AN EVALUATION OF THE TRAINING OF TELEPHONISTS

By

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CONTENTS

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Finally, there are the many operators, supervisors and Traffic staff in various parts of the Eastern, London and Midlands Telecommunications Regions. It is no exaggerations to say that nothing could have been done without their help.

DECLARATION

No material used in this thesis has been used before. The data given in Table II were collected by E. A. Hackett, and his analysis of this data was used to reject valued-call scores for evaluation purposes, although the discussion of progress check targets is my own.

In Tables III and IV, Hackett collected the basic data for Trainees 8 - 12 inclusive. He was responsible also for the observations on the training failure given in Table VIII, although the treatment of this data is my own.

The use of the Kolmogerov-Smirnov and Fisher Exact Probability Tests for the analysis of the simulated call tests was proposed by E. A. Hackett, after consultation with Mr. G. Goodall of Brunel University. The rest of the work is my own.

SUMMARY

The research described in this thesis is part of a study undertaken by the Post Office to determine criteria for the evaluation of training. In particular, the training of operators for switchboards at Auto Manual Centres (AMCs) is investigated. This is done both at AMCs and in training centres known as Wing Schools. The similarities and differences between the training at AMCs and Wing Schools are discussed, together with a brief outline of the work itself and the recruitment process.

The work is considered quasi-repetitive, and includes an element of decision-making. Measures of output exist, which are used by management to determine staffing levels. These measures are considered for the purpose of assessing training effectiveness, which is seen as the core of the problem of evaluating training. However, they are shown to be unsuitable in this role, and a simpler measure of progress is proposed.

By activity sampling methods, the existence of activity profiles is shown for experienced operators. The profiles are affected by the traffic mix in the AMC, but are seen as a means of comparing trainees' progress in different locations. Activity sampling observations of trainees compare the effects of practice on live and simulated traffic during their initial training period, and for a further five months of post-training experience. Additionally, comparisons are drawn between successful and unsuccessful trainees.

Next, objective tests using partial simulation of call situations are used to compare different methods of studying programmed texts. No difference is found between the methods, but a comparison is made also between two different orders of training, with positive results.

A brief study of costs shows that training in an AMC is likely to cost very much less than in a school, but also indicates that improved selection would show financial returns.

The principal conclusions are that

(a) Common activity-profiles exist for trained operators within a particular exchange.

(b) The profiles can be used in the assessment of training performance.

(c) The benefit of training operators for Directory Enquiry work initially and subsequently training for switchboard operation should be given further investigation.

(d) Training in an AMC is more cost-effective than at a Wing School.

(e) A trainability test should be a useful addition to the present selection procedures.

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACS	Advise Called Subscriber
ADC	Advise Duration and Charge
AFN	All-Figure Number
AMC	Auto-Manual Centre
ASr	Assistant Supervisor
DEP	Department of Employment and Productivity
DQ	Directory Enquiries
EQ	Service Enquiries
Erreg	Error or irregularity
Hz	Hertz
ITRU	Industrial Training Research Unit
OJM	Outgoing Junction Multiple
PBX	Private Branch Exchange
PL	Programmed Learning
PLB	Instructor's guide to programmed text
PLC	Instructor's guide to conventional instruction
PO	Post Office
PR	Programmed text
Psy SD	Psychological Services Division
RQ	Route and Rates Enquiry
STD	Subscriber Trunk Dialling
THQ	Telecommunications Headquarters
VIF	Visible Index File

INTRODUCTION

In 1971 the Post Office set up a two-man Research Project to determine criteria for the evaluation of training. Training of switchboard operators was chosen for study, since this represented a considerable single component of the annual training cost. Operators have formed part of the telephone service since its inception in the nineteenth century, although operating techniques have been changed. Techniques used currently by trunk operators are based on those first introduced in 1938-9 when the mechanisation, or semi-automation, of the trunk network was started. Further changes have resulted from the introduction of Subscriber Trunk Dialling from 1958, and the provision of new types of service, such as Credit Cards and Freefone. However, the operator service has been given close attention by management, and a workload-based output measure devised which is used both to control staffing levels and as a yardstick for individual training assessment.

At the same time, the duration of initial training has been shortened progressively. The methods studied use programmed texts as the prime means of imparting the job knowledge to the trainee, and practice sessions on either live or simulated traffic to develop the trainees' manipulative skills and to reinforce the knowledge gained in the classroom. Although the programs had been given some measure of validation, evaluation of the training as such had not been undertaken, nor, so far as could be determined, had earlier training methods been subjected to evaluation.

Evaluation studies undertaken by others, although of interest, tended to be of little direct help. There is a notable concentration of effort at the two ends of the job-complexity scale. At one extreme, interest has centred on the simple, repetitive tasks such as cosmetics packaging, sewing-machine operation and typewriting. At the other, many researchers have braved the deeps of supervisory and management training, usually with indifferent results. However, a telephonist's job comes between these extremes. There are repetitive elements, but simultaneously there is a prominent element of information processing with associated decision-making. The work is seen as quasi-repetitive, allied in

nature with certain clerical jobs or maintenance tasks. The latter have been the subject of much research, particularly in the military field (for example, the Functionally Identified Maintenance System of the Royal Navy, and the Data Flow diagrams of the Royal Air Force), but this has centred on the validation of the system rather than the training given for use of the system.

The output measure was proved unsatisfactory for the assessment of training methods and an alternative approach using activity sampling was tried. By this means, it was established that experienced operators distribute their time among the component activities of the work in a common pattern. The activity profiles so obtained give a means of measuring the effect of training. There is some similarity here between this research and that undertaken by the Industrial Training Research Unit on the effectiveness of instructional styles of London Transport's driving instructors.

By extending the method to studies of trainees, it was found that changes in the activity profiles could be detected not merely beyond the period of initial training (which was to be expected) but also well beyond the point at which the Post Office, using the output measure, considered the recruits to have become fully-qualified telephonists. It was further found that the type of practice during initial training had no effect on profile development.

An important secondary finding was the nature of the difficulty met by many of the recruits who fail during initial training, which led to the proposition that the selection process be modified to try to improve the rejection of potential failures. This is a view reached independently by the Psychological Services Branch of the Post Office, which has been investigating recruitment and selection of telephonists since 1969.

Using a series of objective tests designed to measure the trainee's abilities to process information and solve problems, the study found that two methods of using the programmed texts did not give differences in outcome. However, the indications were that previous experience of Directory Enquiry working improved a trainee's performance in these tests, which suggested a subject for further research.

Chapter 1

TELEPHONISTS' WORK

1.1 The inland operator service

At the end of the financial year 1972-73, 50,709 men and women were employed by the Post Office (P.O.) as telephonists. Some three-fifths of this number are women, employed full-time in providing the daytime inland operator service. Across the United Kingdom, in more than 300 Auto-Manual Centres (AMC), they work the operator-assistance, directory enquiry (DQ) and service enquiry (EQ) services between 8.0 am. and 6.0. pm. This study is concerned with the training of recruits for work in the operator-assistance service (sometimes called controlling-operator duties). Some discussion of the work is unavoidable.

1.2. The Sleeve-control Switchboard

When performing the task, the telephonist sits at a switchboard. Of the three types in current use, the sleeve-control switchboard is the most common. Figure 1 shows a typical sleeve-control switchboard. There are two main parts, the vertically mounted panels which form the face equipment and the horizontal keyshelf. The principle of the work is simple; flexible electrical conductors, the cords, are used to interconnect circuits terminating on the face equipment, and simultaneously to associate keyshelf equipment needed to control the call. The operator can monitor the switchboard functions by lamp signals. A headset, containing microphone and earpiece, is worn by the operator, and plugs into the sockets visible at the bottom of Figure 1, enabling the operator to give and receive audible information.

The face equipment panels carry rows of sockets or jacks, each of which has an associated signal lamp. The panels are divided horizontally into two main sections. The lower portion is called the answering field, and here the jacks are the terminations of incoming circuits. A customer dialling 100 (or O, as appropriate) is connected to one of these jacks. Lines from operators in other AMCs may also be connected to jacks in the answering field. The signal lamp lights when there is a call present on the associated jack. Colour codes may be used to distinguish different types of call, such as from customers with or without subscriber Trunk Dialling (STD)

