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by
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SURVEY OF THE INCIDENCE OF SPEECH DEFECTS IN SOUTH-EAST QUEENSLAND

I. OUTLINE OF THE PROBLEM

1. Need for a Survey

(a) Definition of a Speech Defect

Speech can be described as communicative behaviour operating through the use of conventionalized and arbitrary acoustic symbols,[1] whereas a speech defect "refers to a deviation which at any moment is sufficiently extreme to attract attention to the process of speech, to interfere with communication, or to affect adversely either the speaker or the listener".[2] This definition excludes the immaturity found during normal speech development of children from the onset of speech to approximately the fifth year.[3]

(b) Reasons for Attempting to Eliminate Speech Defects

(i) As Queensland is a sparsely populated area where immigration underlines the need for full utilization of every individual, it seems relevant to investigate the extent and nature of speech disorders which might be interfering with function, physically or psychologically, as a prerequisite to treating them. No such survey has been attempted in Queensland previously. The possible relevance of surveys in other places will be discussed fully in section II.

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[1] C. T. Simon "The development of speech," in L. E. Travis (ed.), *Handbook of speech pathology* (London: Peter Owen Ltd., 1963).

[2] R. Millisen, "Incidence of speech disorders," in L. E. Travis (ed.), *Handbook of speech pathology* (London: Peter Owen Ltd., 1963).

[3] M. E. Morley, *The development and disorders of speech in childhood* (Edinburgh: Livingstone, 1957).

(ii) Obviously the number of speech therapists necessary to treat speech defectives depends on the proportion of speech defectives discovered in the state. Assessment of this, gauged from the test sample, is given in The Implications of Conclusions (section VI).

(iii) Another consideration which stimulated this investigation was the concern of the School Health Department at the number of speech defective children discovered by the School Health sisters during their periodic visits, for whom nothing whatsoever could be suggested and who were observed to be deteriorating on subsequent visits.

2. The Three Categories in Which Children Were Placed in this Survey

The approach taken in this survey was to locate the group of children who were potential speech therapy cases. The degree of severity in this group was over a wide range—some needed immediate and intensive treatment, others were just deviant enough to warrant periodic reviews, while still others appeared to require specialist investigation along lines that the brief tests in the survey indicated.

The remaining group was divided into those with no speech defect of any kind whatsoever over the full period of the test, and those whose errors appeared merely part of the immaturity acceptable in young children until the age of six to seven.[4] This last group should be watched for any arrest in the process of development.

These three broad categories were preferred to a category of different types of defect or to an analysis of severity of defect, owing to a limitation of time. For example, detailed language tests for each child, taking into consideration the relevance of environment, were not possible in the time available to the research speech therapist. (See section III, 4 (d).) Articulation errors and their relative importance are discussed in detail in Appendix B.

3. Limitations

The following problems have been relevant to the conduct of the survey.

(a) Area Covered

Although the ultimate aim is to gather representative samples from every area in the state, limitations of money and personnel necessitated concentration on South-East Queensland, which area contained approximately two-thirds of the state's total population (total population 1,610,688 in June 1965)[5] only. Statistically, this included the metropolitan area of Brisbane with over two-fifths of the state's population and the Downs and Moreton Divisions of South Queensland with combined populations of 347,980 in June 1965.[6] Geographically, it is approximately 36,000 square miles,[7] compared with the total area of the state of 667,000 square miles.[8] (See Appendix A, Maps 1 and 2.) Because of the range in size, geographical and socio-economic variables represented by the selected schools, this sample has been accepted as a reasonably representative sample of the whole state for the purposes of this study.

Selection of schools is discussed in detail in section III, 2.

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[4]M. H. Powers, "Functional disorders of articulation—symptomatology and etiology", in L. E. Travis (ed.), *Handbook of speech pathology* (London: Peter Owen Ltd., 1963).

[5]Commonwealth Bureau of Census and Statistics, Queensland Office, *Queensland Government Year Book* 1966 (Brisbane, Government Printer).

[6]*Ibid.*

[7]*Ibid.*

[8]*Ibid.*

(b) Grades Examined

Another limitation is the fact that Grades I and II only were used in the survey, restricting the age range to between five and eight years. However this was considered a valid age to start this first section of the survey as the majority of speech defects in the school and total population are found at this level.[9]

This was also the lowest age at which, because of compulsory education, a representative cross-section of the normal community was available for sampling.

(c) Time Lapse

Another consideration was the use of one therapist only to assess the speech of each child. This involved travelling to each selected school to perform individual assessments, causing the unavoidable lapse of six months (the second and third terms) between the first and last children seen. The first term was purposely omitted to allow Grade I children to adjust to their new environment. Although it is realized that this difference in time could cause a degree of weighting in favour of those children seen last, conforming to the normal trend of the number of errors per child decreasing with chronological age[10] (e.g. the country children, particularly those of the Maroochydore District), the advantages of increased reliability appeared to outweigh the disadvantages of this variable.

However in actual fact the percentage of potential speech therapy cases in Maroochydore was the highest of the four country areas, while it scored less well than the other three in the No Speech Defect category. This result seems to indicate that the slight increase in chronological age had not significantly improved the quality of the last children's speech in this particular case. Comparison with the earlier town schools is avoided here as other factors besides that of chronology appear relevant. These are considered in detail later. (See section III, 2 (a) and (b).)

(d) Loss of Subjects from the Sample

A fourth point that was significant during field work was the fact that rarely was the whole class available for testing either for the School Health sister or the speech therapist. Absenteeism accounted for some percentage of all but three classes, but the numbers present were adequate to form a valid cross-section of the infant school population. (See section III, 3 (b) and 5 (b).)

II. REVIEW OF PREVIOUS RESEARCH RELATING TO THE PROBLEM

1. Lack of any Large Scale Australian Survey

There has been no large scale Australian survey to act as a precedent for this investigation. Examples of work done in Australia include "The Survey of Speech Therapy in Country Clinics Conducted by the New South Wales Society for Crippled Children" between 1959–60 (covering six clinics)[11] and "The Defects of

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[9] R. Millisen, "The incidence of speech disorders", in L. E. Travis (ed.), *Handbook of speech pathology* (London: Peter Owen Ltd., 1963).

A. Mills and H. Streit, "Report of a speech survey, Holyoke, Massachusetts", *Journal of Speech Disorders* VII (1942), 161–67.

F. Robinson, "A study of the articulation errors in a group of 240 speech defective children between the ages of five and ten" (M.A. Thesis, University of Minnesota, 1947).

H. Manig, "The prevalence of speech defects among school children and their treatment in special institutions connected with the school system", *Dtsch. Sonderschule* V (1938), 671–80.

Chapter on the child defective in speech in White House Conference on Child Health and Protection, Special Education, *Report on the Committee on Special Classes* (New York: Appleton-Century-Croft, 1931).

[10] F. Robinson, "A study of the articulation errors in a group of 240 speech defective children between the ages of five and ten" (M.A. Thesis, University of Minnesota, 1947).

[11] A. Beardsmore, "Survey of speech therapy in country clinics conducted by the N.S.W. Society for Crippled Children", *Journal of the Australian College of Speech Therapists* XVII, No. 1 (June 1967).

Speech in School Children", an investigation made in Tasmania by a psychologist in the Education Department for the Australian Council for Educational Research in 1932.[12]

However, despite this, might Australia be expected to follow a universal trend? If this supposition is considered a valid hypothesis from which to calculate the number of speech therapists needed in Queensland, what is the universal percentage of speech defectives?

2. Problems in Drawing Deductions from Surveys of Incidence in Other Countries

Various studies of incidence have been carried out during the last forty years, the most accessible being from America and Britain, though there has, too, been information from parts of Europe.

(a) Inconsistencies

Comparison has been complicated by lack of standardization in techniques for gathering data, choice of the person to interpret the data, and presentation of results. To these can be added the problem of inconsistent definitions of a speech defect. The following examples will illustrate these inconsistencies.

(b) Methods of Obtaining Information

Possible methods of obtaining information which have been tried have included:

(i) Questionnaires.[13]

(ii) A count of children in established clinics.[14]

(iii) Examination of all infants born in a certain area over a certain period.[15]

(iv) Interviews with a group of untrained investigators.[16] In this particular case the investigators were all at the Institute of Education at the University College of the Gold Coast and were bilingual, speaking English and Ga, Twi, Ewe, Fanta, and Nzima respectively.

(v) Interviews with a group of trained investigators.[17]

(vi) Teacher selection.[18]

(vii) Interviews with one trained investigator.[19]

(viii) One trained investigator with trained satellites. In this case, one qualified speech therapist assessed articulation. Graduate students and one nursery school–kindergarten–primary school undergraduate helped in gathering data concerning sentence development, sound discrimination and voice.[20]

(ix) Questionnaire, followed by a personal assessment by a trained investigator.[21]

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[12] H. T. Parker, *Defects of speech in school children* (Melbourne University Press in association with Oxford University Press, 1932).

[13] *Ibid.*

[14] A. Beardsmore, "Survey of speech therapy in country clinics conducted by the N.S.W. Society for Crippled Children", *Journal of the Australian College of Speech Therapists* XVII, No. 1 (June 1967).

[15] M. E. Morley, "A study of the speech development of 1,000 families in Newcastle-upon-Tyne", in *The development and disorders of speech in childhood* (Edinburgh: Livingstone, 1957).

[16] "Untrained" is used throughout this survey in the sense of not being a qualified speech therapist only. C. McCallien, "Problems of speech defect in the Accra District", *Journal of the College of Speech Therapists, London*, XX, No. 1 (April 1956).

[17] P. A. E. Grady and J. C. Daniels, "A survey of incidence of speech defects in children", *Educational Papers*, No. 1, Institute of Education, University of Nottingham, 1964.

[18] D. S. Parken, "Survey of speech defects in Poole, 1956 and 1960", *The Medical Officer* CV, 17–19.

[19] S. Blanton, "A survey of speech defects", *Journal of Educational Psychology* VII (1916), 581–92.

[20] M. C. Templin, *Certain language skills in children* (Minneapolis: University of Minnesota Press, 1957).

[21] Sister M. de M. Supple, "Survey of speech defective children in primary schools in Ireland and comparisons of same with distribution of speech disorders seen in Children's Hospital, Temple St., Dublin", *Journal of the Australian College of Speech Therapists*, XVI, No. 2 (December 1966).

(c) Presentation of Results

This has also varied considerably. Out of a list of 22 surveys, 19 had percentaged the proportion of speech defectives, while the others talked in terms of the number of speech therapists needed in proportion to the population.

