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Foreword

The International Children's Centre is very happy to have sponsored an international study on the growth and development of the child of which this book sets forth the principles and the methods.

In his preface F. FALKNER relates in a charming way the fortunate encounter which conferred an international character upon the investigation begun in Great Britain by A. MONCRIEFF and entrusted to F. FALKNER himself. Under the auspices of his master, F. FALKNER was the inspirator and remained the organizer of the whole enterprise; the latter, while preserving the aspect of a family concern, evoked with a delightful sense of humour by F. FALKNER, developed to surprising proportions. On behalf of the Executive Board of the International Children's Centre, I wish to thank all the collaborators of this international scheme for their valuable participation.

This collective study illustrates certain characteristics of contemporary medical work, a point upon which I should like to elaborate.

We are becoming aware that all our basic knowledge on the simplest, the most obvious facts, so fundamental that we no longer notice them, need to be revised. The growth and development of the child, the phenomena of sexual activity or of senescence, to take three typical examples, have now been submitted to very extensive investigations. From the outset we note once more the need for the Cartesian rule to admit no thing as true unless and until it has been demonstrated and measured, and then we realize that to throw even a feeble light on these dark fields the techniques of modern biology must be resorted to. These techniques are necessarily founded on mathematics, which used by statisticians, introduce insight into evaluations based on figures. The appraisal of biological facts further requires the recourse to genetics, psychology, economy and sociology. It might be said that the measure of the muscular volume of the child means nothing if one does not know his heredity, his soul, his nutrition, his way of life, his environment.

For each being, a unique specimen of humanity, the influence exerted by genetics and environment must be determined. Such is one of the philosophical aspects of the problem which we have been trying to solve. Thus, the laws and the rules – however relative – must be accepted and consequently it must be sought to establish them more soundly.

The physician who is concerned with morbid causes and effects, the economist who tries to direct the food policy, and the statesman who seeks to influence social life must start from standards. The establishment of certain standards is the very purpose of the present piece of work. Standards alone make it possible to compare the past, the present and the future as well as the different aspects of the same phenomenon in the different societies of the earth.

Thus the work devoted to the study which will be discussed in the following pages will help no doubt, to a modest extent, to improve the knowledge, a little deeper every day, that we acquire of the human species, it will favour the tendency of nations to compare their own children with those of other peoples, it will stimulate in each country the efforts on behalf of childhood and will perhaps encourage development in this field of international assistance.

In closing I wish to come back to the opening lines of this brief note and pay a personal tribute of gratitude to my eminent colleague and friend Professor ALAN MONCRIEFF and to our distinguished collaborator and friend F. FALKNER both of whom have started and developed our common enterprise.

Professor ROBERT DEBRÉ

Preface

> . . . "Studies on growth should – like growth itself – be fully international in scope".
>
> STANLEY M. GARN.

Little did one think at Windermere in 1952 during a meeting of the British Paediatric Association that today there would be grouped eight coordinated international studies on growth and development of children. Professor ROBERT DEBRÉ was present as a distinguished lecturer, and after hearing of a growth study in progress in London, he was interested in extending this work to Paris. Professor ALAN MONCRIEFF, instigator of the London study, made a trio with the writer and there was born the idea of a second study in Paris to run on exactly parallel lines to the London investigations.

On reading the chapters which follow, the progress of the snowball will be gathered. How would it be possible to weld progressively eight separate groups into a state of agreement on principles involved? To think that the various disciplines represented would ever actually agree and plan common veins of investigation? To surmount the language barrier as just one obstacle? How indeed has it been done and is continuing to be done? The main answer is that information on growth itself in the countries represented is needed badly–hence the constant stimulation. Next the spirit of competition: surely it is admirable in a large group to want your team to have the highest standard? But most of all because there appears to have been born over these last six years a family. The family consists of the teams carrying out the work. We have grown to know each other well and to look forward eagerly to our family reunions. It is a virile family and a happy one and everyone in it right from the start has been incredibly hard working, loyal, stimulating, truly friendly and yet have never lost their individuality. It would be a dull family indeed that did not have fights

inside it–ours has them and as with all the *best* families, when they are quickly over, friendships are better and a still higher standard emerges.