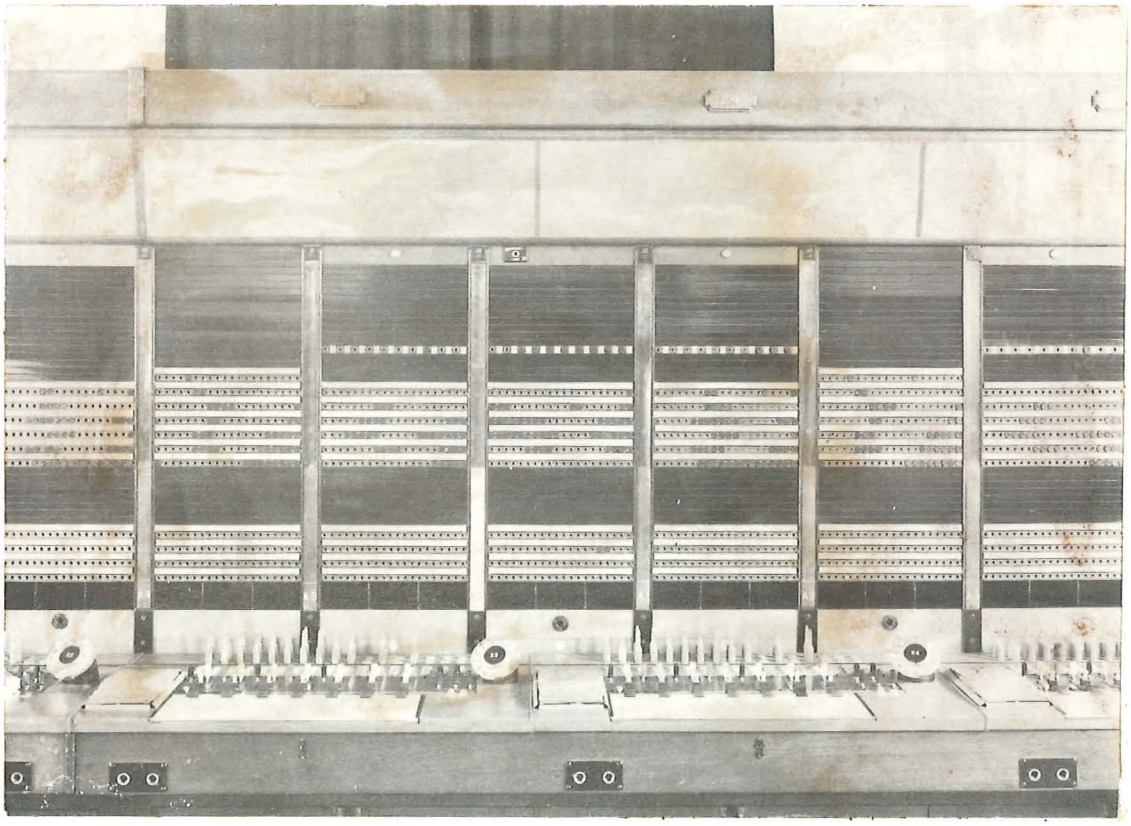


Figure 1. - A sleeve-control switchboard

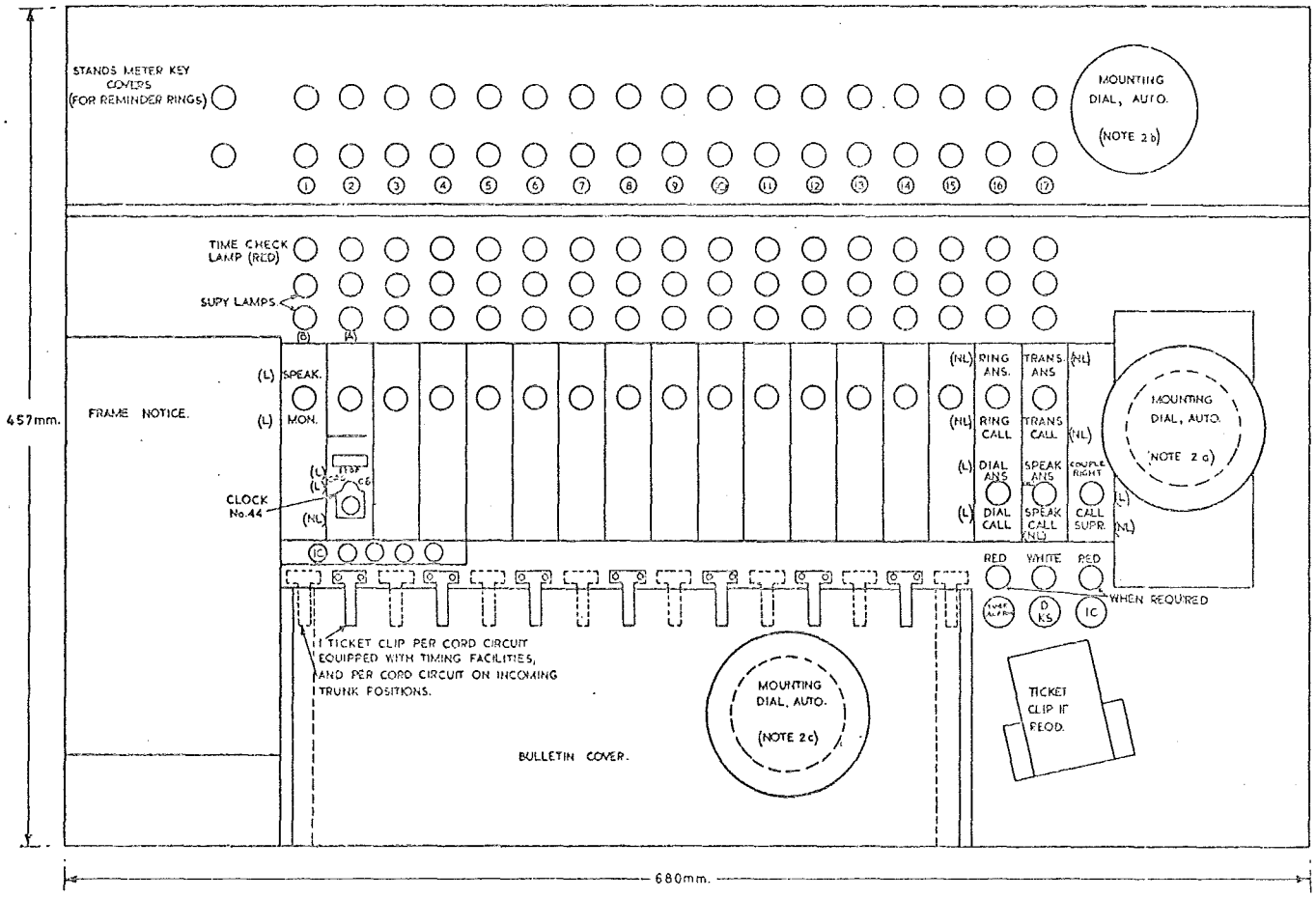
facilities, or incoming calls from other AMCs. When the plug of a cord circuit is inserted in the jack, the lamp is extinguished.

The upper portion of the panels is called the outgoing junction multiple (OJM). Here the jacks terminate outgoing circuits or junctions. Most of these circuits connect to automatic exchanges, either local in the area controlled by the AMC or, at greater distances, in the trunk network. For example, Bedford AMC OJM gives connections to exchanges in the area controlled by Bedford and also to trunk switches in London, Cambridge, Reading, Peterborough and Birmingham, among others. Usually, all the junctions to a particular location are grouped horizontally. The lamp signals light to mark a free junction, that is, one that is not in use. Again, plugging a cord into the jack extinguishes the lamp.

At the top of the OJM are a number of junctions which connect the operator to services within the exchange. Some of these are for customer access, if necessary, such as EQ or DQ. Others are for the operators' needs, such as Route and Rate Enquiry (RQ). This section is sometimes called the service multiple.

Both the answering field and the OJM are repeated at intervals around the switchboard. Hence, a customer dialling 100 may be answered by any of a number of operators at different positions in the switchroom, which improves the service. Similarly, all the operators have common access to outgoing junctions. This may degrade the service; if, on a busy route, all the junctions are in use, (congestion), a call will be held up until there is a free junction.

Figure 2 is a diagram of the keyshelf layout. Nearest to the face equipment (at the top of the figure) is the row of answering cords. Behind these is the row of calling cords. Next come three rows of lamps, the first, coloured red, are the time check lamps, the others, which are white, are the supervisory lamps. The supervisories are associated with the cord circuits. The answering supervisory darkens when the answering cord is plugged into a jack in the answering field on which a customer is calling. When the customer completes the call and replaces the receiver, the answering supervisory glows. The calling supervisory glows when the calling cord is plugged into a free line in the OJM, and darkens when the called customer lifts the receiver. It glows again when the called customer replaces the receiver.



NOTES:-

1. DIAGRAM SHOWS CAPACITY.
   WHERE EQUIPMENT IS NOT SPECIFIED, BLANKS WILL BE FITTED EXCEPT FOR TUBE INLETS & TUBE ALARM LAMPS, HOLES FOR WHICH WILL ONLY BE CUT WHERE TUBES ARE ULTIMATELY REQUIRED.
2. POSITION OF DIAL
   (a) THE DIAL WILL NORMALLY BE FITTED ON THE DIGIT KEY BLANK.
   (b) WHEN DIGIT KEYS ARE FITTED THE DIAL WILL BE FITTED ON THE PLUG SHELF.
   (c) ON J.C.'B' POSITIONS THE BULLETIN COVER WILL BE REPLACED BY A FIBRE-COVERED BLANK AND THE DIAL FITTED AS SHOWN.

R 30634 C

Figure 2. - Keyshelf layout diagram.

The next row is of double-throw key switches. When thrown forward (SPEAK) the operator is able both to speak and listen on the associated cord circuits. When thrown back (monitor or MON) the operator can listen only on the circuit. Circuit interlocks enable only one key to be operated at any time. If two or more keys are off the centre position, the circuits remain dead.

Close to the keys are the timing clock controls. Clocks are not necessarily fitted on each circuit, and one only is shown in Figure 2. The display is of the veeder-counter type, visible through a small rectangular window. The clock start control may be rotated horizontally to either of two positions depending on whether the call comes from an ordinary line or a coin box. The clock is re-set by a push-button. Finally, behind the clocks is a row of ticket clips.

At the right hand side there are five other double-throw keys, the most important of which is the dial key which enables dial pulses to be transmitted to either the answering or the calling circuits. The dial itself is usually mounted alongside this group of keys. On the left-hand side of the position, a frame carries the Visible Index File (VIF).

1.3 The VIF.

The VIF is the operator's principal source of information. It consists of a number of sections in a flip-over, indexed-access format. The largest section is an alphabetically-ordered list of exchanges. A typical page from this section is shown in Figure 3. For each exchange listed, there is a charge letter which tells the rate at which calls to that exchange are charged, and a routing, which tells which set of junctions to use and what code to dial to connect a call to that exchange. For some exchanges, an alternative routing is given, for use if the primary route is congested.

An asterisk against the charge letter shows that STD subscribers can dial calls to this exchange. The customers' dial code will be shown then in a separate column. Typically only about two-thirds of the exchanges within the UK are listed in this section of the VIF. If the operator is asked for a call to an exchange not listed, she refers to RQ; the RQ operator will give the routing and any STD code if this is applicable.

The other sections of the VIF contain miscellaneous items of information. Always included are sections giving

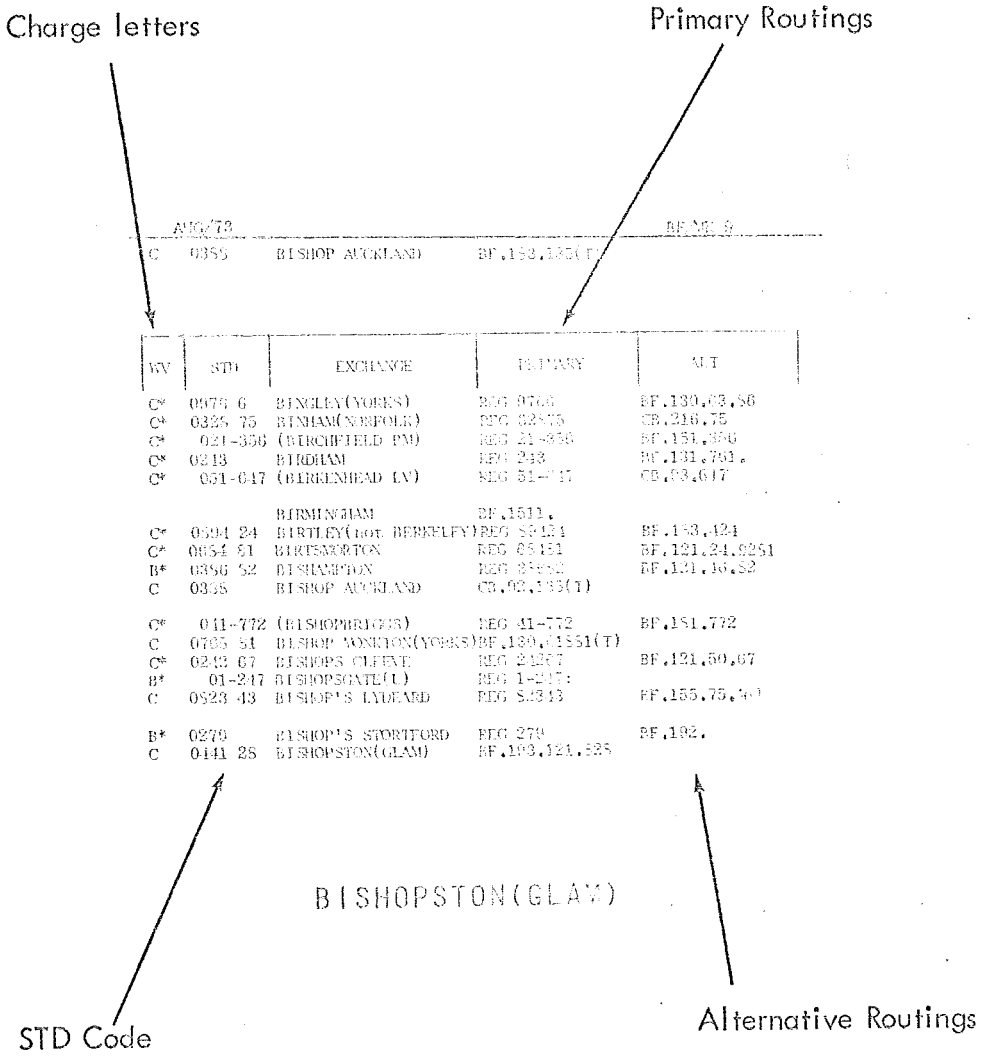


Figure 3. - A page from the Exchange Section of a Visible Index File

a. an explanation of symbols used
b. charge rates for all lines, distances and times
c. Freefone information
d. credit card information
e. emergency services
f. Continental and international services
g. local dialling codes
h. controlled exchange names and abbreviations (and charge groups, if appropriate).

Other information, depending on local practice, may include

j. lists of Private Branch Exchange (PBX) numbers
k. lists of coin-box numbers.

The foregoing list is not intended to be exhaustive.

1.4 The Ticket

The remaining item of equipment used by the telephonist is the ticket. This is the instrument of billing, used to levy charges for the operator's services. Figure 4 shows the ticket used during the period of this study; the reverse side is blank. When completed, the ticket carries all information relating to the handling of a particular call.

1.5. A Straightforward Call.

"About three calls out of every four are straightforward and are connected without difficulty." (1) The procedures for connecting calls of all types are laid down in the Operating Handbook. The 1971 edition, from which the above quotation is taken, was current during the period of the study. A straightforward call will be described to illustrate the typical work activities of a telephonist.

Having completed a previous call, the telephonist sits waiting a call, with the answering plug in her hand and the Speak key forward. When a signal glows in the answering field, the operator plugs into the associated jack and says "Number please".