In eleven studies the total number examined was also given. Fourteen involved school children only, and, of these, three divided out their results into infants, juniors, and seniors. Five considered the whole school population together, and five were concerned only with primary schools. Of this last group, one concentrated on Grade I, and one on Grades I to III.

Of the remaining eight, one was preschool children, one did not specify the age range of the children tested, one was up to 21 years of age, and the other five produced figures without giving details.

(d) Definitions of what Constitutes a Speech Defect

A more basic contradiction, indicating a serious lack of agreement as to what constitutes a speech defect, is shown in the results where the percentage of speech defectives ranges from 1.56 per cent to 56 per cent. Variations are demonstrated by the following list, the sources being given in Appendix D.

1.56 per cent
1.94 per cent
2.00 per cent
2.80 per cent
3.00 per cent
3.10 per cent
3.60 per cent
4.50 per cent
4.90 per cent
5.70 per cent
6.70 per cent
7.50 per cent
8.50 per cent
9.50 per cent
10.00 per cent
12.00 per cent
14.00 per cent
15.10 per cent
27.00 per cent
33.40 per cent
56.00 per cent

(e) Reasons for Specifying Criteria in this Survey

This confusion confirmed that information about incidence drawn from other sources could not automatically be applied to Queensland. It also demanded that techniques, interpretation of data, and definition of a speech defect be carefully controlled and documented as a prerequisite for achieving valid results from this particular survey.

Grading of speech defects is examined in section I, 2. Collection of data is amplified in section III, and results and conclusions are presented in sections IV and V respectively.

III. DATA

1. Relevance of the Article on Tape Recordings

The decisions about choice of material and method of collection were made with the close co-operation of the School Health Department of Queensland. This

survey was conducted simultaneously with a study on the reliability of tape recorders for articulation assessment, reproduced as an independent article. However it is necessary to mention this second study as collection of data was to a certain degree influenced by it. (See section III, 4 (b).)

2. Areas from Which Material Was Drawn

Nine different areas were chosen for sampling, five of these being in the metropolitan area and four in the country. The relevant areas are marked on Maps 1 and 2 (population distribution) and 3 and 4 (detailed location), Appendix A.

The aim of this choice was to include a cross-section of the children of South-East Queensland.

(a) Metropolitan Areas

In the metropolitan areas, socio-economic balance[22] was the controlling factor. Population density is demonstrated by Map 3 in Appendix A.

(i) Large schools (average attendance over 580) are represented by Ironside State School and Inala State School. Both are in comparatively newly settled areas but residence in St. Lucia (Ironside) is sought after by those in the upper income bracket while Inala houses those in a much lower income bracket. Another tendency in Inala is for both parents to work, so increasing the likelihood of unstable home life and lack of parental stimulation.

(ii) Toowong and Manly State Schools were also equated for purposes of comparison or contrast. Both are medium to large schools (the average attendance of Toowong approaching 580 and of Manly being just over 580) and both are in older settled areas. Toowong, however, is in central Brisbane, while Manly is one of the outer suburbs on Moreton Bay.

(iii) St. Ambrose Convent, Newmarket (average attendance 101–300) was left unpaired as representative of non-government schools.[23]

Metropolitan schools according to size[24]

	CLASS I (av. attend. over 580)	*CLASS II* (av. attend. 301–580)	*CLASS III* (av. attend. 101–300)	*CLASS IV* (av. attend. 35–100)	*CLASS V* (av. attend. 21–34)	*CLASS VI* (av. attend. up to 21)
Ironside	1					
Inala	1					
Toowong		1				
Manly	1					
St. Ambrose			1			

(b) Country Areas

The country areas covered are shown on Map 4 in Appendix A. They are known in this survey as the Warwick/Stanthorpe area, the Toowoomba area, the Ipswich

[22]Evidence of the socio-economic rating discussed in this section is given in the M.A. thesis by F. Powell, "The social areas of Brisbane" (University of Queensland, 1961), in the section on the percentives of the three dimensions—family status, economic status and ethnic status.

[23]F. Powell, "The Social Areas of Brisbane" (M.A. Thesis, University of Queensland, 1961). Comparative economic ratings of the suburbs are as follows: Ironside 7673; Inala 3165; Toowong 6541; Manly 4788; Newmarket 4807.

[24]Information on numbers attending the schools from Queensland Education Department. For classes of schools, information was obtained from *Report of the Minister of Education* 1966, (Brisbane: Queensland Department of Education, Government Printer).

area, and the Gympie area, and were chosen to include schools in country towns of varying sizes, e.g.

Toowoomba (over 25,000 population)
Warwick (6,250–25,000)
Stanthorpe, Maroochydore (2,500–6,250)
Crow's Nest, Maleny (1,000–2,500)[25]
Isolated one-teacher schools such as Mons and Tarome are included.

Schools in country areas according to size[26]

	CLASS I (av. attend. over 580)	*CLASS II* (av. attend. 301–580)	*CLASS III* (av. attend. 101–300)	*CLASS IV* (av. attend. 35–100)	*CLASS V* (av. attend. 21–34)	*CLASS VI* (av. attend. up to 21)
Warwick/ Stanthorpe		3		1		
Toowoomba	1		2			
Ipswich			2		3	1
Gympie		2		1	2	

The analysis of the country schools by name is as follows:

Warwick/Stanthorpe
CLASS II — Stanthorpe State School
Stanthorpe Convent
Warwick Central State School
CLASS IV — Wheatvale State School

Toowoomba
CLASS I — South Girls and Infants State School
CLASS III — Our Lady of Lourdes Convent
Crow's Nest State School

Ipswich
CLASS III — Engelburg State School (Kalbar)
Lower Tivoli State School
CLASS V — Ashwell State School
Haigslea State School
Aratula State School
CLASS VI — Tarome State School

Gympie
CLASS II — Maroochydore State School
Maleny State School
CLASS IV — Conondale State School
CLASS V — Mons State School
Glenview State School

3. Procedure

This consisted of two stages.

(a) Work of the School Health Sisters

Ten School Health sisters visited the relevant schools during their work for the Education Department. While there, they administered and tape-recorded a brief screening test for articulation, voice, and language which had been devised by the

[25]See Maps 2 and 4 in Appendix A. Key for town size applies to both equally.
[26]Information on numbers attending the schools from Queensland Education Department. For classes of schools, information was obtained from *Report of the Minister of Education* 1966 (Brisbane: Queensland Department of Education, Government Printer).

Speech Therapy Department, University of Queensland. These recordings were then returned to the Speech Therapy Department to be analysed by the speech therapist responsible for research. Reports on factors which could affect speech—for example, ear infections, hearing loss, low intelligence, familial patterns or upper respiratory tract infections—were included with the recordings. (See section III, 4 (b).)

(b) Work of the Speech Therapist

Only those children seen by the sisters were later seen by the speech therapist, who retested them with a more exhaustive test. Details of her work will be found in section III, 4 (c), section IV, and the Appendix.

The results of the final test by the research speech therapist were used for the final report.

4. Equipment, Tests and Method

(a) Equipment

The basic equipment used consisted of six Crowncorder portable tape-recorders, Model CTR-5450; six Hanimex Hanorama slide viewers; coloured slides; and analysis sheets.

(b) Screening Test Content

The screening test consisted of 38 slides, 28 being of familiar objects or actions. (See Appendix E.) The initial consonants or blends of consonants were, in each case, the only sounds being tested.

The remaining 10 slides were composite pictures, illustrating situations which the children described. This description served as a rudimentary language assessment, each child being required to speak a minimum of three sentences. The number of composite slides needed to elicit this speech was immaterial.

(c) Detailed Test Content

The detailed test used by the speech therapist consisted of 81 slides of familiar objects and actions. (See Appendix F.) The consonants used in standard English were tested initially, medially, and finally; also tested were the two and three consonant initial blends used in standard English and the vowels.

Composite slides were used as in the screening test to stimulate spontaneous speech but language investigation was frequently prolonged beyond the minimum of three sentences demanded in the screening test.

(d) Method of Presenting Tests

While both tests were being evolved, the slides were tested for easy recognition on approximately one hundred children between the ages of five and eight years.[27]

The aim was for each child to name the object spontaneously on seeing the slide, but if this did not occur, stereotyped questions were asked by the speech therapist. For example, in naming objects where the word "string" was required, "What do you tie up parcels with?" Or in naming actions, a choice was given: "Is the man jumping or swimming?"

This third method was used without inhibition if not for choice as experiments suggest there is little statistical difference in the production of spontaneous or repeated utterance.[28]

The average time taken for the screening test was five minutes and for the detailed test approximately ten minutes, but this could be tripled depending on the

[27] Grade I and II children at Kenmore and Enoggera State Schools, Brisbane.

[28] M. C. Templin, "Spontaneous versus imitated verbalization in testing articulation in preschool children", *Journal of Speech Disorders* XII (1947).

child's response and the amount of further investigation necessary. In addition to the information provided by the sisters and the indications of the screening tests, parents' and teachers' comments were taken into consideration.

As far as conditions allowed, there were no more than two children in the room at once, the one being tested and the other waiting. This meant that the waiting child was initiated into what was expected of him before demands were made on him but that there was less chance of learning responses than if he had been part of a queue.

Interpretation was greatly helped by the fact that the slides had been created specifically for the survey and were of real objects against completely plain backgrounds. The composite pictures were chosen from pre-reading books.[29]

5. Numbers Involved in Survey

(a) Altogether 1,446 Grade I and II children were included in the survey. They were divided as the table shows.

	Grade I	Grade II	Totals
Brisbane	388	293	681
Country	376	389	765
Total	764	682	1446

Subdivisions of the individual town schools and of the country areas are given in Appendix G.

(b) The above table shows that the country numbers are greater than those of Brisbane and that, contrary to the expected pattern, there are more Grade II's in the country than Grade I's. The large country sample was taken in an attempt to cover a wide range of schools through varying sizes of country towns and different country areas. (See section III, 2 (b) and section I, 3 (a).)

The size of the Grade II in the country was a point of interest and discussed with the teachers. This imbalance was limited to one-teacher and two-teacher schools in the Ipswich, Warwick/Stanthorpe and Gympie areas and was accounted for by the teachers as being due to the fact that a more flexible system of promotion could be indulged in than that of larger schools, and that individual teacher attention to help with problems or encourage success was more easily available in smaller classes.

Absenteeism was also a factor contributing in some degree to this imbalance.