It is clearly not possible to list the very many people who have helped (a hopelessly inadequate word) us; but in the name of the teams they are most gratefully thanked. I do wish, personally, to single out for special gratitude Professor ROBERT DEBRÉ for his foresight, encouragement, wisdom and constant warm welcomes in his beautiful City; to my one-time "chief", Professor ALAN MONCRIEFF for so many things, but his stimulation, constant encouragement, faith, and friendship are the most valuable; to Professor GUIDO FANCONI, Professor MARCEL GRAFFAR, Professor ARVID WALLGREN, and Dr. HENNING ANDERSEN for receiving me in their Universities with such interest and warmth in that chronological order; to, first, Dr. MAURICE GAUD, and subsequently Dr. ETIENNE BERTHET, as Director-Generals of the International Children's Centre, who have placed its resources and reputation behind us; to the Council of the International Children's Centre for its faith, constant approval and help; to my friend Madame le Dr. MARIE PAULE PERNOT-ROY with whom the first *Section-Croissance* outside London was built and who laboriously taught a difficult pupil her beautiful language; to my friend Madame le Dr. NATHALIE MASSE, surely the epitome of "best friend of the family" – we could have no better; to my friends Dr. J. M. TANNER for never ceasing help and constructive criticism, and Dr. STANLEY M. GARN for advice, stimulation and great humour; and finally to the members of the teams themselves who have made the task of "co-ordination" easy and – fun: there is no other word for it. But most of all for their friendships – reward enough without our hope of useful knowledge and work achieved.

The contributors to this book are warmly thanked for their painstaking efforts, labours, patience and help. Much gratitude is due to my staff at the Child Development Unit, Miss ELIZABETH FERREL, Mrs. NANCY SINGLETON and Mr. RICHARD WESTLAND, who have helped in the preparation in countless ways and borne my bear-like exterior in the final days of preparation with stoicism, amusement and warmth. Finally to the Publisher for incredible tolerance, help and guidance.

FRANK FALKNER
Louisville, Kentucky
October, 1958.

Contents

Appendix

Falkner, F.: Mod Probl. Paediat. 5, 1—4 (Karger, Basel/New York 1960).

CHAPTER I

The History and Conception of the Co-Ordinated Studies

By FRANK FALKNER

In 1951 the very great majority of work from studies of human growth and development emanated from the United States. Longitudinal studies were indeed sparse in Europe and Asia. There were the excellent Aberdeen anthropometric study (Low, 1952) carried out between the years 1923–1927; the Oxford Child Health Survey (e.g. ACHESON et al., 1955); and the comprehensive Harpenden Growth Study (TANNER, 1955). The University of London's Institutes of Child Health, and Education, decided at this time to instigate a multi-disciplinary longitudinal growth study from birth to maturity on a group of London children. This was started in 1951 (MOORE, HINDLEY AND FALKNER, 1954).

The International Children's Centre in Paris decided through its council to start in 1953 a similar study in that city. The author spent that year in France and with French colleagues started the Parisian investigations. At that time it was possible only to study the physical growth of the child and in this respect, together with information on the social background of the child, the London methods and data collection were exactly followed and close liaison maintained. At the end of this year the lack of psychological investigation was realized to be a great misfortune and support was found to supply the means for stopping this gap. The two studies were then completely co-ordinated.

Other European and African Centres next cast interested eyes towards this phenomenon; in a swiftly passing moment of alarm the author pictured himself spending his future days helping to

start growth studies in the capitals of the world. Alarm because it was not clear at all to him whether indeed they were the right type of study either as they stood, or for extension to other countries.

The time had clearly come for discussion and planning between interested countries. After a great deal of visiting and work, in 1954 the first conference was held in Paris. Teams from Zurich, Brussels, Stockholm, Dakar and Kampala (in order of subsequent starting their studies) joined the London and Paris teams who were already engaged in their co-ordinated investigations. This important meeting launched the whole concept of the co-ordinated studies as they stand today. They have been joined by the youngest member, Louisville, U.S.A., to form the present eight studies.