The customer gives the wanted exchange name and number, which the operator records on the ticket in the TO spaces. If she has not done so before receiving the call, the operator also writes in her initials or number in the REC'D BY space, and marks off the time rate (P, S, I or C) in the marking panel. (Figure 5a.). As she

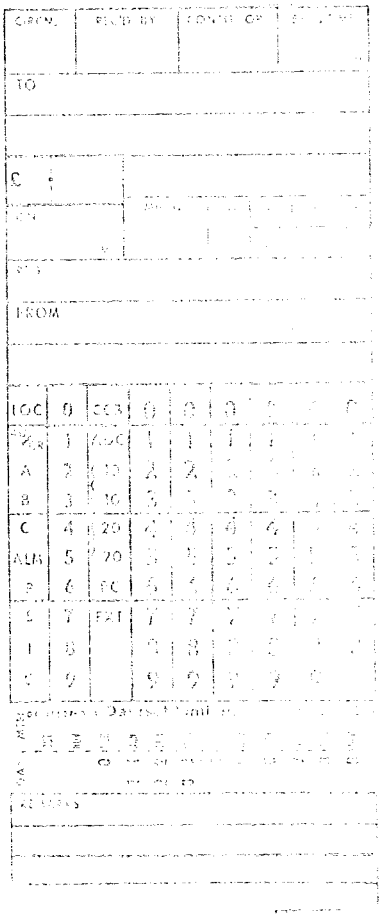


Figure 4. - A Telephone Call Ticket

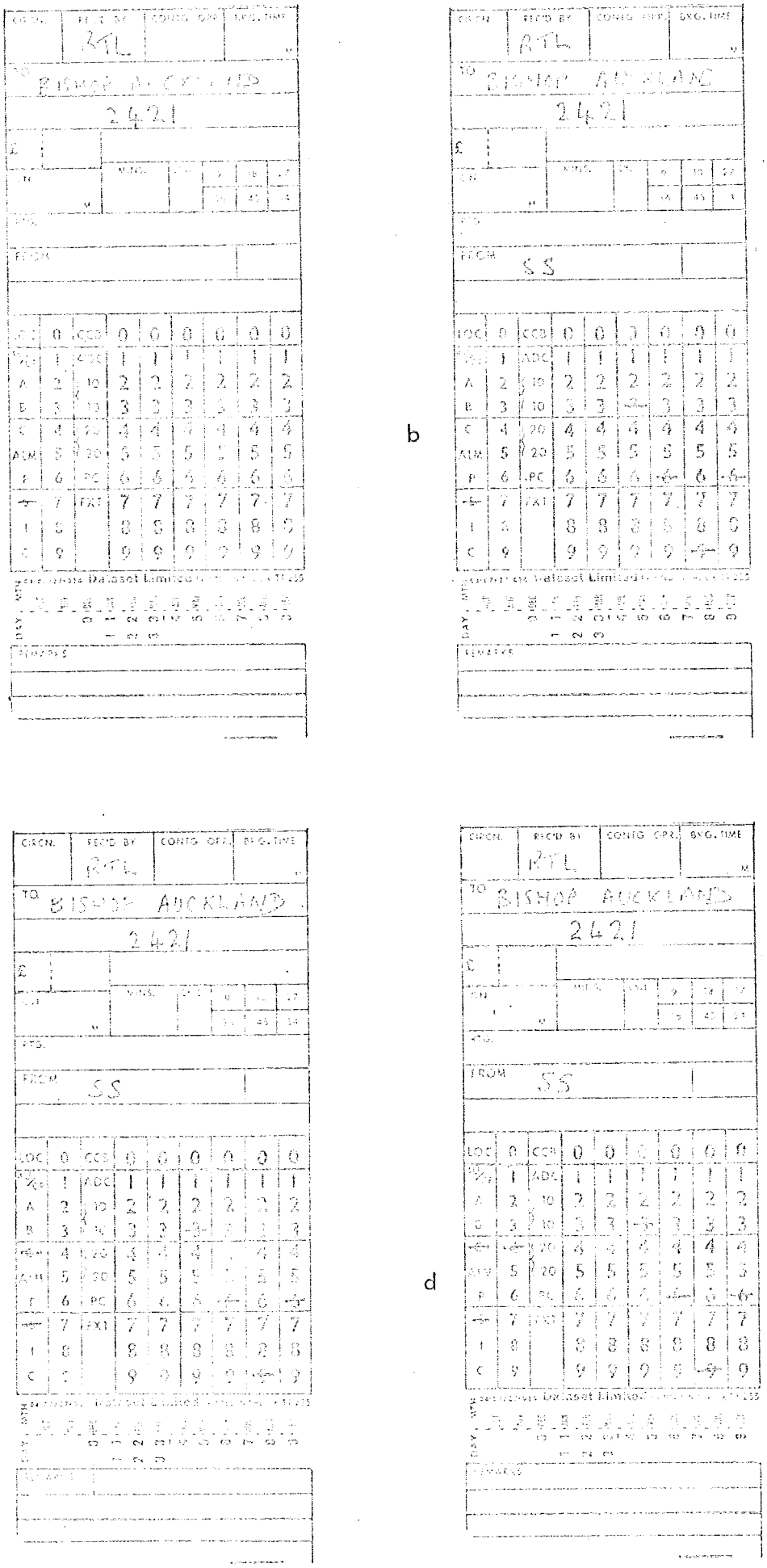


Figure 5. - Completion of a Ticket

writes the wanted name and number, she repeats them back to the customer for verification or correction.

If the customer does not offer his number, the operator says "What is your number, please". As it is given, the operator records the name in the first line of the FROM space, and marks off the digits in the last six columns of the marking panel (Figure 5b.). The originating exchange name will usually be written as an authorised code.

The operator now looks for the called exchange in the VIF. Having verified that the call cannot be dialled by the customer, she marks off the charge letter in the first column of the marking panel (Figure 5c.) and notes the routing, (in this case CB 92 135). Plugging the associated calling cord into a free CB junction, she throws the dial key to the DIAL CALL position and dials the routing digits followed by the called number digits (92 135 2421). At the end of the digit sequence, the dial key is restored to normal. The ticket is placed under the appropriate clip.

If all has gone well, ringing tone will be heard. In most exchanges, the operator can preset the timing equipment, which she does by depressing the push-button (that is, resetting the clock to zero) and then turning the switch to the left (ORD or ordinary line timing). The clock will now start automatically as soon as the called number answers. At the same time, the calling supervisory will darken. Hence the operator can leave the circuit and attend to other calls, and yet still be able to tell at a glance whether the call has been answered.

Assuming that the called customer answers and a conversation occurs, at the end of the conversation both customers replace their receivers, and both the calling and answering supervisories glow (a "double clear"). The operator stops the clock by turning the switch to the normal position, unplugs both the calling and answering cords (clearing down), reads the time used from the clock and marks it off, rounded up to the nearest minute, on the ticket (Figure 5d.). The ticket is now filed for collection by the ticket collector.

1.6. Difficulties

For the one call in four in which, according to the Handbook, difficulties are met, procedures are set out which the telephonist follows either to a successful conclusion or to delayed further attempts or enquiries. It is worth noting that there are more than 300 different types of call in terms of differently completed tickets. These are taught during training.

1.7. Responsibility

Although some centralized recruiting existed during the early stages of the study, this task has now been devolved to the exchanges. This has the advantages, among others, that recruits know where they are going to work, and those who do the recruiting feel the effect of any mistakes they make. Conversely, a possible disadvantage is the establishment of local standards where, ostensibly, national standards exist.

1.8. Selection Tests

The selection procedure is defined in a PO booklet, "Recruitment of Telephonists". There are aptitude tests for eyesight, hearing, speech, writing and alertness (this last using the VIF), and an interview. In each case, applicants are graded A, B or C. In theory, no applicant with a C grade in any of the tests or the interview, but often those with one C grade in the tests may be considered for employment, provided the interview grade is A or B.

The interviews are conducted in most cases by the Training Supervisor, who is at least a second-level supervisor. Some training is given to the interviewers, and the booklet gives some further guidance as well as the rules for selection and the associated clerical procedures (2).

Although the test results give some indication, most supervisors seem to place most emphasis on the interview. Some candidates apply for training merely to enable themselves to obtain other jobs in PBXs where the employers specify "P.O. trained" as a necessary qualification. Motivation is accordingly considered important and may be ranked by some supervisors as equal with aptitude.

1.9. Modified Selection Procedure

Psychological Services Division (PsySD) of the Central Headquarters of the Post Office was asked in 1969 to study selection procedures with the aim of producing an improved method. A Job Analysis was made from which a job specification was drawn up. A modified selection procedure was proposed, which essentially standardised the existing procedure. As well as an interview, there were tests for

a. Vision - the Ishihara test

b. Hearing and spelling - using a standardised pre-recorded tape

c. Arithmetic - a standardised test emphasizing speed rather than depth of knowledge

d. Ability to locate information - looking up charging rates in a simplified matrix rather than the VIF.

Again, there is no test of manipulative ability. The report says " ... and manual dexterity, in the sense of being nimble-fingered, plays a vital part in speed and accuracy, both extremely important elements in the job. However, the ability to control a position efficiently can be acquired by most staff during the course of their training in the use of the switchboard." (3) At first sight this seems a reasonable conclusion.

The trial of this procedure has suffered delays caused by cessation of recruitment in the exchange, so that all trainees who have participated in this study have been selected by the existing method.

TRAINING

1.10. Wing Schools

When the study began, a number of Wing Schools existed. These were established on a geographical basis in that they trained operators from a particular Telecommunications Region. Some Regions had more than one school. During the period of the study, a policy of closure of Wing Schools has been pursued, so that only the London Region's schools at Rodwell House, E.1, and Kew remain. Training has been transferred, wherever possible, to the exchange itself.

In the remaining schools classes comprise ten trainees at maximum. During practice periods, one instructor oversees each pair of trainees.

1.11. Training In The Exchange

In an exchange, normally one instructor controls a pair of trainees, both in the classroom and in practice periods. The instructor is an Assistant Supervisor (ASr), that is, a first-level supervisor. Occasionally, if demand arises, the class size may be increased, up to a maximum of eight trainees. If this occurs, the ASr is given more help during practice periods, usually from the experienced senior telephonists.

The Training Supervisor has overall responsibility for training, including the training of ASrs in the use of the Programmed Learning Course. In a large exchange, training may be the Training Supervisor's only task. In smaller exchanges, she will also have operational duties.

1.12. The Programmed Learning Course

In both schools and exchanges, the basis of telephonists' initial training is now the Programmed Learning (PL) Course. This is a series of PL texts, produced by a Telecommunications Headquarters (THQ) group. The programs are predominantly linear, although there is some branching. Their content deals with the procedures contained in the Operating Handbook and the same programs (with slight variations to cover equipment differences) apply to all AMCs in the U.K.

Some procedures do not lend themselves to programming because they are affected by local circumstances. For these, the same THQ group prepares guides for conventional instruction; the guides form the framework within which the ASr adds the local detail. A good example of this is the procedure for checking on calls lasting more than 9 minutes; the basic procedure is the same in all AMCs, but it is markedly affected in detail by the inclusion of a PBX list in the VIF.

Some programs are accompanied by audio tapes. Each trainee has an individual playback machine under her control and playing into her headset earpiece. Instructions to switch on are in the text, those to switch off are on the tape. Hence a trainee is able to work through the program at her own rate.

There are 29 programs and 13 conventional instruction guides. The material taught in the programs is summarised in printed handouts prepared at THQ. The ASr either dictates notes or herself prepares handouts for the conventional instruction. Other notes may be made by the trainee as she wishes, as well as making examples of tickets. The trainees also write answers to the questions that are asked in the programs. The answers are marked and used to diagnose weaknesses in the training for remedial action. Inevitably, though, many ASrs also see the answers as indicators of progress.

Operating procedures are often changed, although most of the changes are slight. When the programs were written, validation checks were made. Validation of subsequent amendments has been very rare, because of the length of time needed for their production and distribution.

The first six programs deal with the fundamentals of the system, how to speak to customers, the ticket and the VIF. Accordingly they have to be read before the remainder, which tend to be self-contained. The reading order for the remainder can be changed to suit the conditions at the AMC. For example, if personal calls arise infrequently, the programs on this topic may be left to the end of the training period. The order of reading should be determined by the Training Supervisor.

1.13. Practise

The manipulative element of the job is taught on the switchboard, initially by demonstration, then by supervised practise. In an AMC this is on "live" traffic, that is, on calls originated by customers. There is no control over the calls, so that when a trainee plugs into a jack she may be asked to carry out work in which she has not had instruction. The ASr will then have to advise her or take over the call. With two trainees to supervise, this can impose a heavy demand on the ASr, particularly during the first week.