IV. RESULTS

1. Results with Regard to the Three Categories of Speech Used in This Survey

(a) Range of Defect

(i) The range of defect handled included:

Articulation defects
Language defects and delayed language development
Stuttering
Cleft palate
Dyseneia
Neurological defects
Voice defects
Emotional problems affecting speech.

[29] H. M. Robinson, M. Monroe and A. S. Artley, *The new basic readers* (Chicago: Scott, Foresman and Co., 1962).

(ii) Articulation accounted for the major portion of the speech defects and the degree of severity varied from mild to severe in all types of disorder. Division into types of disorder and degrees of severity has been considered in other studies, but was not relevant in this particular case for the reasons given in (b).

(b) Examination of the Potential Speech Therapy Group

(i) Particularly in the case of language, further lengthy detailed investigation might have been necessary before the full extent of the apparent defect could be known.

(ii) Further investigations such as medical examination, intelligence tests, and hearing tests, were often indicated before a speech diagnosis could be reached with accuracy.

(iii) Many children had a combination of defects such as delayed language, grossly immature articulation, and emotional problems. These could not be placed accurately in any one category.

(iv) As part of the aim in this particular survey is to determine the number of speech therapists needed in Queensland, the number of prospective patients appears to be the most relevant figure. Final diagnosis was not required as this would require medical examination and further testing as indicated above.

(v) The category Potential Speech Therapy Cases was utilized to allow for this range of defects and severity, as part of any speech therapist's time is necessarily spent in assessments and reviews of children, some of whom are likely to present speech symptoms the cause of which requires specialist medical treatment only, medical or surgical treatment before speech therapy is initiated, or medical treatment concurrently with speech therapy. In any such case, a speech therapist would be involved in initial assessment and review, if not in regular treatment.

2. Comparison of the Potential Speech Therapy and No Speech Defect Groups

(a) Percentage of Children in the Above Groups out of the Total Number Tested (1,446)

	No Speech Defect	Potential Speech Therapy
Grade I	11.48% ($\frac{116}{1446}$)	12.17% ($\frac{176}{1446}$)
Grade II	19.7% ($\frac{285}{1446}$)	6.08% ($\frac{88}{1446}$)
Percentage out of a total of 1446	31.19% ($\frac{451}{1446}$)	18.25% ($\frac{264}{1446}$)

(b) Percentage of Children in the Above Groups in the Metropolitan and Country Areas

In Brisbane 681 children were seen, 388 in Grade I and 293 in Grade II.

In the country, 765 children were seen, 376 in Grade I and 389 in Grade II.

The total number of children seen were 764 in Grade I and 682 in Grade II.

It must be repeated that when grade numbers are given, these numbers represent only the numbers in each grade seen by both the School Health sister and the speech therapist. (See section III, 2 (a).)

(c) Percentage of Children in the Above Groups in the Individual Town Schools and Country Areas

These details were included because the weighting of the different schools and areas was felt to be relevant to the Conclusions (See section V).

Details of the individual country schools are in Appendix G.

No Speech Defect

	Grade I	Grade II	Grades I and II combined
Brisbane	15.46% ($\frac{60}{388}$)	40.61% ($\frac{119}{293}$)	26.28% ($\frac{179}{681}$)
Country	28.19% ($\frac{106}{376}$)	42.67% ($\frac{116}{389}$)	35.42% ($\frac{272}{765}$)
Brisbane and Country	21.73% ($\frac{166}{764}$)	41.79% ($\frac{285}{682}$)	31.19% ($\frac{451}{1446}$)

Potential Speech Therapy

	Grade I	Grade II	Grades I and II combined
Brisbane	25.77% ($\frac{100}{388}$)	10.58% ($\frac{31}{293}$)	19.23% ($\frac{131}{681}$)
Country	20.21% ($\frac{71}{376}$)	14.65% ($\frac{57}{389}$)	17.39% ($\frac{133}{765}$)
Brisbane and Country	23.04% ($\frac{176}{764}$)	12.75% ($\frac{88}{682}$)	18.25% ($\frac{264}{1446}$)

Table Comparing No Speech Defect and Potential Speech Therapy in the Metropolitan Schools
(Included with the percentages are the actual number represented from each grade)

	Ironside	Inala	Toowong	Manly	St. Ambrose
No Speech Defect Grade I	21.01% ($\frac{25}{119}$)	11.54% ($\frac{12}{104}$)	14.93% ($\frac{10}{67}$)	11.67% ($\frac{7}{60}$)	15.79% ($\frac{6}{38}$)
Grade II	43.14% ($\frac{44}{102}$)	32.14% ($\frac{27}{84}$)	56.00% ($\frac{28}{50}$)	48.57% ($\frac{17}{35}$)	13.64% ($\frac{3}{22}$)
Total	31.22% ($\frac{29}{221}$)	20.74% ($\frac{39}{188}$)	32.48% ($\frac{38}{117}$)	25.26% ($\frac{24}{95}$)	15.00% ($\frac{9}{60}$)
Potential Speech Therapy Grade I	21.01% ($\frac{25}{119}$)	43.27% ($\frac{45}{104}$)	13.43% ($\frac{9}{67}$)	23.33% ($\frac{14}{60}$)	18.42% ($\frac{7}{38}$)
Grade II	14.29% ($\frac{12}{102}$)	10.71% ($\frac{9}{84}$)	8.00% ($\frac{4}{50}$)	2.86% ($\frac{1}{33}$)	22.73% ($\frac{5}{22}$)
Total	16.74% ($\frac{37}{221}$)	28.72% ($\frac{54}{188}$)	11.11% ($\frac{13}{117}$)	15.7% ($\frac{15}{95}$)	20.00% ($\frac{12}{60}$)

Table Comparing No Speech Defect and Potential Speech Therapy in the Country Areas
(Included with the percentages are the actual number represented from each grade)

	Warwick/ Stanthorpe	Toowoomba	Ipswich	Gympie
No Speech Defect Grade I	29.51% ($\frac{18}{61}$)	28.66% ($\frac{45}{157}$)	39.06% ($\frac{25}{64}$)	19.15% ($\frac{18}{94}$)
Grade II	60.94% ($\frac{39}{64}$)	42.11% ($\frac{64}{152}$)	44.59% ($\frac{33}{74}$)	30.3% ($\frac{30}{99}$)
Total	45.6% ($\frac{57}{125}$)	35.27% ($\frac{109}{309}$)	42.02% ($\frac{58}{138}$)	24.87% ($\frac{48}{193}$)
Potential Speech Therapy Grade I	22.9% ($\frac{14}{61}$)	21.02% ($\frac{33}{157}$)	15.62% ($\frac{10}{64}$)	20.21% ($\frac{19}{94}$)
Grade II	15.62% ($\frac{10}{64}$)	11.18% ($\frac{17}{152}$)	18.92% ($\frac{14}{74}$)	16.16% ($\frac{16}{99}$)
Total	19.2% ($\frac{24}{125}$)	16.18% ($\frac{50}{309}$)	17.39% ($\frac{24}{138}$)	18.04% ($\frac{35}{193}$)

V. CONCLUSIONS FROM RESULTS

1. Application of Potential Speech Therapy Percentage to School Figures

According to the Report of the Minister of Education, 1966,[30] as presented to the Queensland Parliament, there were:

355,773 pupils in all State and non–State primary and secondary schools;
252,292 pupils in all primary State and non–State schools;
78,670 pupils in Grades I and II in all State and non–State schools.

These figures exclude special schools (blind, deaf, physically handicapped, and opportunity), mission schools and native schools, but include correspondence schools. The percentage in the Potential Speech Therapy group was 18.25 on the basis of the sample tested. This percentage applied to the above yields the following results:

18.25 per cent of 355,773 = 64,929 of the total school population.
18.25 per cent of 252,292 = 46,043 of the primary school population.
18.25 per cent of 78,670 = 14,357 of the Grade I and II population.

2. Trends from the Total Figures

(a) Total Figures

(i) 8.22 per cent more children have no speech defect in Grade II.
(ii) 6.09 per cent fewer children are in the Potential Speech Therapy group in Grade II.

(b) No Speech Defect Group

(i) 12.73 per cent country children are in the No Speech Defect group in Grade I.
(ii) 2.06 per cent more country children are in the No Speech Defect group in Grade II.
(iii) There is an improvement of 25.15 per cent in metropolitan children with no speech defect between Grade I and Grade II.
(iv) In contrast there is only an improvement of 14.48 per cent of country children with no speech defect between Grade I and Grade II.

(c) Potential Speech Therapy Group

(i) 5.56 per cent more metropolitan children are in the Potential Speech Therapy group in Grade I.
(ii) 4.07 per cent more country children are in the Potential Speech Therapy group in Grade II.
(iii) There is a reduction of 15.9 per cent of metropolitan children in the Potential Speech Therapy group between Grade I and Grade II as opposed to the reduction of 5.56 per cent in country children.

(d) Conclusion

The conclusion that can be drawn from this is that country children in Grade I have less defective speech than metropolitan children, but that the latter improve faster, almost equalling the numbers with No Speech Defect in Grade II country schools. Therefore by Grade II there are fewer town children than country children in the Potential Speech Therapy group.

3. Trends in Individual Metropolitan Schools and Individual Country Areas

(a) Metropolitan

(i) Ironside had conspicuously more children with No Speech Defects in Grade I, 5.22 per cent more than Toowong and St. Ambrose, and Inala and Manly, respectively, had roughly parallel results in Grade I. However, this advantage was lost in

[30]Printed by the Government Printer, Brisbane.

Grade II, Toowong having 12.86 per cent more in the No Speech Defects groups, and Manly 5.63 per cent.

St. Ambrose reversed the trend towards improvement in all other town and country schools by reducing the number of children with No Speech Defects by 2.15 per cent.

(ii) Inala had the largest number of children in the Potential Speech Therapy group in Grade I—19.94 per cent more than the next school. However the figure improved markedly in Grade II, there being fewer in the Potential Speech Therapy group than St. Ambrose by 12.02 per cent and Ironside by 4.58 per cent.

(iii) Environmental speech standards were considered relevant when classing children from contrasting schools such as Ironside and Inala, particularly from the point of view of language.

However these figures indicate that although children from contrasting socio-economic areas may start school with widely varying speech standards, the difference will have been greatly reduced or eliminated by the second year of school.

(b) Country

The internal country areas have a wider range in the No Speech Defect group and a narrower range in the Potential Speech Therapy group.

(i) There is a difference of 19.91 per cent in the No Speech Defect group in Grade I—interestingly the two areas concerned, Ipswich and Gympie, contain the majority of one and two teacher schools (four and three respectively). (See section III, 2 (b).)