One cardinal principle was stressed at the outset: Certain centres wished to investigate growth and development in their locale. If in doing so a common *base-line of investigations* could be agreed upon with other groups, then clearly truly comparable international data would accrue. This seemed a golden opportunity and one too precious to miss. All studies agreeing to coordinate themselves with others in the group were to remain completely individual and be under no direction whatever from any "central organisation"*. They were, and are entirely free to investigate what they wish and how they wish, but the group has undertaken to form this common base-line; whatever else individual teams do, all are agreed to follow the base-line whenever it is possible.

Clearly the base-line in all the disciplines involved had to be devised, not only to decide upon what data to collect, but by what *method* it should be collected. The International Children's Centre performs the invaluable service of sponsoring the obviously vital regular meetings of the teams when one will constantly renew, polish, discuss and modify the base-line, and compare data and techniques and discuss all aspects of the fields of research. The four meetings which have been held to date are described in Appendix iii. It is the habit of the Centre to invite certain experts to attend these meetings to advise and offer criticisms. As an instance, a biometrist is always considered to be most welcome and necessary.

All the projects (except Louisville) are basically multi-disciplinary birth to maturity studies upon unrelated children. (The Louis-

* All the studies are indeed financially independent although the International Children's Centre has given generous support to most studies mainly to help them start.

ville study is in fact a developmental genetic study and the samples consist of twins. Twins of all ages are followed by several overlapping runs; and a second project will follow twins ante-natally and then for the first five years of life. Thus although the orientation is different a very large part of the base-line is followed.) The main aim of the whole co-ordinated research is to produce (of course in addition to the individual groups own local research) timely, reliable truly comparable data on many diverse problems of growth and development. It was realised from the outset that since the international samples vary so very widely in many factors, direct comparisons would be rarely possible and probably undesirable. But comparisons of factors and patterns occurring *within* the individual studies themselves, should produce valuable information, with special emphasis upon cultural, genetic, racial, geographical, and nutritional influences.

The presence of the two African studies is a source of constant interest and pleasure to the whole group. Here in particular there are abundant chances to study the factors listed above for obvious reasons.

Clearly to arrive at the common base-line not only required much work but much give and take. One very simple example will be quoted to show the type of problem arising, how it was dealt with and the sacrifice and understanding offered by one team. Concerning the psychological side of the research, the Stockholm team made a strong plea for interviewing and testing the children in their own homes, being geared for this work. This principle has many advantages to the parents in the samples and for the research–greater "attendance" for one important reason. But it also is objected to because the "situations" are not standard, and (here came the crux) although in Stockholm the housing situation is generally happy and spare rooms abound, the thought of trying to test a child in a crowded, happy, noisy, prolific Parisian three room appartment caused the French team (for one) to pale. The Stockholm team at once, in order to standardise the procedure and at clearly considerable inconvenience, agreed cheerfully and definitely to carry out all psychological work at the team's own headquarters and not in the home.

One facet of the work is often forgotten: the value of the co-ordinated research to the teams *themselves* is of inestimable value.

This education is brought to productive peaks at the semi-annual meetings of the teams already mentioned. If nothing else is accomplished (and may this be unthinkable!) it is certain all taking part would agree how very much they have benefited from the contacts we have all made. For the author's part, he is constantly amazed how little we know about growth and development of the human; and how much he has learned from the stimulating co-ordinated work and contacts. The future does seem full of high promise to fulfil in some measure what we all have set out to do, however mammoth the task.

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CHAPTER II

General Considerations

By COLIN B. HINDLEY

1. Introduction

Two methods of studying the growth and development of children may be differentiated. The *longitudinal* method involves the repeated observation and recording of particular aspects of the same children over a period of time, as they develop. The *cross-sectional* method involves investigating the characteristics of different groups of children at one or more ages. As it is becoming fashionable to conduct longitudinal studies, the words of SHUTTLEWORTH (1937), in his outstanding contribution to the longitudinal method, sound an appropriate note of caution:

"The importance of repeated measurements on the same children has been urged for so long and by so many as to become the first article of faith among students of child development. Nevertheless, the multitude of longitudinal studies which have yielded only cross-sectional findings suggest that this faith has been degenerating to the level of pure dogma."