In Wing Schools, simulated traffic is used, although the practise switchboard embodies the facilities and functions of the real thing. The source of calls is another ASr in a separate room, who plays the parts of customers, other operators and automatic equipment. Hence, during practise, there are two ASrs for each pair of trainees. Practise calls are restricted to those with which the trainee is familiar, and are concentrated on reinforcement of the most-recently-learned material. If the trainee does or says the wrong things, no response is given, and she is allowed to reconsider her action. There is no need for the ASr to take over the call.

In a large school, all the trainees must be given practise, so the teaching timetable is centred on the practise periods. This reduces both the inherent flexibility of PL and the time given to practise. In most AMCs, the training positions can be used at any time; in the early stages of training, more time can be given to program reading, if needed, whereas later the practise time can be increased.

1.14. The Training Timetable

In both schools and AMCs, three weeks is allowed for initial training, that is, program reading with associated conventional instruction interspersed with practise at the board. This is followed by a week of consolidation at the board. (School trainees transfer to an exchange after initial training). In most AMCs

a further week of conventional instruction, interspersed with practise, is used to teach remaining topics (for example, handling emergency calls). However, this may be spread out over the next three months.

Appendices A and B show timetables for initial training in a school and an AMC respectively. Both similarities and differences may be seen in these timetables. In particular, it will be noted that the order of teaching, as indicated by program-reading, is virtually the same in each location during the first week. These programs contain the basic information about the work, the components that are common to almost every type of call. During the second and third weeks, the variations are taught, and there is here some flexibility of teaching order. This allows the material to be taught in order of priority, determined by the nature of the traffic at a particular exchange as interpreted by the Training Supervisor.

The major difference is in the amount of time given to switchboard practice. The time in the AMC is effectively double that allowed in the Wing School. However, it should be remembered that there is no control over the traffic in the AMC so that, especially during the first week, the actual practice time is less than is given in the timetable. Further, in the AMC the timetable is flexible. If more time is needed for program-reading it is taken from the practice periods. Nevertheless, the overall effect is that consolidation is primarily through practice in the AMC, as opposed to in the classroom at the Wing School.

CHAPTER 2

EVALUATION

2.1. Some Definitions

"Evaluation - The assessment of the total value of a training system, training course or program in social as well as financial terms. Evaluation differs from validation in that it attempts to measure the overall cost benefit of the course or program, and not just the achievement of its laid-down objectives. The term is also used in the general judgemental sense of the continuous monitoring of a program or of the training function as a whole." (4)

The initial definition quoted above, from the Glossary of Training Terms, is so global as to be virtually unworkable. In its widest sense, social implies "the community at large", and assessment of value in this context then becomes subjective to the extent that in most cases diametrically-opposed views may be advanced. On the other hand, Rackham's definition of evaluation as the systematic collection and utilisation of data in order to improve training (5) is too restrictive, although certainly practicable.

The standpoint taken during this study has been between these two extremes. There are few cases where the evaluation of training is neither carried out nor paid for by the organisation concerned, and this is no exception. Hence, any judgement of the benefit to society is likely to be biased; the value to society of telephonists is assumed, and will not be examined hereafter. The effectiveness and efficiency of this training are considered, but not solely with the improvement of training in mind.

Training is not an end in itself, although, regrettably, this is an attitude adopted often, not only by those outside the training sphere. It is merely one part of the operation, and, as such, interacts with the other parts. Whilst it is true that poor training is likely to give poor task performance, it is equally true that a badly-designed task is likely to result in

poor training. The aim of training must be to produce changes in trainee-behaviour. The possibility that the projected behavioural changes are themselves less than optimum can not be overlooked. Accordingly, although the study concentrates on training, the interactions with the task itself and with selection of trainees are considered.

2.2 A Justification

A definition of evaluation as a process which has the aim of improvement of task performance, as distinct from training performance, may need some justification. Certainly, it will not be universally well-received.

The traditional role of training may be summarised, somewhat cynically, as the process of shaping more-or-less square pegs to fit round holes. The long duration of the old-fashioned apprenticeship must surely owe much to the victim's need to adjust his attitudes, as well as to acquire the skills of hand. It is only during the last century that attention has been given to the attributes which qualify a recruit to begin training, and even now the standard of applicants is determined more by what the job pays than by any other consideration. Moreover, most selection methods hope to predict whether the applicant will ultimately do the job well, and not whether he or she can be trained easily by the method in use.

It is even more recently, perhaps only in the last decade, that training has been considered while new tasks are being developed. Initially, this has taken the form of higher priority in the provision of equipment and other resources for training purposes. This has been particularly evident in technological areas, and especially in the larger, national organizations such as the Defence Services and the nationalized industries. For example, in the early 1960's, the first of a series of new radars bought by the RAF was installed at a technician training establishment. By the time the first operational unit was installed, personnel were trained to maintain it.

Although this case may be dismissed as special, occasioned by the needs of a defence situation, it must be noted that this attitude to training has not existed in the services in the past. Furthermore, the tendency within industry to relegate training to a last-priority position has been weakened, partly by legislation but, more importantly, by the high costs of technologically-advanced systems. Failure to make adequate preparation for training is coming to be seen as financially foolhardy.

Task analysis to determine training needs is well-established. In the Post Office there is some dialogue between the operational and training groups concerning training needs, during the development of new systems. If training is recognised as a part of operations, such discussion follows inevitably. However, the attitude to evaluation in this study seeks to extend the process to existing tasks; the detailed investigation of training must include the task itself. Conclusions drawn about the task ought to be as valid as those concerning training.

2.3. Cost-effectiveness

Usually, at the heart of the evaluation process, some attempt is made to assess the cost-effectiveness of training. Since costing is, comparatively, a well-defined and simple process (at least, when social issues are avoided), the problem simplifies to the determination of effectiveness.

Now, Davies (6) differentiates between effectiveness and efficiency, summarising the former as doing the right things, and the latter as doing things right. Arguing that training may be efficient without being effective, he concludes that effectiveness is the most desirable goal of training, although he adds that, for manual workers, only efficiency is necessary.

However, the converse must also apply. It is possible for training to be effective but not efficient, which may be equally undesirable. Martin (7) uses the term "worthwhileness" to describe this attribute. Whatever terms are used, it is clear that a combination of effectiveness and efficiency is the true goal of any training scheme. An assessment of cost-effectiveness sets out to

answer one or both of the questions "Can the same result be had for less money?" or "Can a better result be had for the same money?".

2.4. Criteria

The difficulty, then, consists of devising appropriate measures of the outcome of training, that is, of establishing criteria. This might be considered a more simple problem than that associated with selection, since, at the end of training, the trainees should be able to perform the task. Where the task is manual and has some tangible output, a quantity measure might be proposed, which seems simple enough. However, there may be an associated quality standard, which immediately complicates the issue. How may a scheme whose outcome is characterised by high output with a high rejection rate be compared with one which results in a lower output with little wastage?

Furthermore, how does assessment at the end of training relate to subsequent achievement. Martin (7) suggests four stages of assessment

a. Immediate (during and at the end of sessions)
b. Short-term (at the end of a course)
c. Middle-term (relating to objectives beyond those specified for the course)
d. Long-term (relating to the general efficiency and adaptability of the organization).

It is well-known (for example Ghiselli and Haire (8), Bass (9))that the predictive validities of selection criteria vary widely with time, and there is no reason to suppose that this is not the case for evaluation criteria. For example, labour turnover must be considered in middle or long-term assessment, and an output quantity criterion used in short-term assessment may correlate positively, negatively or not at all with likelihood of leaving.

Even so, output quantity has been used extensively in investigation of repetitive manual tasks, presumably because little else springs to mind, and also because the measure lends itself to being fitted to one of the many learning curves that have been devised in the past half-century. At the

other extreme, evaluations of management training tend to rely on questionnaires for the comparison of pre- and post-training behaviour. In many cases the findings of such studies are inconclusive (for example, that reported by Schein (10)) perhaps because the objectives of management training courses are themselves nebulous.

However, the telephonist's task is by no means as complex as that of management. It does involve decision-making and choice of strategies, but the alternatives involved are limited in number, and defined in detail. On the other hand, although the work has an appreciable manual component, it is not truly repetitive. Although there are certain basic actions they are not common to all calls, and indeed, there is a high probability that, even if two successive calls were to the same number, the procedures followed would differ in some respect. The work might be termed "quasi-repetitive". This complicates the measurement and use of output quantity.

There are two criteria other than speed of working in the assessment of individual telephonists, namely accuracy and courtesy. Inclusion of the latter in an evaluation exercise was rejected; any measurement attempted would inevitably be subjective, with no real chance of standardization. Accuracy can be measured, though, in terms of errors made, but even here there are complications. What is counted by an ASr as an error or irregularity may have no effect on the handling of a call. If, for example, the trainee uses an incorrect expression which is yet understood by the customer, the call may proceed without interruption. Indeed it may be that the customer does not understand the standard expression, so that an element of judgement is involved in any assessment of errors.

On the other hand, where an error does have an effect, usually it is to slow the rate of working. For example, during training, and subsequently, ticket errors are returned to the operator for correction, during which no other work can be undertaken. Also, if an incorrect expression confuses the customer, more time will be taken to convey the information, and so on. In consequence, no direct assessment of errors under operational conditions has been made as part of the evaluation process.

2.5 A levelling process

Davies (11) proposes three indications of training effectiveness

a. A highly skewed distribution of achievement scores at the end of training

b. Small differences or variances in performance at the end of training

c. No significant relationship between achievement and general ability.

Regardless of questions about what is being scored or how achievement is assessed, these three indications all emphasize the levelling nature of training. The last factor is the most-usual stumbling block; some sort of pre-training selection occurs for most training schemes, setting some standard for ability on entry. Otherwise, most schemes, and particularly those relating to manual operations, can be seen to have this levelling process as an aim. Hence, uniformity of behaviour may be used as an evaluation criterion, although again it is incomplete as a middle or long-term assessment tool.

In summary, the problem of evaluation has been seen as that of measuring the effect of training, with side issues concerning the selection process and subsequent retention of trainees. Three ways of measuring the effect of training are to be considered, involving output measures, behavioural changes and special tests respectively. These are, essentially, middle-term assessment measures, although the first and last have some immediate and short-term use.

CHAPTER 3

VALUED CALLS

3.1 Output measures

The measurement of an operator's output is fundamental to the determination of correct staffing levels in an AMC. As stated in the previous chapter, there are differences between calls. In consequence, a complex process is used to estimate the work content of the various types of call, from which call valuations are obtained. The basic unit of work is the valued call, which represents the work done by an experienced operator in 18 seconds. It follows that an experienced operator's load is 200 valued calls/hr.

The process of call valuation is summarised in Appendix C, which is extracted from a P.O. Report on switchboard staffing (12). The report describes the method as "difficult to keep up to date, and laborious to use." It is important to note that the result is the average work content of a particular type of call, so that if a call has a valuation of, say, 6, on average, it will take an experienced operator 108 seconds to handle such a call, including waiting time and time for personal needs. The actual time to handle any particular call of that type will vary over a wide range, depending on many factors.

Allowance is made for the standard of service given, as measured by time-to-answer (the average time that the customer waits between the start of ringing tone and the operator's answering). The outcome is the number of operators needed to meet the expected traffic during a particular period; since the actual traffic rarely equals that expected, the operators work at the exact 200 valued calls/hr. rate very infrequently.

3.2 Individual assessments

At each exchange, call valuations are obtained for the three basic call types (untimed, timed and incoming). National standard allowances are fixed for added complications (credit card, personal, transferred charge calls, etc.). These are used in checking the performance of individual

trainees. Checks are made during training starting with a half-hour period on the fifth day; during the third week, one-hour periods are used. The trainee is reckoned to have reached qualifying standard when she can achieve at least 150 valued calls/hr. with not more than 5% errors or irregularities (erregs.)

Erregs are measured as the number of different types observed. Once a particular erreg has been recorded, further instances are disregarded. The erreg percentage is expressed in terms of the valued call total, rather than as a function of the possible erregs. Hence, the higher the valued-call score, the greater is the number of erregs which is tolerated.

In most AMCs the checks are made by the ASr in charge of the trainee. The check is partly subjective; the ASr is aware of the standards of the AMC, and is able to assess the trainee in this light. Frequently, where the trainee only just achieves the target, the ASr will demand a further check after a few days more. Similarly, if the trainee fails to reach the target score, the ASr will decide whether or not there were special circumstances to justify repeating the check later.