(ii) However a very much narrower range is exhibited in the Potential Speech Therapy group, three of the areas being between 22.9 per cent to 20.21 per cent in Grade I. Ipswich has the lowest percentage in this group, being 4.59 per cent below the next area.

In Grade II there is a range of 7.74 per cent for all four areas, in this case Toowoomba having the lowest percentage in the Potential Speech Therapy group by 4.44 per cent.

(iii) These results suggest that though all areas show very much the same pattern in the Potential Speech Therapy group, there is wide variation in the group with No Speech Defects and few conclusions can be drawn from these results. No initial advantage was gained by the area with the largest country town (Toowoomba) —on the contrary this advantage appeared to be with Ipswich rural district, containing only one large village. Gympie, containing the greatest spread of population, from a medium-large seaside town to one-teacher schools, scored lowest in both Grade I and Grade II.

VI. IMPLICATIONS OF CONCLUSIONS

Under optimum circumstances, the maximum case-load for a speech therapist should be no more than fifty patients a week.

The total number of Grades I and II in Queensland, quoted by the *Queensland Yearbook 1966*, is 78,670 and the percentage of children in these grades in the Potential Speech Therapy group is 18.25 per cent. (See section V, 1.) 18.25 per cent of 78,670 is 14,357, this being the number in the Potential Speech Therapy group in the whole state. Therefore, a minimum of 287 speech therapists would be required to assess, diagnose, and treat these two grades alone.

VII. SUMMARY

During 1967 a survey of speech defects among Grade I and II children in normal schools in South-East Queensland was carried out. A total of 1,446 children were tested, 681 (388 Grade I and 293 Grade II) being from the Brisbane metropolitan area, and 765 (376 Grade I and 389 Grade II) from the country. Initial screening

tests were carried out by ten School Health sisters but final diagnosis was based on direct testing by one speech therapist.

The results indicated that 18.25 per cent of the total number were Potential Speech Therapy cases, thus indicating the need for a minimum of 287 speech therapists to cover the 78,670 Grade I and II children in normal schools.[31]

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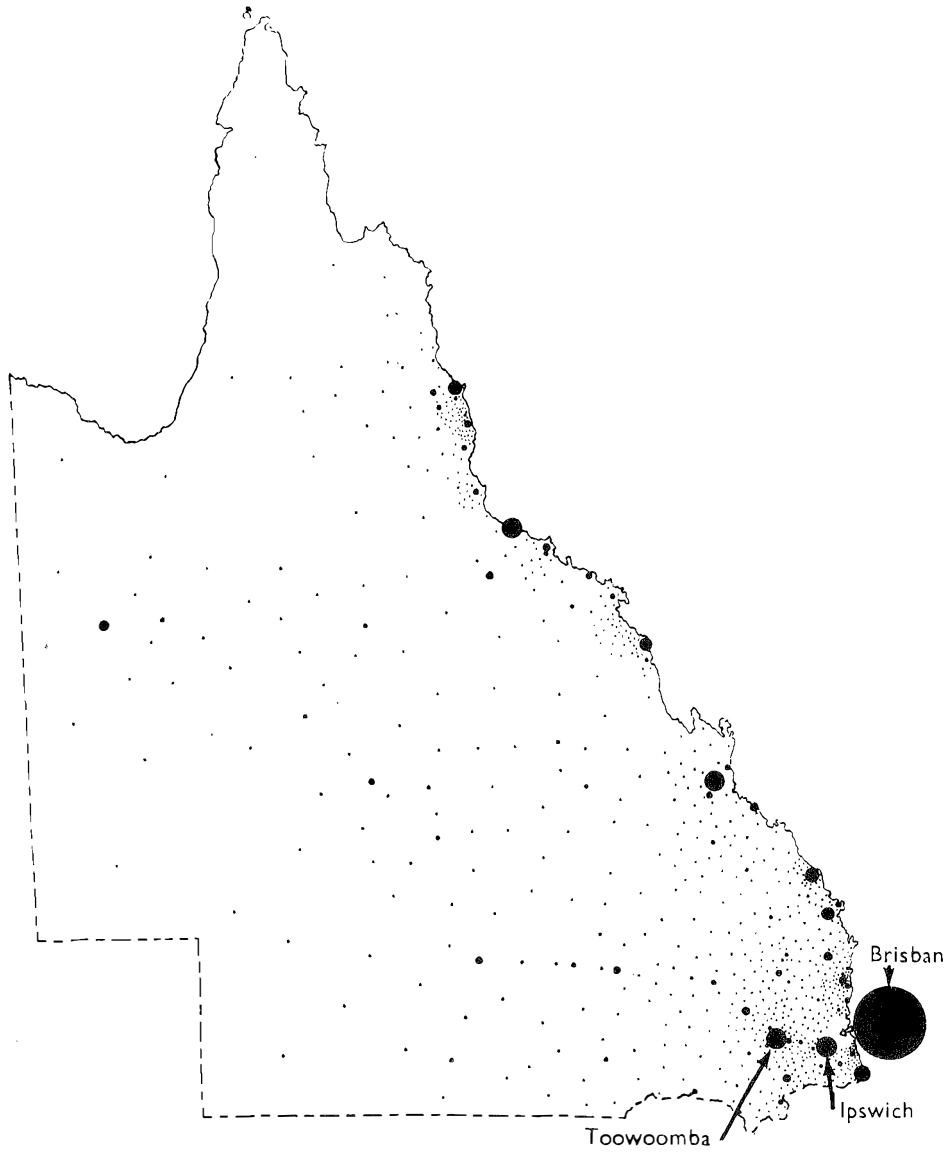
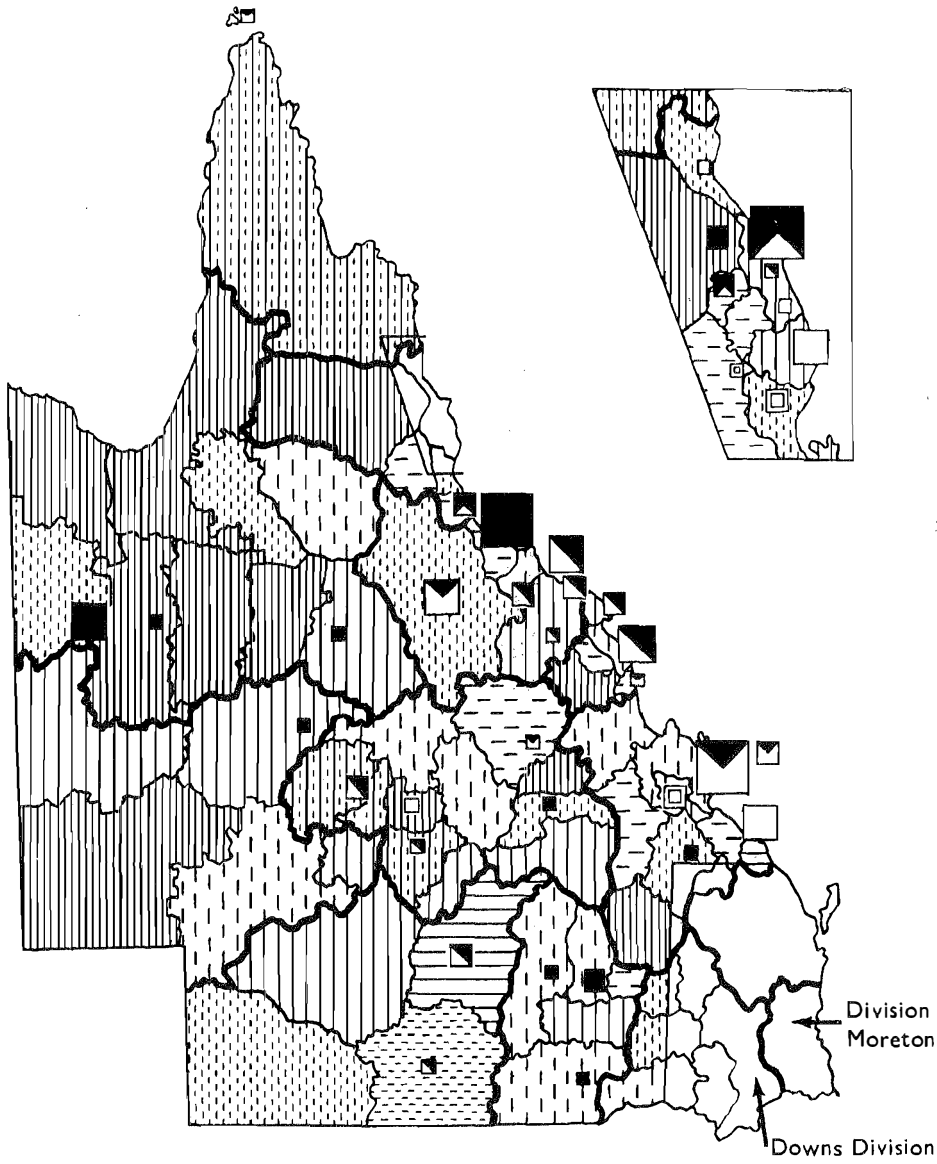
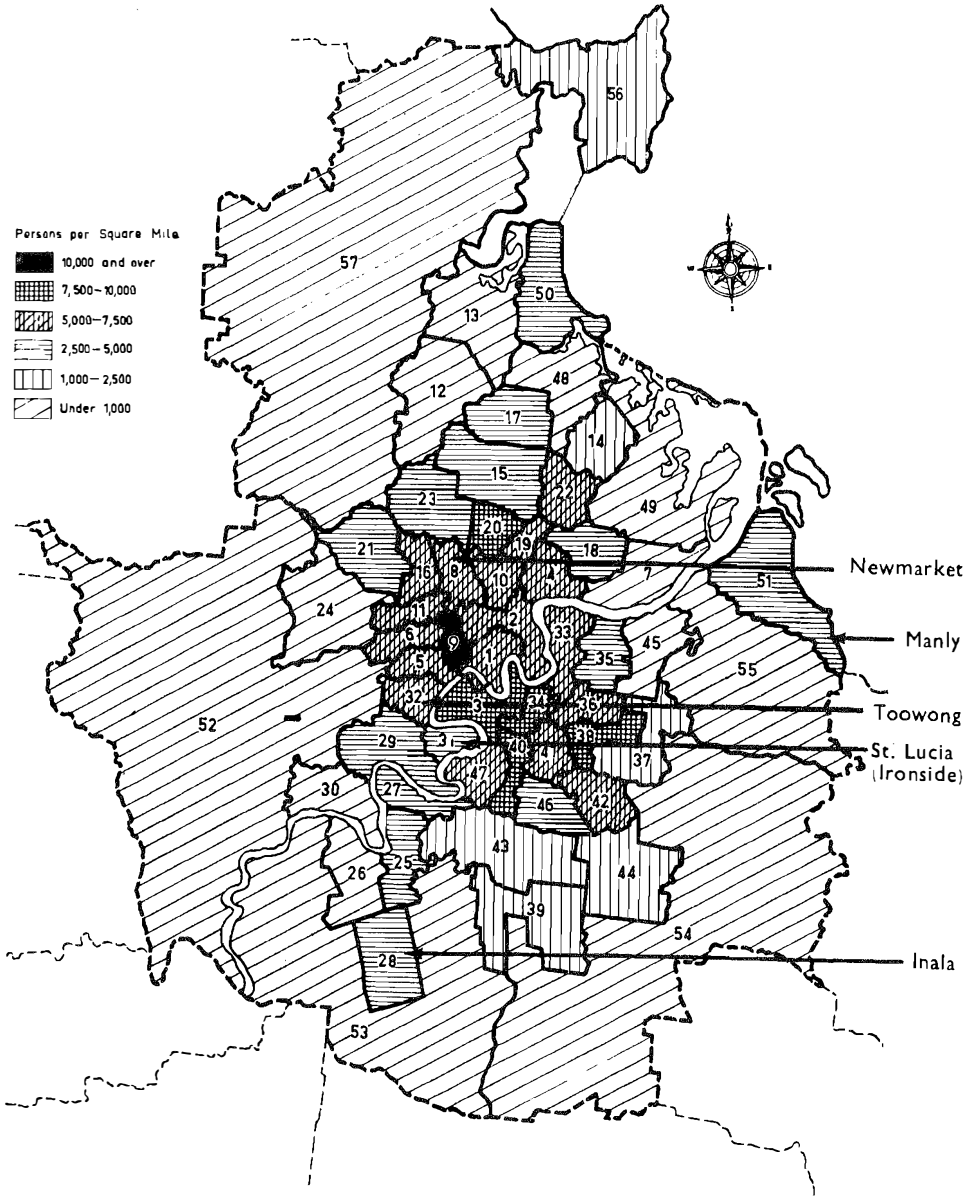
[31] Commonwealth Bureau of Census and Statistics, Queensland Office, *Queensland Government Year Book* 1966 (Brisbane, Government Printer).