It is the purpose of this chapter to examine some of the problems which arise in longitudinal studies, and to indicate, where possible, what appear to be the most useful solutions to them.

2. Previous Studies

It is not intended here to attempt to review all the previous work which has been done in this field. It should be noted, however, that the longitudinal approach to the study of children was first applied to single children. Thus DE MONTBEILLARD recorded the growth in height of his son, from soon after his birth in 1759 until

he reached the age of 18 years (SCAMMON, 1927). The first biographical study of child development referred to by MURPHY (1938), was that of TIEDMANN (1797). This was followed by others, noteworthy amongst which was that of SHINN (1893), which began with a detailed description of the behaviour of a new-born infant.

Indeed, with the extension of this method to the use of small groups of children, and the use of more or less standardized conditions of observation, very valuable contributions have been made, as by GESELL in his many studies of infant development.

However, the type of longitudinal enquiry which has most relevance to the C.I.E. Co-ordinated Growth Studies, is that in which a considerable number of children is studied over a period of years, by means of both physical and psychological assessments, with the application of statistical analysis to the results.

Such comprehensive researches have until recently been confined to the U.S.A., and TANNER (1947) has provided a comprehensive review of them. Of outstanding interest, because of the relative completeness of its data on nearly 1000 cases from 6 to 17 years, and because of its extremely valuable contribution towards improving the technique of analysis of longitudinal data, is the Harvard Growth Study. The main report of DEARBORN AND ROTHNEY (1941) was preceded by several by SHUTTLEWORTH. Of particular interest is his methodological contribution in his work of 1937.

3. Aims of the Co-operating Studies

These will be considered in more detail in succeeding chapters, but they may be summarized here:

(a) *Within Each Country:*

(i) To chart the course of physical and psychological * development of children, in terms of a number of important variables.

(ii) To obtain reasonably comprehensive life histories, which will be applicable to a considerable variety of problems.

(iii) To employ a sufficiently large sample to permit of statistical analysis.

(iv) To relate important features of development to other important variables, as for example, social background, size of family, parental methods, health, etc.

* In the case of Dakar and Kampala, the studies at the moment have only attempted to follow the physical "base-line", although some psychological studies are taking place.

(v) To study the inter-relationship of one feature of development with another, as for example of physique and health, behaviour problems and previous experience, intelligence and physical health, or of physique and behaviour.

(b) *Between Countries:*

(i) To determine to what extent the developmental process, and inter-relationships between variables, show similar or different features in different countries.

(ii) Where clear differences exist, to attempt to explore the possible reasons for them.

It will be seen from the succeeding chapters that interest has been specially focussed on a number of problems, but in view of the expense of longitudinal studies, and the fact that it is impossible to go back to collect data which has been missed, it is hoped that the data accumulated, will be applicable to more problems than the investigators concerned have been able to formulate with any precision. To many, this might appear an apalling confession to make, but it should be obvious that the possible number of inter-relationships which could be examined by this type of data, runs into at least millions.

4. The Value of Longitudinal Studies

Many aspects of child health, physique, intelligence and personality can be effectively studied by using children at particular ages, and where this is the case there is little point in conducting longitudinal studies.

When it is a question of studying the process of growth and development, however, the longitudinal approach is essential. The presentation of the average values for children of different ages, in a variable such as height, or intelligence scores, will throw no light on the course of growth in individual children. It is highly misleading to think in terms of the height of the "average child" at each age, and connecting these points, to assume that this mythical child could grow in this way. The average not only conceals irregularities of growth rates in individual children, but may also conceal or greatly distort, common trends, such as the "adolescent spurt", when these occur at different ages in different children (SHUTTLEWORTH, 1937).