The aim with the programmed learning scheme is to bring trainees to the qualifying standard by the end of the third week (day 15). Table I shows the distribution by ages of the actual numbers of days taken, for 1971-72. Clearly, less than 25% qualified within the target period, but more than 80% did within four weeks. The data were grouped in a 5 x 5 contingency table, for which a X^2 test did not reject the hypothesis that there is no difference in performance with age, contrary to the widely-held belief among ASrs that programmed learning favours the younger trainees.

A full-efficiency check is made about three months after the trainee has qualified. During this time, further coaching may have been given. The trainee has to achieve at least 200 valued calls/hr. with less than 5% erregs. Again, there is a subjective component in the check.

TABLE 1

DAYS OF TRAINING NEEDED TO REACH QUALIFYING STANDARD - DISTRIBUTION BY AGES

Age Group	Days of Training to Reach Qualifying Standard													Totals
	13 or less	14	15	16	17	18	19	20	21	22	23	24	25 or over	
16 years or under	3	1	21	1	31	12	13	38	1	6	1	5	15	148
17 to 20	5	4	16	3	12	11	8	22	2	-	1	1	8	93
21 to 24	4	1	10	2	10	5	10	12	4	-	-	2	5	65
25 to 34	3	2	10	-	5	2	5	5	3	-	1	1	5	42
35 to 44	3	2	4	2	3	2	5	12	-	2	-	-	4	39
45 to 50	1	-	2	-	-	-	-	2	1	1	-	-	1	8
Over 50	-	-	1	-	-	-	1	1	-	-	-	-	-	3
TOTALS	19	10	64	8	61	32	42	92	11	9	3	9	38	398
%	4.75	2.50	16.50	2.0	15.25	8.0	10.5	23.0	2.75	2.25	0.75	2.25	9.50	100

3.3 Valued-call scores for training evaluation

This method of individual assessment was in use at the start of the evaluation, and is still in use. An obvious question was whether or not it could be used as an evaluation measure. It seemed likely that data on trainees in different AMCs would have to be amalgamated. In theory this should present no problem, since equal call values should indicate equal work content.

Hackett (13) has investigated the hourly call-value scores achieved by experienced operators in three different exchanges. His experimental design was intended to reveal systematic differences due to time of day, day of week, position in the multiple, or the AMC itself. The scores he measured are shown in Table II. His method emphasised that the operators were not being tested, and in any case they remained anonymous. It is reasonable to suppose that they were working normally. He concluded that the only systematic difference was that between AMCs.

Two explanations might be offered for the difference. It could be that the call valuations are correct (in terms of equality of work content) and that operators in Exchange 1 do less work than those in Exchange 2. Alternatively, the valuations could be incorrect, and the operators in Exchange 1 could be working at the same rate as those in Exchange 2. Whichever is true, valued call scores are unusable for evaluation purposes, for the former case would demand resolution by a series of subjective ratings and the latter would yield scores without a common basis.

3.4 Implications for individual assessments

Hackett's results raise the question of whether valued call scores are valid for the assessment of individual trainees. It has been stated that the checks include a subjective assessment, which may now be seen to be of greater importance. It may be that there are different "exchange norms" arising from incorrect call valuations, but the ASr judges the trainee by the local standard so that absolute output measures are irrelevant.

TABLE II

VARIATIONS IN WORK LOAD AS MEASURED BY CALL-VALUATION AT THREE AMCS.

		EXCHANGE 1			EXCHANGE 2			EXCHANGE 3		
		posn. 1	posn. 2	posn. 3	posn. 4	posn. 5	posn. 6	posn. 7	posn. 8	posn. 9
Day 1	Time 1	158.75	201.25	187	227	233	307.25	257	171.25	217.5
	Time 2	144	224	147	233	249.75	232.25	232	179.25	272
	Time 3	216.5	214.75	193	193.75	272	225.25	272.5	209.5	235.75
	Time 4	162.5	168.75	191.75	265.25	229	281.75	211.5	204	191
Day 2	Time 1	143	257.75	159.25	266.75	292	202	260	219	247
	Time 2	238.5	175.5	211.5	267.5	257.75	268.25	261.5	254	223
	Time 3	200.5	177.25	143.5	255	268.75	258.25	191.25	183.75	160
	Time 4	172.25	216.75	189	264.25	238	266.75	224	219.25	208.75
Day 3	Time 1	202.75	145.5	174.5	281.25	267.25	268.25	163.25	222.25	206
	Time 2	206.5	182	151.75	182.5	191.75	250.75	185	184.5	185.75
	Time 3	169.5	185	156.75	162	287.75	264.25	163	172.25	202.25
	Time 4	222.25	200.75	221.75	244.5	268.5	288.5	228.5	198.75	202

(Data obtained by E.A. Hackett and published in his report "Valued Calls and Variability in Calling Traffic at Exchanges".)

KEY:

Day 1 = Tuesday
Day 2 = Wednesday
Day 3 = Thursday

Time 1 = 0900 - 1000
Time 2 = 1030 - 1130
Time 3 = 1400 - 1500
Time 4 = 1530 - 1630

However, the full-efficiency check target is a different case. A large fraction (0.36) of the totals in Table II is below the 200 valued calls/hr. target. Even for Exchange 2, the figure is 0.11. Hence, in many cases, an experienced operator, working normally, is unable to achieve the target figure. A trainee under test is in competition with the experienced operators for available traffic, which means that often the trainee will need to work at an excessive rate to achieve her target. Admittedly the ASr will make allowance for lack of traffic (even to the extent of reducing the number of experienced operators on the board) but the setting of a target which often can not be achieved is indefensible. The consequent excessive work rate is likely to affect adversely both the error rate (14) and the individual (15).

A further cause of excessive working rate in any of the checks is the trainee's inability to relate her output to the target figure. The training given does not explain call valuation, so that although the trainee knows that she must reach 150 or 200 valued calls per hour, she cannot interpret this as a rate of working. This is aggravated by the fact that some calls (such as P.O. service calls) carry no direct valuation. In the event, almost all trainees adopt the strategy of working as fast as possible.

3.5 Transaction counts

With the valued call score, not all the work done by the trainee carries a direct valuation. For example, where the operator finds that the customer can dial the call directly (using subscriber trunk dialling equipment) she should suggest that this be done. If the customer agrees, the call is cancelled and carries no valuation. Several other categories of call also have no call value, even though, in some cases, the operator actually connects the call.

Now, those calls which do have a valuation include a component allowing for these other types of call, but this is of little consolation to a trainee who picks up a series of unvalued calls. However, if a transaction count is substituted for the valued call score, such calls would be included, if a transaction is defined as a process in which the operator, by interchange of information,

TABLE III

RELATIONSHIPS BETWEEN CALL-VALUATIONS AND TRANSACTION COUNTS FOR TRAINEES AT FOUR AMCS

AMC	Trainee	Individual Valued Calls/Transaction		Collective Valued Calls/Transactions	
		Mean	Standard Deviation	Mean	Standard Deviation
A	1	5.58	0.57		
A	2	5.42	0.69		
A	3	5.52	0.72		
A	4	5.57	0.65	5.52	0.66
B	5	5.25	0.70		
B	6	5.28	0.84		
B	7	5.23	0.80	5.25	0.76
C	8	5.06	0.76		
C	9	5.19	0.69		
C	10	4.99	0.97	5.08	0.80
D	11	6.74	1.10		
D	12	6.58	0.72	6.66	0.91

coupled with use of equipment where necessary, achieves some operationally-desired outcome. Note that the outcome is not necessarily customer-desired; where the customer agrees to dial the call, for example, this is certainly not that which the customer wanted originally, but it would count as a transaction. As another example, where the called number was engaged, this also would count as a transaction, as would any further tries to connect the call if the customer asked for it to be kept in hand, although clearly this would be undesirable for the customer.

Valued-call scores and transaction counts were obtained for a total of twelve trainees in four exchanges over periods lasting up to six months. From each pair of observations, the mean call value per transaction was calculated. Table III shows the individual and collective means and standard deviations for each exchange. For trainees within any particular exchange, differences between means and standard deviations are not significant at the level $p < .05$ (that is, the 5% level), using the t-test and the F-test respectively. Using the same criteria, significant differences in one or both quantities are shown between exchanges.

These results are what would be expected, since each exchange has different call values for the three standard types of call.
If the standard deviations are multiplied by the appropriate number of transactions to give approximately 200 valued calls/hr., the results are closely similar to the standard deviations obtained by Hackett in his study. This suggests that a transaction count would be affected by chance no more than call valuation scores.

In Figure 6, the progess of a trainee is plotted in terms of both transactions/hr. and valued calls/hr. There is an easily-discernible similarity between the two plots. Both scales are logarithmic, and it can be seen that a straight-line fit is possible in those circumstances. This is to be expected, since the data are from a learning situation and should fit (more or less) an expression of the form

$$y = ax^b \quad \ldots\ldots\ldots \quad 3.1$$

where a and b are constants. Using the method of least squares, the estimates

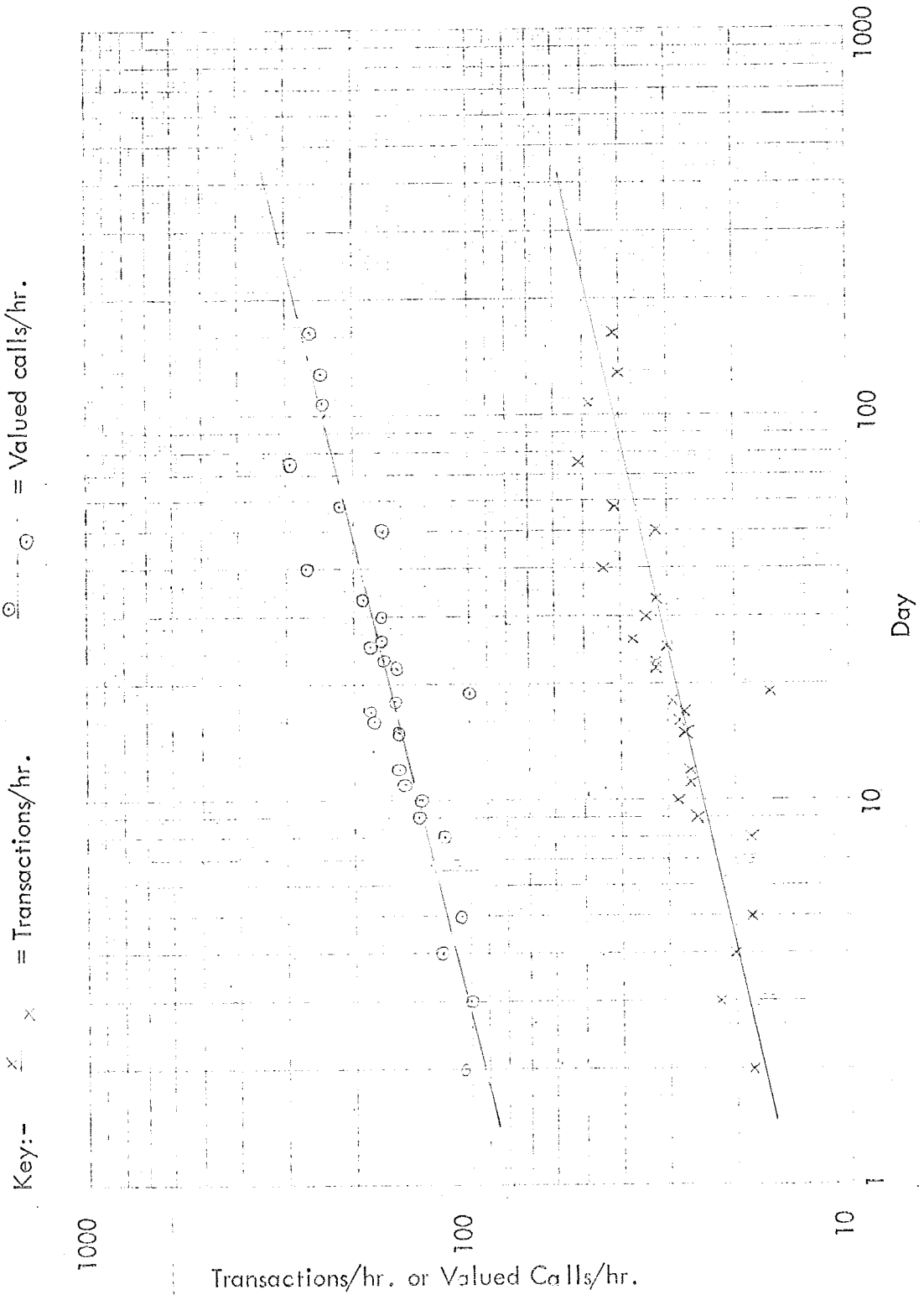


Figure 6 - Daily progress, Trainee 1

TABLE IV

VALUED CALLS AND TRANSACTION COUNTS AS INDICATORS OF PROGRESS

This table compares the values of b in the equation $y = ax^b$

where y = output measured in either valued calls/hr. or transactions/hr.

x = time after the start of training, measured in days

and a and b are constants.