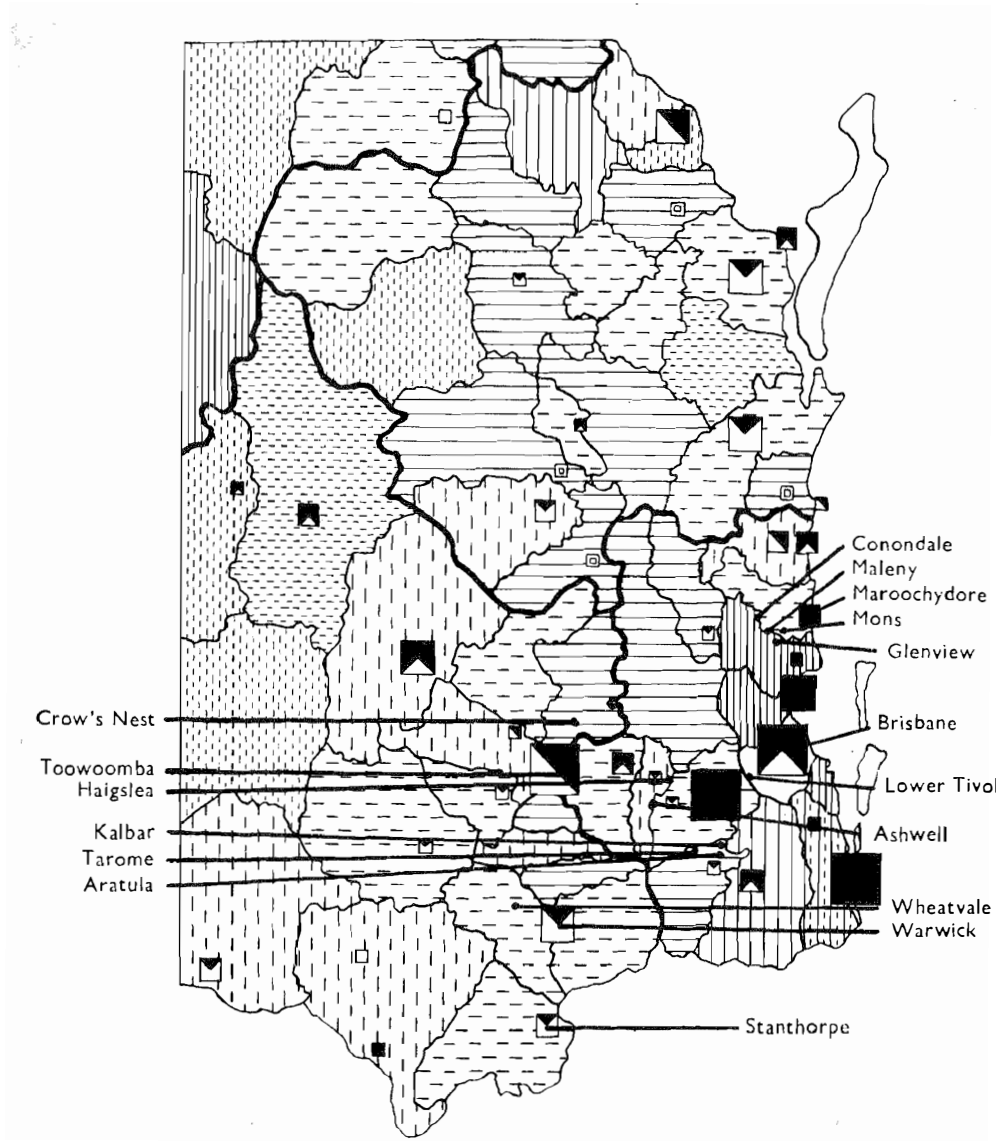
MAP 1.–Distribution of population in Queensland at census, 30 June 1961. Each dot represents 500 persons. Circles show cities and towns of 1,000 or more persons, and have areas proportionate to populations. Map taken from Commonwealth Bureau of Census and Statistics, Queensland Office, *Queensland Year Book 1966* (Brisbane: Government Printer), p. 46.


Division
Moreton
Downs Division
Shires (Rural Population only)
% Increase Decrease %
0-5
6-11
12-17
18-23
24 & over
Towns
Size in 1961
1,000-2,500
2,500-6,250
6,250-25,000
25,000 & over
% Increase
0-5
6-11
12-17
18-23
24 & over
Decrease



Above: MAP 3.—Metropolitan statistical areas—population density at census, 30 June 1961. Map taken from Commonwealth Bureau of Census and Statistics, Queensland Office, *Queensland Year Book 1966* (Brisbane: Government Printer), p. 56.

MAP 2.—Increase or decrease of population, 1954 to 1961, in Queensland towns and rural areas. Map taken from Commonwealth Bureau of Census and Statistics, Queensland Office, *Queensland Year Book 1966* (Brisbane: Government Printer), p. 58.



MAP 4.—Increase or decrease of population, 1954 to 1961, in Queensland towns and rural areas. Map taken from Commonwealth Bureau of Census and Statistics, Queensland Office, *Queensland Year Book 1966* (Brisbane: Government Printer), p. 59.

APPENDIX B

What follows is an analysis of defective articulation, the individual consonants being considered with regard to recurrence of error, variation of error, whether it is found in blends only or not, and whether there is any specific related anatomical defect such as absence of teeth. The implications of the position of the error are to be considered in a future article as are sex and age.

In all cases the total number of children in each grade who have the sound incorrect will be given, though as many have multiple defects in any one sound, the number of errors categorized will very often be greater.

Voiced and voiceless sounds have been classed together and called voiceless (e.g. θ/s; ð/z) unless the errors have been in voicing itself (e.g. ð/s; t/d), or when the error is only, and consistently, found in the voiced form. However in the lists of individual multiple defects, voiced forms have been given as such to indicate their frequency. Omissions and glottal stops have also been grouped (e.g. ʔ/t). Any sounds apparently omitted, e.g. "Blends only" in Grade II "s", means this error did not occur in that particular group.

Brisbane "s"

In the whole Brisbane area there were 129 (33.25 per cent) children out of 388 in Grade I with an "s" defect, and 70 (23.89 per cent) out of 293 in Grade II. The pattern is as follows. (The percentages relate the numbers.)

Grade I

Blends only	s/s; θ/s	without incisors	–/s; ʔ/s	x/s	Φ/s	p/s	ʃ/s	f/s
8	87	20	35	4	5	1	14	4
fw/s	t/s	dr/s	k/s	d/s	s/s	bw/s	l/s	ts/s
1	10	1	1	5	2	1	1	3
ʒ/s	l/s	l/z	hʃ/s	m/s	n/s	h/s	n/z	
1	3	1	1	3	3	1	1	

Multiple Defects for "s"

(24 or 6.19 per cent of 388 Grade I)

sθ/s; ʃ/s; f/s	2
ʃ/s; ʔ/s	3
t/s; dr/s; ʔ/s	1
fw/s; ʔ/s	1
sθ/s; ʃ/s	2
ʔ/s; x/s; Φ/s	1
l/z; ʔ/s	1
sθ/s; ʃ/s; l/z; Φ/s, β/z	1
sθ/s; t/s; ʔ/s	1
ʒ/s; sθ/s	1

h/s; m̥/s; n̥/s; ŋ/s..... 1

m̥/s; n̥/s; ŋ/s..... 1

sθ/θ/s; ʃ/s; ŋ/s..... 1

t/s; d/s; sθ/θ/s; hʃ/s 1

sθ/θ/s; m̥/s; n̥/s; ŋ/s 1

ts/z; h/s; ŋ/s..... 1
ŋ/s; d/s 1
ŋ/s; n/z; t/s; h/s 1
d/s; sθ/θ/s; l̥/s; f/s 1

sθ/θ/s; ts/s 1

24 (6.19 per cent) out of the 388 Grade I Brisbane children had multiple "s" defects.

