. |
| Thursday, April 3 | Mrs. Levasseur and Mr. Vignaud. Service des Etudes Informatiques et Statistiques, Ministry of Education. |
| Friday, April 4  | Mr. J. Saur. Centre National d'Art et de Culture Georges Pompidou. |

N.B. The proposed visit to the Association pour la Formation Professionnelle des Adultes in Montreuil did not take place because the subjects for discussion were considerably removed from our particular aims.
Experts and Centres visited in Moscow, 8 - 10 April 1980

Tuesday, April 8
Mr. Tchetverikov. Director of the Research Institute for Higher Education Problems.
Mr. Matuchkin. Head of the Psychology Section at the Institute.

Wednesday, April 9
Mr. Monakhov, Deputy Director of the Research Institute for Education Content and Methods, and Mrs. Sokolova.
Mr. Davidov. Director of the Institute for Psychological Research of the Academy of Pedagogic Science.

Thursday, April 10
Mr. Sleptsov. Vice-Rector of the Energy Institute.
Mr. Bodalev, Dean of the Psychology Faculty, and Mrs. Talysina, Associate Professor in the Faculty.

N.B. Our guide and interpreter was Mr. Vassily Kachtanov, Researcher in the Institute for Higher Education Problems.
ANNEX III

Experts and Centres visited in Federal Germany, 14 - 16 April

Monday, 14 April  Dr. Kessler, Deputy Secretary-General of the Research Institute on Intelligence Testing, together with other specialists.

Tuesday, 15 April  Dr. Kraft and Dr. Mair, Respectively Director of the Institute for International Solidarity and Director of the Institute for the Promotion of Skilled Personnel, in the Adenauer Foundation.

Wednesday, 16 April  Visit to Dr. Rüppell, Director of the Department of Developmental Psychology, Bonn University.

Dr. K.J. Klauer, Faculty of Education, Aachen University.

N.B. We were accompanied by Dr. Rissom, from the German Delegation to UNESCO, and by an interpreter.
ANNEX IV

Experts and Centres visited in Ghent, 17 - 19 April 1980

Thursday, 17 April  Professor Verhofstadt, and visit to the crèche for children of Ghent University staff.

Interview and luncheon with the Dean of the Faculty of Psychology and Education Science, Professor De Bock.

City of Ghent Education Centre.
Interview with Professor De Meyer.

Friday, 18 April  Professor Verbist. Director of the Laboratory of Experimental Psychology and Education.

Professor De Block. Director of the Laboratory of Didactics.

Professor Heene. Study of pupils' attitudes.

Saturday, 20 April  Professor W. De Coster. Director of the Laboratory of Experimental, Differential and Developmental Psychology.
ANNEX V

Experts and Centres visited in Geneva, 22 - 24 April 1980

Tuesday, 22 April
Mr. G. Metraux. Director of the Centre for Educational Psychology Research for the Orientation Cycle, Geneva.

Wednesday, 23 April
Mr. Metraux. Continuation of our interviews at the Centre, with a visit to an experimental school attached to it. We had discussions with various experts at the Centre, including Mr. Walter Lehman and Mrs. Anca-Lucia Schapira.

Thursday, 24 April
Mrs. Barbel Inhelder. Professor in the Faculty of Psychology and Education Science, Geneva University.

N.B. The proposed visit to Mrs. Anne-Nelly Perret-Clemont, in Neuchâtel, did not take place because the subjects for discussion were considerably removed from our particular aims.
ANNEX VI

Experts and Centres visited in London, 28 - 30 April 1980

Monday, 28 April
Professor John Versey and Professor Norman Worall, of the University of London Education Institute.
Dr. Phil Salmon, Lecturer in Child Development at the Institute.
Professor Colin Hindley, Director of the Child Development Department at the Institute.

Tuesday, 29 April
Dr. Peter Moss of the Thomas Coram Research Unit associated with the Institute.

Wednesday, 30 April
Professor Hazel Francis and Professor Klaus Wedell. Both members of the Institute.