AMC	Trainee	Transactions/hr.	Valued Calls/hr.
A	1	0.23	0.24
A	2	0.31	0.32
A	3	0.28	0.23
A	4	0.23	0.23
B	5	0.24	0.31
B	6	0.33	0.29
B	7	0.26	0.17
C	8	0.23	0.24
C	9	0.30	0.27
C	10	0.52	0.55
D	11	0.28	0.39
D	12	0.37	0.31

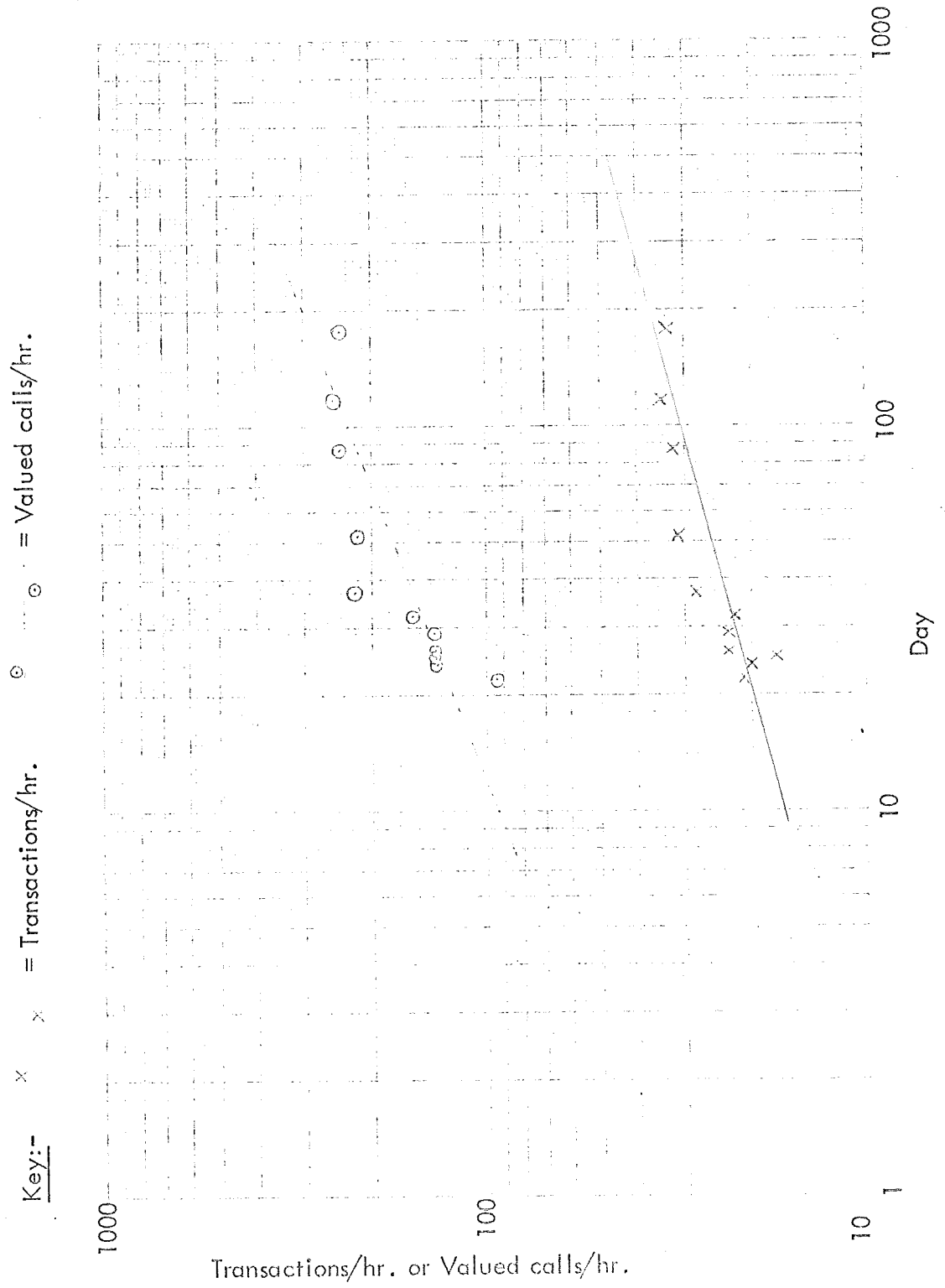


Figure 7 - Daily progress, Trainee 11

of b, which corresponds with the slope of the line on log - log paper, are 0.23 for the transaction count and 0.24 for the valued-call scores. These are tabulated with those for the other trainees in Table IV. In most cases, the slopes are similar. In the most extreme case, trainee 11, the data do not seem suited particularly to a straight-line fit (see figure 7).

Data for this trainee start at day 22; the earlier stages of training were in Rodwell House, where there are both artificial constraints on the working rate and an atypical mixture of calls. The other four trainees from Rodwell House have a similar restriction of data, and their data plots also suggest poor straight-line fits, although the slops for the two measures show greater similarities in each case.

Note, though, that no particular claim is made for equation 3.1 as a learning curve model. Despite the indication of figure 6, equation 3.1 can not fit the ultimate situation, when the trainee's output levels off, albeit at a higher level than the experienced operator standard. In this case, the equation is being used as a simple comparator of the two measures, and its crudeness is accepted as a limitation. Nonetheless, it seems fair to say that, as an indicator of trainee progress, a transaction count is at least as good as a valued-call score.

3.6 Advantages of the transaction count

The principal advantage of the transaction count as an indicator of trainee progress is that it is a measure which is easily understood by the trainee. Hence, targets set for the trainee and feedback of actual performance become meaningful, involving the trainee more fully in her progress.

A second advantage is that progress could, with ease, be continuously monitored. A valued-call score needs the presence of an ASr to record and categorise the calls. Using transactions as the criterion, the trainee could record her own performance during each practice period (using, say, a simple counter), so giving a day-to-day record of (hopefully) improvement.

3.7 Erregs

The day-to-day record would give output quantity only, without taking account of quality. However, the purpose of this record is essentially the involvement of the trainee with her own progress. The ASr usually would try to correct erregs as they arose, during training periods. It is only during formal assessments that the measurement of erregs poses a problem.

Two possibilities suggest themselves as answers. The first is to convert the transaction count to a valued-call score, using the multiplying factor appropriate to the AMC, and measure erregs as a percentage of the call valuation, as in the present scheme. Alternatively, a maximum-permissible number of erregs could be specified, typically eight at a qualifying check, determined again by knowledge of the valued calls per transaction conversion factor.

Of these, the latter seems preferable; with continuous assessment the trainee would be aware of her standard before the test, reducing the need to increase her working rate to a level at which the error rate could be expected to worsen. Hence, an absolute standard for erregs, rather than a comparative one, could be imposed, emphasizing the importance of output quality.

3.8 Evaluation

The transaction count has the same defects as call-valuation for the evaluation of a training method. This is inevitable, since the figures would have to be derived from the basic data used to determine call values and staffing levels. The use of the transaction count is seen, essentially, as an improvement of training administration, rather than training itself, although the latter might expect to gain some benefit from side-effects. Hackett's results lead to the rejection of output quantity measures as evaluation criteria; attention was turned to behavioural measures.

CHAPTER 4

ACTIVITY PROFILES

4.1 A process for effecting behavioural change

It seems a self-evident truth that training is a process for effecting behavioural change. If the trainee is capable already of the desired terminal behaviour, the training is unnecessary. Otherwise, the trainee will have one set of responses to stimuli at the start of training which will be supplanted by the desired responses as training proceeds.

As has been stated, Davies sees similarity of performance after training as a measure of training effectiveness, but in behavioural terms, this measure is seriously affected by the extent to which the task is suited to a communal performance standard. At one extreme, the simple repetitive manual task is ideally suited; almost certainly there is an optimum way of packing tins in a box or bolting wheels on a car which can be determined by work study methods and then taught to trainees.

At the other extreme, probably too much has been written already about the range of styles to be found in or recommended to managers. A reasonable conclusion is that "best" managers are all things to all men, which renders Davies' criterion unworkable and may account for the general lack of success of management training evaluation schemes.

In the middle there is a wide range of tasks for which common behavioural patterns may or may not exist. Newsham and Fisher (16), for example, have identified an optimum style in driving instructors, and the Functionally Identified Maintenance System described by Langham-Brown (17) implies the development of an optimum pattern of behaviour in fault diagnosis.

It is likely that in these complex tasks, experienced workers develop their own optimum pattern of working, determined by personal preference. In one case known to the author, all save one of the maintenance fitters in a power station used a common procedure when changing the balls of a fuel pulverising mill. The odd man out used a method which, from a managerial viewpoint, was superior in that it took less time, since the amount of dismantling involved was

reduced. However, it also involved greater strength and willingness to perform hard physical work in a confined space, for which reason the other fitters rejected it. Here, clearly, is a situation in which a common optimum behaviour pattern will not exist.

4.2 Experienced operator studies

In 1972, a series of observations was made of experienced operators in four AMCs to find whether or not a common behavioural pattern could be detected. The existence of such a pattern was considered likely; procedures for handling calls are the same nationwide and one sleeve-controlled board is nearly identical with the others. However, at the same time, it was apparent from a casual glance around an AMC that individual operators tended to adopt individual styles. For example, when recording the called exchange name on the ticket some operators write only the first two or three letters, adding the rest at a later stage, whereas others write the name in full before going further.

With experience gained from a short period of instruction in switchboard operating, it was decided to break down the work into a number of fundamental components. Some were manipulative operations, such as Plugging In, Operating Keys, Dialling, Filing, Timing and Clearing Down. Others were related to the giving or getting of information, such as VIF, Speaking and Listening. Still others combined the functions, as in Ticket, Speaking+ and Listening+ . The remaining categories were concerned with inactivity, either Waiting Call or Inactive for other reasons. The full definitions of each activity are listed in Appendix D.

Observations were made over periods of an hour at 15-second intervals. After subtraction of observations of inactivity (the sum of Inactive and Waiting Call), the percentage of time spent on each activity was determined. Analysis of variance was applied to find whether or not significant differences existed between different operators, in terms of how their time was divided between the activities.