Grade II

s/θ/s; θ/s	without incisors	ʃ/s	l̥/s	ʃl̥/s	f/s	ŋ/s	l/z
58	28	5	4	1	3	2	1

Multiple Defects

(24 or 1.37 per cent of 293 Gr. II)

l/z; ŋ/s 1
sθ/θ/s; f/s; ʃ/s 1
sθ/θ/s; ʃ/s..... 1
sθ/θ/s; l̥/s..... 1

Brisbane "θ"
244 (62.89 per cent) out of 388 Grade I were affected.
82 (27.99 per cent) out of 293 Grade II were affected.

Grade I

Blends only	f/θ	d/ð	s/θ	l/θ	
12	226	49	12	1	
b/θ	ŋ/θ	t/θ	ʃ/θ	v/θ	fr/θ
6	17	1	5	1	1

Multiple "θ" Defects

55 (14.17 per cent) out of 388

f/θ; d/ð 27
f/θ; s/θ 6
f/θ; d/ð; ŋ/θ 3
f/θ; ŋ/θ 4

b/v; t/θ 1
f/θ; b/ð 3
ɹ/θ; d/ð 1
d/ð; ɹ/θ; s/θ 1
f/θ; d/θ; ʃ/θ 1
d/ð; s/θ 1
fr/θ; v/θ 1
f/θ; ʃ/θ 1
s/θ; f/θ; d/ð; ʃ/θ 1
b/θ; ɹ/θ 1
f/θ; ɹ/θ; s/θ 1
ɹ/θ; s/θ; d/ð 1
f/θ; ʃ/θ; s/θ 1

Grade II

Blends only	f/θ	b/θ	d/ð	s/θ
3	80	1	6	1

Multiple "θ" Defects

4 (1.3 per cent) out of 293

f/θ; d/ð 3
f/θ; s/θ 1

Brisbane "r"

196 (50.55 per cent) out of 388 Grade I affected.
74 (25.26 per cent) out of 293 Grade II affected.

Grade I

Blends only	v w/r	ɹ/r	j/r	l/r	x/r	ʒ/r
63	175	65	17	6	1	2

Multiple "r" Defects

(62 children)
(15.98 per cent)

v w/r; l/r 4
v w/r; ɹ/r 43
ɹ/r; j/r 3
v w/r; j/r; ɹ/r 6
v w/r; l/r; j/r 1
v w/r; ʒ/r; j/r 1
v w/r; j/r 4

Grade II

Blends only	v/w/r	ɹ/r	l/r	dʒ/r	j/r	rj/r
24	62	21	3	1	4	1

Multiple "r" Defects

(15 children)
(5.12 per cent)

v/w/r; j/r 4
v/w/r; ɹ/r 10
v/w/r; rj/r; ɹ/r 1

Brisbane "l"

39 (10.05 per cent) of 388 Grade I.
7 (2.39 per cent) of 293 Grade II.

Grade I

Blends only	v/w/l	r/l	wl/l	x/l	n/l	j/l
16	23	8	1	1	1	1
ɹ/l	jl/l	d/l	hj/l	dʒ/l	ov/l	k/l
15	1	2	1	1	1	1

Multiple "l" Defects

(15 or 3.87 per cent)

v/w/l; ɹ/l 4
v/w/l; wl/l 1
v/w/l; r/l 2
j/l; r/l; ɹ/l 1
d/l; ɹ/l 1
ɹ/l; j/l 1
v/w/: ɹ/l; d/l 1
hk/l; j/l; ɹ/l; r/l 1
v/w/l; dʒ/l 1
n/l; ɹ/l; ov/l 1
v/w/l; k/l 1

Grade II

Blends only	v/w/l	ɹ/l	r/l	Φ/l
4	4	1	1	1

Brisbane "f"

35 (9.02 per cent) of 388 Grade I.
5.(1.71 per cent) of 293 Grade II.

Grade I

p/f	Φ/f β/v	ɳ/f	b/f	k/f
25	3	8	1	1
s/f	t/f	h/f	b/f	x/f
5	1	1	1	1

Multiple "f" Defects

(18)
(4.64 per cent)

b/v; θ/f 1
ɳ/f; b/f; b/v; k/f 1
bl/v; t/f; b/v 1
hl/f; b/v 1
b/v; t/f 1
d/v; p/f 1
ɳ/f; b/v 8
s/f; b/v 1
s/f; b/v; ɳ/v 1
b/v; s/f; Φ/f 1
s/f; ɳ/v 1

Grade II

b/v	θ/f ð/v	Blends only
2	2	1

Multiple "f" Defects

(0)

Brisbane "ʃ"

30 (7.73 per cent) of 388 Grade I.
4 (1. 37 per cent) of 293 Grade II.

Grade I

s/ʃ	x/ʃ	t/ʃ	dʒ/ʃ	f/ʃ	jʃ/ʃ	tʃ/ʃ	d/ʃ	θ/tʃ
17	2	1	2	2	1	2	1	1

Multiple "ʃ" Defects

(5) (1.29 per cent)

x/ʃ; f/ʃ 1
dʒ/ʃ; x/ʃ 1
t/ʃ; ɳ/ʃ 1
tʃ/ʃ; ɳ/ʃ; dʒ/ʃ 1
d/ʃ; tʃ/ʃ 1

Grade II

s/ʃ	θ/ʃ	l̥/ʃ
2	1	1

Multiple "ʃ" Defects

(0)

Brisbane "tʃ"

38 (9.79 per cent) of 388 Grade I.
5 (1.71 per cent) of 293 Grade II.

Grade I

ʃ/tʃ	t/tʃ	s/tʃ	ɻ/tʃ	f/tʃ	
18	2	16	4	1	
sθ̥/tʃ	ls/tʃ	b/dʒ	ts/tʃ	dʒr/dʒ	l̥dʒ/tʃ
3	1	1	2	1	1

Multiple "tʃ" Defects

(9) (2.32 per cent)

sθ̥/tʃ; s/tʃ 1
s/tʃ; ʃ/tʃ; ɻ/dʒ 1
t/tʃ: z/dʒ 1
f/tʃ; ʃ/tʃ; sθ̥/tʃ 1
ls/tʃ; s/tʃ; d/dʒ; z/dʒ 1
ɻ/tʃ; b/dʒ 1
ts/tʃ; dʒr/dʒ 1
s/tʃ; ʃ/tʃ 1
ɻ/tʃ; ʃ/tʃ; ʒ/dʒ 1

Grade II

tθ/tʃ	tl̥/tʃ	s/tʃ	ʃ/tʃ	ɻ/tʃ	ts/tʃ
1	1	1	1	1	1

Multiple "t" Defects

(1) (0.34 per cent)

s/tʃ; ts/tʃ 1

Brisbane "p"

39 (10.05 per cent) of 388 Grade I.
6 (2.05 per cent) of 293 Grade II.

Grade I

Blends only	t/p	d/p	t/b	b/p	ɳ/p	f/p	f/b
17	6	1	1	7	10	10	2
k/p	Φ/p	s/p	n/b	v/p	ʒ/b	m/p	p/b
3	6	1	2	1	1	1	2

Multiple "p" Defects

(17) (4.38 per cent)

ɳ/p; v/b; f/b 1
f/p; t/p 2
t/p; ɳ/p 2
ɳ/p; b/p 1
ɳ/p; d/b; Φ/p 1
v/p; ʒ/b; b/p 2
d/b; b/p 1
b/p; Φ/p; k/p 1
f/p; p/b 1
p/b; Φ/p 1
t/p; p/b 1
m/p; Φ/p 1
ɳ/p; b/p; n/b 1
ɳ/p; f/p 1

Grade II

Blends only	k/p	v/b	t/p	v/p
4	2	2	1	1

Multiple "p" Defects

(0)

Brisbane "t"

47 (12.11 per cent) out of 388 Grade I.
9 (3.07 per cent) out of 293 Grade II.

Grade I

Blends only	x/t	⁅t⁆/t	tʃ/t	d/t	ɳ/t	p/t
13	1	3	5	10	24	2
f/t	g/t	l/t	dz/t	ʃt/t	sf/t	dʒ/t
3	4	2	1	1	1	1
k/t	v/t	θ/t	ʃ/t	t/d	b/t	
7	1	1	1	1	1	

Multiple "t" Defects

(16) (4.12 per cent)

d/t; l/t; ɹ/t	1
tʃ/t; g/t; d/t	1
k/t; ɹ/t; d/t	1
k/t; ɹ/t; p/t	1
ɹ/t; b/t	1
d/t; dz/t	1
ɹ/t; ʃt/t	1
ɹ/t; f/t	1
ɹ/t; l/t; g/t	1
v/t; ɹ/t; d/t	1
ɹ/t; d/t	1
ɹ/t; t͡ɹ/t; d/t; g/d	1
ɹ/t; t/d	1
ɹ/t; tʃ/t; ʃ/t	1
ɹ/t; θ/t	1
ɹ/t; k/t	1

Grade II

ɹ/t	k/t	s/t	g/t	tʃ/t
4	6	1	1	1

Multiple "t" Defects

(3) (1.02 per cent)

k/t; ɹ/t	2
g/t; ɹ/t	1

Brisbane "k"

40 (10.31 per cent) out of 388 Grade I.
5 (1.71 per cent) out of 293 Grade II.

Grade I

Blends only	p/k	t/k	x/k	d/k	g/k	dʒ/g	kwl/k
27	8	13	1	10	9	2	1
Φ/k	ɹ/k	dr/k	f/k	ʃ/k	dʒ/k	kaI/k	
2	8	1	1	1	1	1	

Multiple "k" Defects

(11) (2.84 per cent)

kwl/k; d/g	1
dʒ/g; g/k	1
t/k; p/k	2
t/k; p/k; f/k	1
ɹ/k; g/k; dr/k; d/g	1
t/k; dʒ/g; p/k	1

dʒ/k; d/k 1
g/k; Φ/k; d/g 1
ŋ/k; d/k; g/k 1
t/k; d/k 1

Grade II

ŋ/k	g/k	t/k	r/k	dʒ/k
1	2	1	1	1

Multiple "k" Defects

(1) (0.34 per cent)

dʒ/k; g/k 1

Brisbane "j"

3 (0.77 per cent) out of 388 Grade I.

Grade I

(3 or 0.77 per cent)

l/j 3

Brisbane "w"

6 (1.55 per cent) out of 388 Grade I.

Grade I

–/w	v/w	t/w
5	1	1

Multiple "w" Defects

(1) (0.26 per cent)

t/w; –/w 1

Brisbane "m"

16 (4.12 per cent) of 388 Grade I.