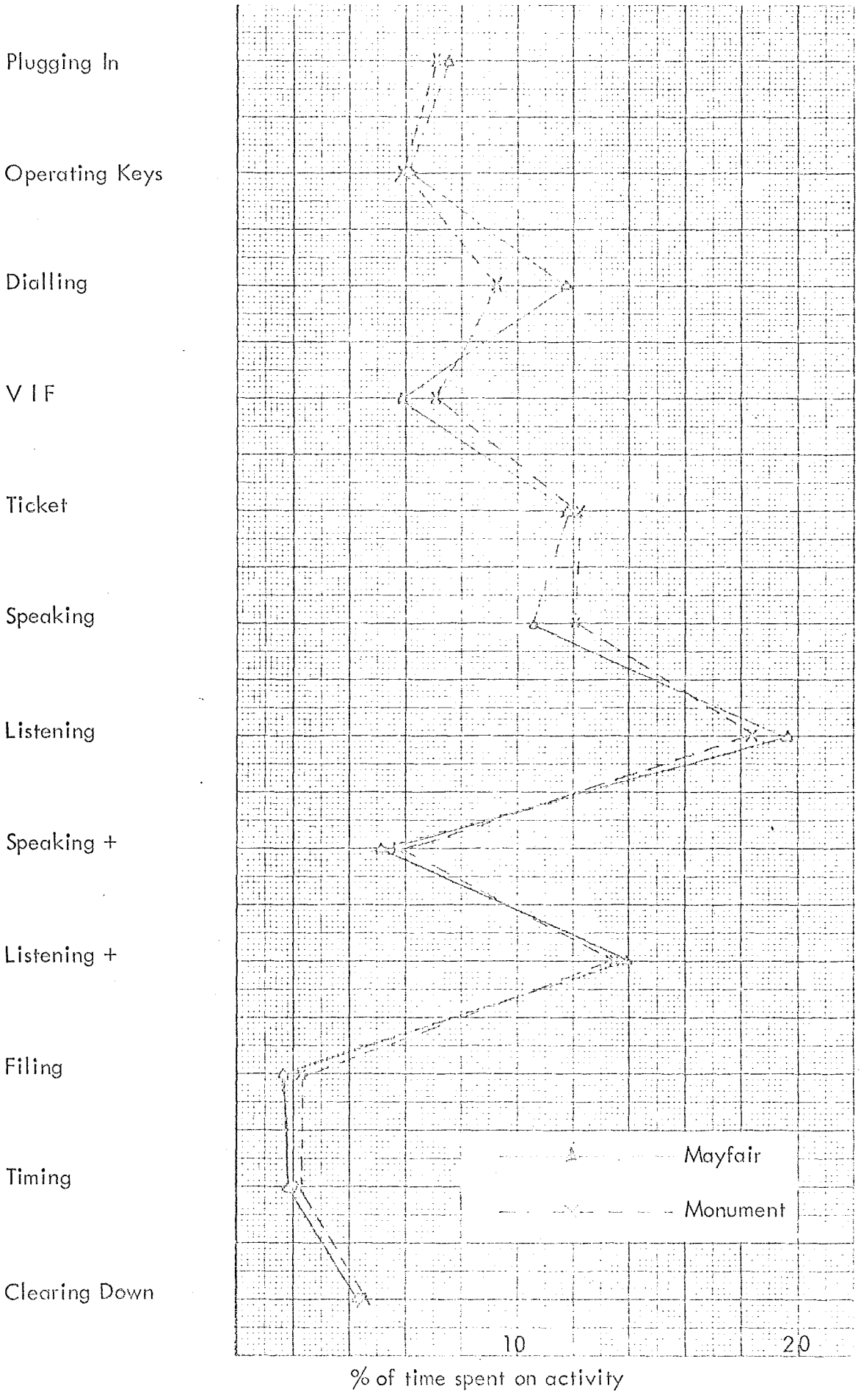


Figure 8 – Typical Activity Profiles for London AMC Operators

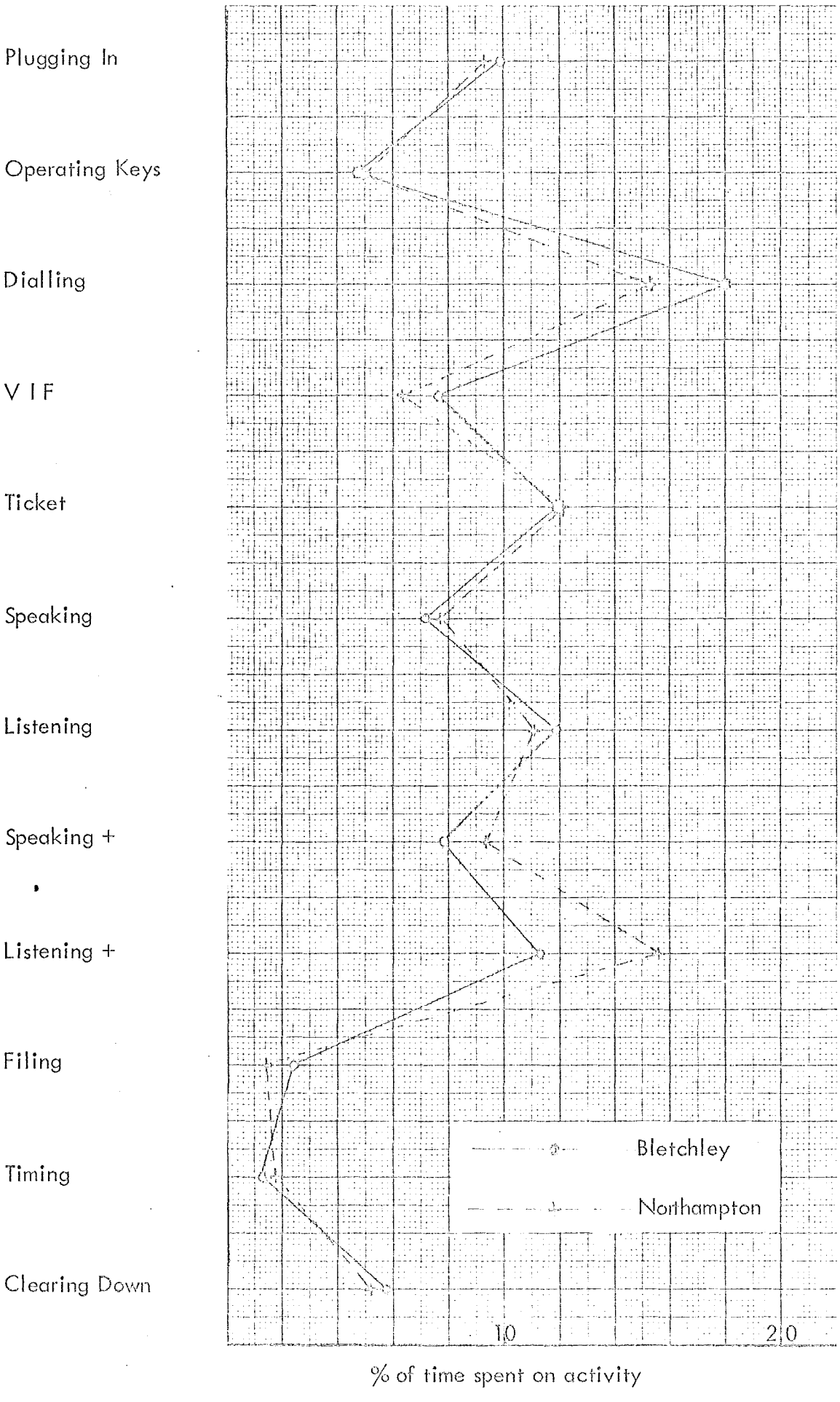


Figure 9 - Typical Activity Profiles for Provincial AMC Operators.

TABLE V

This Table gives values of the constants a and b in the linear regression equation $y = ax + b$ where

y = percentage of time spent on the activity

and x = percentage of time during which no activity is occurring

= Inactive percentage + waiting call percentage

Activity	a	b
Plugging in	0.022007	7.897259
Operating Keys	-0.002726	5.865717
Dialling	-0.000759	16.228479
VIF	-0.006001	8.146481
Ticket	-0.036018	13.195818
Speaking	-0.099353	9.550422
Listening	0.089418	9.704620
Speaking +	-0.037078	8.760334
Listening +	0.043169	12.368051
Filing	-0.016108	2.421632
Timing	-0.007880	1.940668
Clearing Down	0.064086	3.417075