–/m	n/m
15	1

Multiple "m" Defects

(1) (0.26 per cent)

n/m; –/m 1

APPENDIX C

In the four country areas there were 376 Grade I children and 389 Grade II. This unexpected increase in the number of Grade II's can be partially accounted for by the fact that in the one and two teacher schools the combination of erratic spread of ages and much more individual tuition with corresponding advance at the child's own speed could result in schools such as Tarome with no Grade I and seven in Grade II; or Ashwell with one in Grade I and six in Grade II; or Haigslea with three in Grade I and ten in Grade II.

The method follows that for Brisbane.

Country "s"

Grade I

Blends only	$\overset{s}{\theta}$/s; θ/s	without incisors	ɳ/s	ʃ/s	$\overset{n}{\circ}$/s
16	83	32	12	20	1
dʒ/z	tʃ/s	$\overset{l}{\circ}$/s	t/s	fr/s	n/s
	4	3	9	1	1
Φ/s	d/s	f/s	dʒ/s	jð/s	
1	1	2	1	1	

113 (30.053 per cent) out of 376 Grade I were affected.
54 (13.881 per cent) out of 389 Grade II were affected.

Multiple Defects for "s"

(18 or 4.78 per cent out of Grade I)

$\overset{s\theta}{\theta}$/s; ʃ/s 2
ɳ/s; ʃ/s 1
θ/s; f/s 2
d/s; ɳ/s 1
θ/s; ʒ/s 1
ɳ/s; dʒ/z 1
$\overset{s\theta}{\theta}$/s; ɳ/s 2
$\overset{s\theta}{\theta}$/s; t/s 2
ɳ/s; t/s 1
ɳ/s; t/s; ʒ/z 1
ɳ/s; n/s; dʒ/z 1
$\overset{s\theta}{\theta}$/s; ɳ/s; ʃ/s 1
ɳ/s; t/s; jð/s 1
ɳ/s; ʃ/s; t/s; dʒ/z; n/s 1

Grade II

Blends only	sθ/s; θ/s	without incisors	ɻ/s	Φ/s	ʃ/s
1	41	11	8	1	8
l̥/s	f/s	t/s	tʃ/s	d/s	
4	4	3	3	2	

Multiple "s" Defects

(9 or 2.313 per cent of 389 Grade II)

ɻ/s; ʃ/s 2
sθ/s; l̥/s 1
ʃ/s; Φ/s 1
ʃ/s; f/s 1
sθ/s; f/s 1
ɻ/s; d/s; d/z 1
sθ/s; ɻ/s; d/z; tʃ/s 1
sθ/s; ɻ/s; d/s; dʒ/z 1

Country "θ"

190 (50.531 per cent) out of 376 Grade I.
125 (32.133 per cent) out of 389 Grade II.

Grade I

Blends only	f/θ	ʃ/θ	d/ð	s/θ
17	180	2	27	8
fl/θ	t/θ	ɻ/θ	l/θ	Φ/θ
1	2	10	1	1

Multiple "θ" Defects

(19 (5.053 per cent) out of 376)

f/θ; dð 19
f/θ; fl/θ 1
f/θ; s/θ 3
f/θ; l/θ 1
s/θ; d/θ 1
f/θ; ɻ/θ; d/ð 9
f/θ; d/ð; s/θ 1
d/ð; ɻ/θ; Φ/θ 1

Grade II

Blends only	f/θ	fl/θ	d/ð	ts/θ
8	117	2	20	1
pl/θ	s/θ	p/θ	ɹ/θ	Φ/θ
1	3	2	1	1

Multiple "θ" Defects

(17 (4.37 per cent) out of 389)

f/θ; d/ð 9
f/θ; ɹ/θ 2
f/θ; s/θ 3
f/θ; fl/θ 1
f/θ; fl/θ; t/θ 1
f/θ; d/ð; Φ/θ 1

Country "r"

124 (32.978 per cent) out of 376 Grade I were affected.
103 (26.478 per cent) out of 389 Grade II were affected.

Grade I

Blends only	v/r w	–/r	rl/r	j/r	l/r	il/r	l/r o	m/r
59	88	30	1	13	2	1	1	1

Multiple "r" Defects

(24 (6.169 per cent) out of 376)

v/w r; ɹ/r 13
v/w r; j/r 5
v/w r; il/r 1
v/w r; ɹ/r; j/r 3
v/w r; j/r; l/r 1
v/w r; ɹ/r; m/r 1

Grade II

Blends only	v/r w	–/r	j/r	l/r	l/r o	bw/r
57	83	22	11	1	1	1

Multiple "r" Defects

(24 (6.169 per cent) out of 389)

$\frac{v}{w}$/r; –/r 14
$\frac{v}{w}$/r; j/r 7
$\frac{v}{w}$/r; j/r; –/r 2
$\frac{v}{w}$/r; –/r; l/r 1

Country "l"

45 (11.968 per cent) out of 376 Grade I were affected.
17 (4.370 per cent) out of 389 Grade II were affected.

Grade I

Blends only	$\frac{v}{w}$/l	–/l	k/l	t/l	r/l	b/l
24	33	17	1	1	4	

Multiple "l" Defects

(7 (1.861 per cent) out of 376)

$\frac{v}{w}$/l; –/l 5
–/l; r/l 1
w/l; –/l; b/l 1

Grade II

Blends only	$\frac{v}{w}$/l	–/l	$\frac{l}{o}$/l	k/l	r/l
10	10	3	1	2	2

Multiple "l" Defects

(1 (0.257 per cent) out of 389)

$\frac{v}{w}$/l; r/l 1

Country "ʃ"

7 (1.861 per cent) out of 376 Grade I.
4 (1.028 per cent) out of 389 Grade II.

Grade I

s/ʃ	θ/ʃ	$\frac{s}{\theta}$/ʃ	–/ʃ	stw/ʃ	ts/ʃ
3	4	1	1	1	1

Multiple "ʃ" Defects

(3 (0.797 per cent) out of 376)

s/ʃ; θ/s 1
s/θ/ʃ; stw/ʃ 1
s/ʃ; θ/ʃ; ts/ʃ 1

Grade II

s/ʃ	–/ʃ	d/ʃ	θ/ʃ
2	1	1	1

Multiple "ʃ" Defects

(1 (0.257 per cent) out of 389)

–/ʃ; d/ʃ 1

Country "tʃ"

20 (5.319 per cent) out of 376 Grade I.
5 (1.285 per cent) out of 389 Grade II.

Grade I

ʃ/tʃ	θ/tʃ	ts/tʃ	tθ/tʃ	t/tʃ	ɹ̊/tʃ
11	4	4	2	5	3
ɹ̊n̥/tʃ	ks/tʃ	st/tʃ	dʒ/tʃ	d/tʃ	tw/tʃ
1	1	1	1	1	1

Multiple "tʃ" Defects

(8 (2.127 per cent) out of 376)

θ/tʃ; ts/tʃ 1
ʃ/tʃ; d/dʒ 1
ʃ/tʃ; ɹ̊/tʃ 1
tw/tʃ; ts/tʃ 1
dʒ/tʃ; θ/tʃ; d/tʃ 1
t/tʃ; ts/tʃ; ɹ̊/dʒ 1

Grade II

ʃ/tʃ	ɹ̊/tʃ	d/tʃ	d/dʒ	θ/tʃ	dz/dʒ
3	1	1	2	1	1

Multiple "t" Defects

(3 (0.771 per cent) out of 389)

ɹ̊/tʃ; d/tʃ; d/dʒ 1
ʃ/tʃ; d/dʒ; dz/dʒ 1
ʃ/tʃ; d/dʒ; dz/dʒ 1

Country "f"

16 (4.255 per cent) out of 376 Grade I.
7 (1.799 per cent) out of 389 Grade II.

Grade I

θ/f	b/v	t/f	s/f	–/f	Φ/f	b/f
1	14	2	2	4	1	1

Multiple "f" Defects

(4 (1.063 per cent) out of 376)

b/v; –/f 2
b/f; b/v; s/f; t/f 1
–/f; b/v; s/f; Φ/f; t/f 1

Grade II

b/v; p/f	b/f	–/f	β/v
6	1	2	1

Multiple "f" Defects

(1 (0.257 per cent) out of 389)

p/f; b/f; –/f; β/f 1

Country "p"

16 (4.255 per cent) out of 376 Grade I.
4 (1.028 per cent) out of 389 Grade II.

Grade I

ɳ/p	β/b	k/p	n̥/p	b/p	ʒ/b	s/b	t/p	Blends only
3	2	4	1	2	1	1	4	3

Multiple "p" Defects

(1 (0.265 per cent) out of 376)

b/p; ɳ/p; ʒ/b; n̥/p 1

Grade II

t/p	k/p	pf/p
2	1	1

Multiple "p" Defects

(0)

Country "t"

33 (8.776 per cent) out of 376 Grade I.
16 (4.113 per cent) out of 389 Grade II.

Grade I

ʔ/t	d/t	p/t	f/t	f/d
12	5	2	1	1
h/t	Φ/t	dʒ/t	tʃ/t	ɳ/t
1	1	1	10	1

Multiple "t" Defects

(16 (4.255 per cent) out of 376)

ʔ/t; d/t 3
ʔ/t; f/t 1
h/t; Φ/t 1
ʔ/t; t/d 1
d/t; dʒ/d 1
k/t; ʔ/t; p/t 1

Grade II

ʔ/t	ʒ/t	d/t	b/t	p/t	k/t	pΦ/t	tʃ/t
8	1	3	1	3	3	1	1

Multiple "t" Defects

(4 (1.028 per cent) out of 389)

ʔ/t; k/t 1
ʔ/t; d/t 1
ʔ/t; d/t; b/t 1
ʔ/t; p/t; pΦ/t 1

Country "k"

34 (9.042 per cent) out of 376 Grade I.
11 (2.827 per cent) out of 389 Grade II.

Grade I

Blends only	dʒ/k	d/k	t/k	p/k
8	1	5	16	2
ʔ/k	Φ/k	x/k	f/k	g/k
3	1	1	1	5

Multiple "k" Defects

(11 (2.925 per cent) out of 376)

t/k; p/k 1
t/k; f/k 1
t/k; d/k 3
t/k; ɳ/k 1
t/k; g/k 2
t/k; ɳ/k; g/k 1
t/k; ɳ/k; Φ/k; x/k 1
ɳ/k; t/k; d/k; dʒ/k 1

Grade II

Blends only	ʒ/k	d/k	t/k	b/k	
8	1	1	4	1	
p/k	kl/k	θk/k	f/k	ɳ/k	g/k
1	1	1	1	2	1

Multiple "k" Defects

(1 (0.257 per cent) out of 389 Grade II.)

d/k; d/g; b/k; b/g 1

Country "w"

11 (2.925 per cent) out of 376 Grade I.
1 (0.257 per cent) out of 389 Grade II.

Grade I

Blends only	–/w	β/w	t/w	kw/w	n/w	n̥/w	p/w	tw/w
3	5	1	1	1	1	1	1	1

Multiple "w" Defects

(1 (0.265 per cent) out of 376 Grade I.)

n/w; –/w 1

Grade II

ð/w
1

Multiple "w" Defects

(0)

Country "m"
4 (1.063 per cent) out of 376 Grade I.
0 Grade II.

Grade I

–/m	t/m
3	1

Country "j"
3 (0.797 per cent) out of 376 Grade I.
0 Grade II.

–/j 3

APPENDIX D

Various Other Surveys Indicating Requirements in the School Population

Dunbartonshire (1927)

21,452 examined.
5.7 per cent infants; 4.5 per cent juniors; 6.7 per cent seniors.

Ayrshire (1931)

38,736 examined.
3.1 per cent infants; 2.8 per cent juniors; 3.6 per cent seniors.

Glasgow (1932)

5,705 examined.
8.5 per cent infants; 4.9 per cent juniors; 7.5 per cent seniors.

Watson, W. N. B. (1960). Speech therapy in local authority schools in Scotland. *Medical Officer* CIII, 105–107.

1 : 8,000

Parken, D. S. (1961). Survey of speech defects in Poole 1956–60. *Medical Officer*, CV, 17–19.

11,924 examined.
3.9 per cent (474) speech defective.

Dorset Survey (1947–50)

2 per cent speech defective.

National Incidence (Britain)

1.5–3 per cent speech defective.

Authoritative Opinion

1 : 10,000 school children.

Department of Education and Science, Leicester Survey (Chief Medical Officer 1966), *The health of the school child*, 1964–65, pp. 35–40.

2,019 examined.
15.1 per cent defective.

Grady, P. A. E., and Daniels, J. C. (1964). A survey of incidence of speech defects in children. *Educational Papers*, No. 1, Institute of Education, University of Nottingham.

3,000 examined.
10 per cent ther.
17 per cent obs. } 27 per cent

Purchase, U. (1958). In the *Report of Primary School Medical Officer*, City of Leeds, for the year 1958, pp. 20–21.

56 per cent on first entering school—about half resolved spontaneously in first year.

Morley, M. E. (1957). *The development and disorders of speech in childhood*. Edinburgh: Livingstone, pp. 1, 20–28, 44.

14 per cent of random sample of 1,000 children had serious defects at five years, and 4 per cent unintelligible even though about to enter school.

Horner, J. S., and Wickerson, S. M. (1967). A comprehensive local authority speech therapy survey. *The Medical Officer*, pp. 179–184.

1 : 5,000 (fr. earlier figures).

Supple, Sister M. de M. (1966). Survey of speech defective children in primary school population of Ireland, and comparison of same with distribution of speech disorders seen in Children's Hospital, Dublin. *Journal of Australian College of Speech Therapists* XVI, No. 2.

3 per cent overall.

Bennett, R. (1947). 1943 survey. *Journal of the College of Speech Therapists, London* XXI, No. 1.

11,498 examined (infants, juniors, seniors) = 1.94 per cent.

Wallin (1927)

2.8 per cent speech defective in Miami.

Wohl, M. T. (1951). The incidence of speech defects in the population. *Journal of the College of Speech Therapists, London* XV, No. 1, 13–14.

12 per cent speech defective (5–18 years of age in Dumbarton).

ASHA Committee on the Midcentury White House Conference (1952). Speech disorders and speech correction. *Journal of Speech and Hearing Disorders* XVII, No. 2, 129–137.

10 per cent defective (5–21 years of age).
5 per cent severe.

Hawk, E. A. (1945). "A survey and critical analysis of speech needs in the elementary schools of an Ohio city of 15,000 population with a suggested remedial program in speech." Unpublished doctoral thesis, Ohio State University.

1,200 children examined.
9.5 per cent (114) defective.

Johnson, W. (1942). The Iowa remedial education program: summary report. *Child Welfare Research Statistics*, Iowa City, Iowa.

30,000 examined.
10 per cent defective.

Irwin, R. B. (1948). Ohio looks ahead in speech and hearing therapy. *Journal of Speech and Hearing Disorders* XIII, 55–60.

6,000 Grade I to VI children examined.
10 per cent defective.

Mills, A., and Streit, H. (1942). Report of a speech survey, Holyoke, Massachusetts. *Journal of Speech and Hearing Disorders*, VII, 161–67.

First three grades tested (1,196).
33.4 per cent defective.

APPENDIX E

Screening Test

Initials	*Blends*
*p*ig	*pl*ate
*b*ed	*cl*ock
*t*ap	*sl*eep
*d*og	*sm*oke
*c*ake	*sn*ake
*g*un	*str*ing
*f*ish	*scr*ew
*s*ock	*spr*inkler
*sh*oe	*pr*am
*th*umb	*tr*ee
*ch*air	*cr*y
*j*ug	*fr*og
*r*ose	
*l*eg	
*w*ashing	
*y*ellow	

APPENDIX F

Detailed Test

Slides of familiar objects and actions:

carrot	feather
stamp	bottle
smoke	blue
pram	cup
tap	key
green	yellow
oranges	knife
snake	ticket
clouds	toothbrush
chair	ladder
butcher	switch
tree	sprinkler
glass	jumping
watch	apple
saw	shoe

pencil
flag
web
string
washing-machine
bird
tiger
frog
dress
three
glasses
telephone
zebra
table
dog
flowers
spoon
pig
vase
thumb
trousers
screw
teeth
book
horses
rope
gun
scarf
ball
egg
letter
climbing
foot
hat
bell
glove
cage
bread
comb
banana
sun
car
nest
sandwich
hammer
mouse

APPENDIX G

681 children were seen by the research speech therapist at the five sample Brisbane schools, the subdivisions being as follows:

	Grade I	Grade II	Total
Ironside	119	102	221
Inala	104	84	188
Toowong	67	50	117
Manly	60	35	95
St. Ambrose	38	22	60
Total	388	293	681

In the country, however, the four areas will be compared as wholes and then each area will be further broken down into its component schools

	Grade I	Grade II	Total
Warwick/Stanthorpe	61	64	125
Toowoomba	157	152	309
Ipswich	64	74	138
Gympie	94	99	193
Total	376	389	765

No Speech Defect and Potential Speech Therapy Cases in Each Country Area

Warwick/Stanthorpe

	Stanthorpe State	Stanthorpe Convent	Warwick Central	Wheatvale
No Speech Defect Grade I	$\frac{8}{24}$	$\frac{1}{15}$	$\frac{7}{12}$	$\frac{2}{10}$
Grade II	$\frac{18}{28}$	$\frac{5}{15}$	$\frac{10}{11}$	$\frac{6}{10}$
Total	$\frac{26}{52}$	$\frac{6}{30}$	$\frac{17}{23}$	$\frac{8}{20}$
Potential Speech Therapy Grade I	$\frac{6}{24}$	$\frac{3}{15}$	$\frac{2}{12}$	$\frac{3}{10}$
Grade II	$\frac{3}{28}$	$\frac{4}{15}$	$\frac{1}{11}$	$\frac{2}{10}$
Total	$\frac{9}{52}$	$\frac{7}{30}$	$\frac{3}{23}$	$\frac{5}{20}$

Toowoomba

	South Girls and Infants	Our Lady of Lourdes	Crow's Nest
No Speech Defect Grade I	$\frac{25}{78}$	$\frac{7}{40}$	$\frac{13}{39}$
Grade II	$\frac{41}{95}$	$\frac{13}{32}$	$\frac{10}{25}$
Total	$\frac{66}{173}$	$\frac{31}{72}$	$\frac{23}{64}$
Potential Speech Therapy Grade I	$\frac{11}{78}$	$\frac{7}{40}$	$\frac{15}{39}$
Grade II	$\frac{12}{95}$	$\frac{1}{32}$	$\frac{4}{25}$
Total	$\frac{23}{173}$	$\frac{8}{72}$	$\frac{19}{64}$

Ipswich

	Ashwell	Haigslea	Engelburg	Aratula	Tarome	Lower Tivoli
No Speech Defect Grade I	$\frac{0}{1}$	$\frac{2}{3}$	$\frac{5}{29}$	$\frac{1}{6}$	$\frac{0}{0}$	$\frac{19}{35}$
Grade II	$\frac{2}{6}$	$\frac{4}{10}$	$\frac{12}{18}$	$\frac{4}{11}$	$\frac{4}{7}$	$\frac{7}{22}$
Total	$\frac{2}{7}$	$\frac{6}{13}$	$\frac{17}{37}$	$\frac{5}{17}$	$\frac{4}{7}$	$\frac{26}{57}$
Potential Speech Therapy Grade I	$\frac{0}{1}$	$\frac{0}{3}$	$\frac{3}{29}$	$\frac{2}{6}$	$\frac{0}{0}$	$\frac{5}{35}$
Grade II	$\frac{1}{6}$	$\frac{2}{10}$	$\frac{2}{18}$	$\frac{1}{11}$	$\frac{1}{7}$	$\frac{7}{22}$
Total	$\frac{1}{7}$	$\frac{2}{13}$	$\frac{5}{37}$	$\frac{3}{17}$	$\frac{1}{7}$	$\frac{12}{57}$

Gympie

	Maroochydore	Maleny	Conondale	Mons	Glenview
No Speech Defect					
Grade I	$\frac{8}{50}$	$\frac{6}{28}$	$\frac{4}{10}$	$\frac{0}{4}$	$\frac{0}{2}$
Grade II	$\frac{10}{52}$	$\frac{19}{35}$	$\frac{2}{7}$	$\frac{1}{7}$	$\frac{0}{3}$
Total	$\frac{18}{102}$	$\frac{25}{63}$	$\frac{6}{17}$	$\frac{1}{6}$	$\frac{0}{5}$
Potential Speech Therapy					
Grade I	$\frac{8}{50}$	$\frac{6}{28}$	$\frac{3}{10}$	$\frac{1}{4}$	$\frac{1}{2}$
Grade II	$\frac{11}{52}$	$\frac{3}{35}$	$\frac{0}{7}$	$\frac{0}{2}$	$\frac{2}{3}$
Total	$\frac{19}{102}$	$\frac{9}{63}$	$\frac{3}{17}$	$\frac{1}{6}$	$\frac{3}{5}$