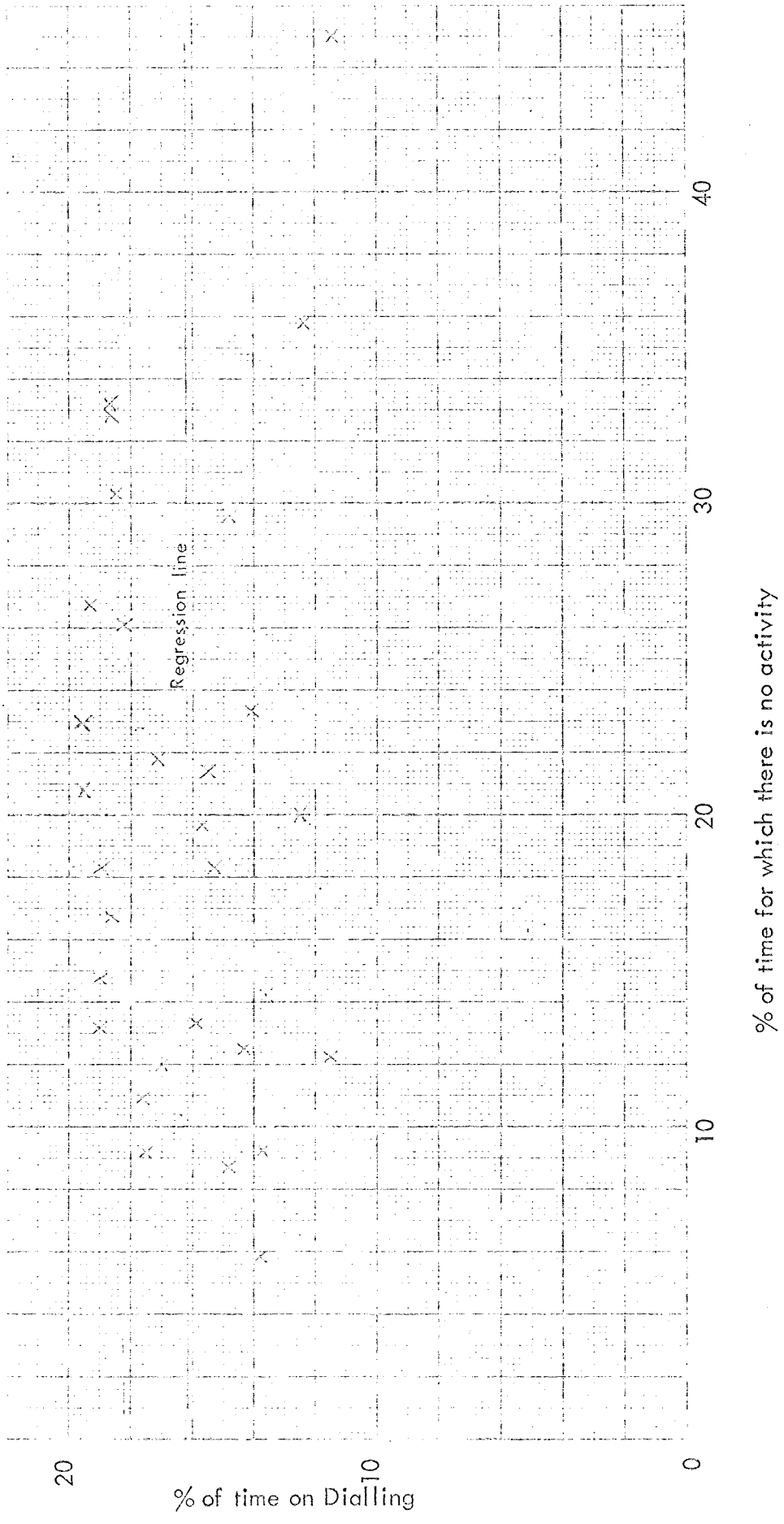


Figure 10 - Change in Dialling associated with work load

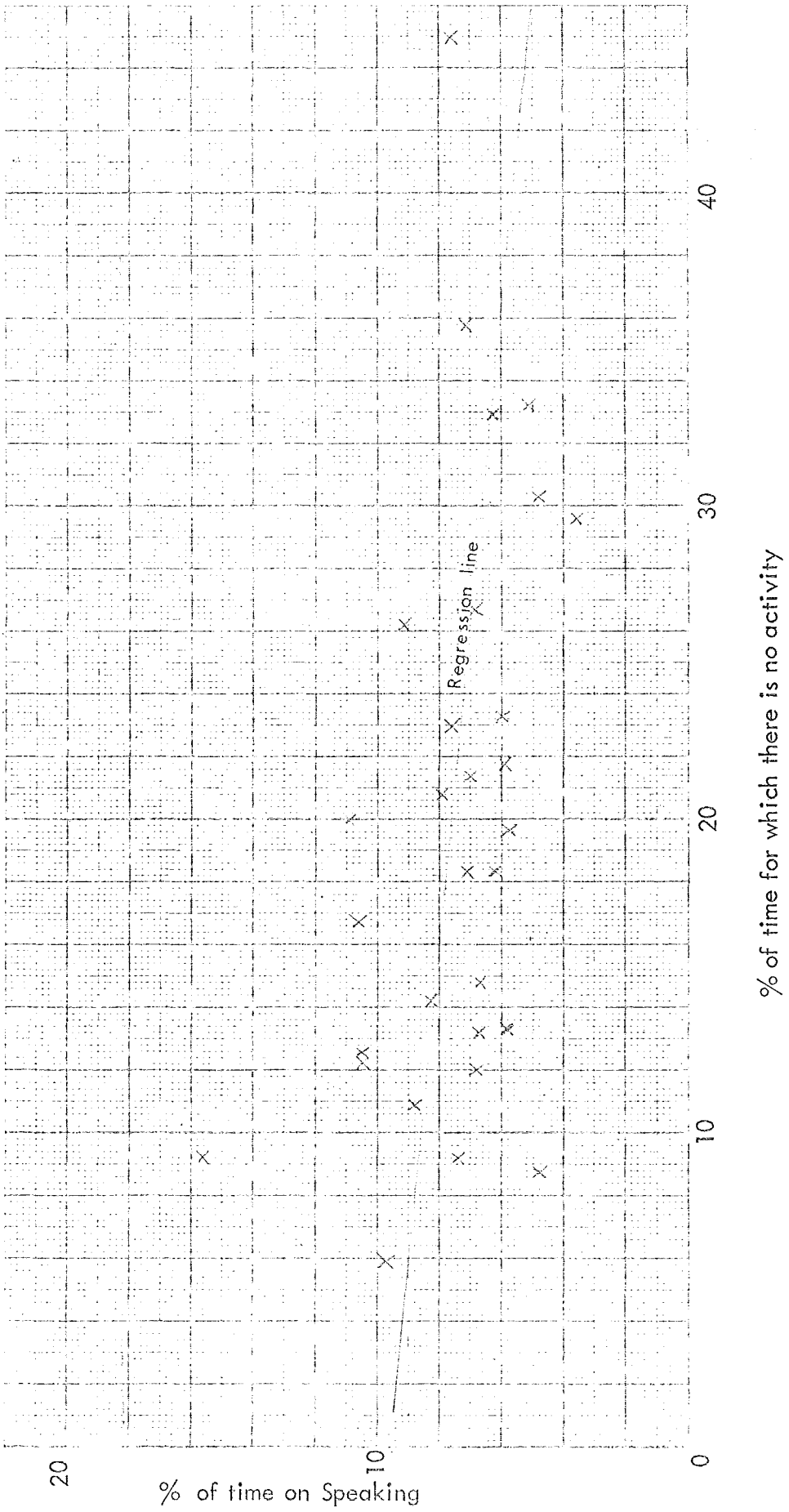


Figure 11 - Change in Speaking associated with work load.

4.3 Activity profiles of experienced operators

The results of the study have been described elsewhere (18), but may be summarised briefly as follows:

a. In any AMC, experienced operators tend to divide their time on the activities of the task in a common pattern.

b. The pattern is linked to the traffic mix in the AMC. AMCs having similar traffic have similar patterns of operator activity.

c. Although individuals, in some cases, may not conform to the pattern, the cause is likely to be apparent immediately to an observer. Activity profiles for typical operators in AMCs in London and the Provinces are shown in Figures 8 and 9 respectively.

An important property of the profiles in that they are affected but little by changes in work load. Table V gives the coefficients of regression of the various activities on total inactive time, for one exchange. The regression lines are plotted for the best case (Dialling) and the worst case (Speaking) in Figures 10 and 11 respectively. Other measures, such as valued-call scores, or mean call-handling time (as reported by Conrad and Hille (19) are affected considerably by the traffic rate. A subjective impression of the situation is that when traffic is light, the operators are more inclined to listen to the woes of customers, and will go beyond the lengths specified in the Operating Handbook to connect the call. The effect of such actions on the profiles would tend to be small, and is certainly borne out by the signs of the more-significant coefficients.

4.4 Activity profiles of trainees

The activity profile, then, represents the desired terminal behaviour of trainees; it was expected that changes in profile would be detected as training progressed. Expected changes were as follows:

a. The proportion of time spent on Plugging In was likely to be greater than that for experienced operators, reducing as the sensori-motor skill developed

b. Similarly the proportion of time devoted to Listening was expected to be greater, because of the need to interpret both customers' requests and line conditions.

c. VIF and Ticket proportions were also expected to be high, reducing as familiarity with spellings and ticket procedures improved.

d. Proportions of time spent on Listening+ and Speaking+ were expected to be low. Both these categories involve the simultaneous performance of two activities. It was felt that the initial proportions might be zero in most cases.

e. The other activities were seen as makeweights, subject to unpredictable changes as proficiency developed in the critical activities.

Observations were made on trainees in two Provincial AMCs and at Rodwell House, with subsequent observations at two London AMCs. Because of limitation of practise periods, observations were over half-an-hour in the first three weeks, thereafter for an hour at a time. The interval between observations was reduced to 6 seconds, using an electronic timer with audible indication.

The categories of activity were essentially the same as those used in the study of experienced operators, with the addition of Procedural Instruction (also defined in Appendix D). However, for the individual activities, there was differentiation between observations when the trainee was herself pursuing that activity (own initiative) and when she was being directed or instructed in that activity (instruction). This latter also included the situation when the ASr had to take over a call, and was performing the activities herself.

Each transaction was treated separately, with additional information recorded to enable call-values to be calculated. This was the source of the data discussed in the previous chapter. In all, fifteen trainees were observed. One withdrew from training at the end of the first week, a second withdrew at the end of two weeks. Both were failing the course. A third, after being recoursed at the end of the first week completed her initial training in Rodwell House, but subsequently did not report for duty at the AMC. The remaining twelve were trained successfully, and were observed at intervals up to six months after the start of training. In all cases, calendar days rather than working days were used for the time scale.

As in the previous study, Waiting Call and Inactive observations were subtracted from the total, and the proportions of time spent on the remaining activities calculated. These were done for a combined own initiative and instruction total. However, for each category, the fraction of observations classed as own initiative was found as well. Table VI shows the results for a successful trainee at Northampton, Table VII for a successful trainee at Rodwell House (followed by Tottenham) and Table VIII gives the results for the trainee who withdrew from training at High Wycombe after two weeks.

4.5 Comparison with prediction

Table IX gives the mean proportions of time spent by experienced operators at Northampton and Tottenham on the activities. Comparison of the results with these figures shows that

a. Plugging In percentages show little if any systematic change. There is a slight rising trend in the Northampton case, but this is barely detectable for Tottenham (day 22 onwards). This absence of trend is true also for the case of failure.

b. There is a general rising trend in both Northampton and Tottenham for the time spent on Listening, again present in the failure case. However, initial percentages are below those of experienced operators.

TABLE VI

ACTIVITY PROFILE OF SUCCESSFUL TRAINEE IN NORTHAMPTON

Activity \ Day	2	3	4	5	8	9	10
Plugging in	6.8 0.76	8.2 0.74	8.3 0.70	6.6 0.79	6.6 0.82	7.8 0.95	7.5 0.85
Operating Keys	4.0 0.50	6.8 0.58	5.0 0.91	5.9 0.76	4.3 0.76	5.7 0.91	8.6 0.96
Dialling	14.2 0.99	10.4 0.97	12.1 0.97	10.1 1.00	11.7 1.00	11.0 1.00	12.7 0.97
VIF	7.2 0.52	7.9 0.77	5.8 0.93	9.0 0.42	9.5 0.77	8.5 0.77	8.2 0.95
Ticket	17.6 0.67	20.1 0.73	22.1 0.83	31.9 0.60	22.1 0.88	26.4 0.85	18.3 0.94
Speaking	7.0 0.20	6.1 0.41	6.7 0.38	7.6 0.36	6.0 0.54	3.5 0.75	4.9 0.69
Listening	5.6 0.96	6.1 1.00	9.2 1.00	8.7 1.00	10.7 1.00	9.6 0.96	8.2 0.72
Speaking +	4.0 1.00	2.5 1.00	2.9 1.00	2.8 1.00	2.9 1.00	3.9 1.00	4.1 1.00
Listening +	4.4 1.00	3.9 1.00	4.2 1.00	2.4 1.00	5.8 1.00	5.9 1.00	6.3 1.00
Filing	0.8 1.00	0.4 1.00	0.4 1.00	0.3 1.00	0.2 1.00	1.4 1.00	1.5 1.00
Timing	2.0 0.30	2.9 0.75	2.5 0.67	0.7 1.00	1.2 1.00	2.1 0.92	1.5 1.00
Clearing Down	1.6 0.50	1.4 0.50	3.8 1.00	2.4 0.71	3.1 0.83	3.7 0.95	4.9 0.92
Procedural Instruction	24.6	23.3	17.1	11.5	16.0	10.5	13.4
Transactions/hr.	18	22	20	18	18	25	28
Call Value/hr.	102	100	119	103	117	136	131

TABLE VI

ACTIVITY PROFILE OF SUCCESSFUL TRAINEE IN NORTHAMPTON

Activity \ Day	11	12	15	16	17	18	19
Plugging In	6.6 0.97	5.6 0.88	5.7 0.97	7.2 1.00	6.8 0.98	6.8 0.97	9.0 0.92
Operating Keys	4.7 0.93	4.2 0.92	6.5 0.94	6.5 1.00	4.8 0.96	8.3 0.98	5.0 0.93
Dialling	8.9 1.00	14.0 1.00	11.8 1.00	13.0 1.00	12.4 1.00	11.9 1.00	12.2 1.00
VIF	9.6 0.80	10.9 0.84	8.4 0.91	11.6 0.94	11.9 0.79	10.8 0.95	5.4 1.00
Ticket	17.8 0.92	14.0 1.00	27.0 0.90	22.2 1.00	23.5 0.90	20.9 0.97	20.8 0.98
Speaking	5.1 0.44	5.3 0.40	5.7 0.73	5.4 0.31	6.5 0.58	4.3 0.88	5.0 0.79
Listening	10.6 0.90	15.8 1.00	5.7 1.00	6.8 1.00	8.0 0.96	9.4 1.00	19.4 1.00
Speaking +	5.2 1.00	4.2 1.00	3.8 0.95	4.4 1.00	3.9 1.00	4.3 1.00	1.4 1.00
Listening +	4.9 1.00	5.3 1.00	8.4 1.00	6.5 1.00	8.5 0.92	7.4 1.00	3.6 1.00
Filing	1.2 1.00	0.7 1.00	1.9 1.00	1.0 1.00	1.5 1.00	1.3 1.00	0.0 -
Timing	1.4 1.00	1.8 1.00	1.0 1.00	2.0 1.00	1.7 1.00	1.8 1.00	0.4 1.00
Clearing Down	3.1 0.89	4.2 0.83	4.4 0.78	3.8 1.00	3.7 0.86	3.6 1.00	2.2 0.83
Procedural Instruction	21.3	14.0	9.9	9.6	6.8	9.2	15.8
Transactions/hr.	26	26	27	28	27	29	16
Call Value/hr.	147	152	151	177	180	154	100

TABLE VI

ACTIVITY PROFILE OF SUCCESSFUL TRAINEE IN NORTHAMPTON

Activity \ Day	22	23	25	26	30	33
Plugging In	7.8 0.98	7.6 1.00	7.3 0.95	6.3 0.92	7.7 1.00	7.0 1.00
Operating Keys	8.5 0.98	7.1 0.83	6.2 0.83	8.7 0.96	4.8 1.00	9.5 1.00
Dialling	11.2 1.00	13.1 1.00	12.5 1.00	11.0 1.00	14.9 1.00	15.4 1.00
VIF	5.8 1.00	9.3 0.91	7.6 0.98	9.5 0.93	12.9 1.00	12.3 0.98
Ticket	18.7 0.96	17.8 0.97	19.2 0.88	20.9 0.96	18.6 1.00	16.7 1.00
Speaking	6.5 0.89	6.1 0.71	5.9 0.59	4.1 0.96	5.5 1.00	4.2 0.95
Listening	11.2 1.00	12.6 0.99	11.6 1.00	9.3 1.00	10.9 1.00	6.1 1.00
Speaking +	4.3 1.00	4.7 1.00	4.3 1.00	4.4 1.00	4.6 1.00	6.1 1.00
Listening +	5.8 1.00	5.9 1.00	7.6 1.00	8.8 1.00	9.4 1.00	9.1 1.00
Filing	1.9 1.00	1.4 1.00	1.0 1.00	1.4 1.00	3.3 1.00	3.2 1.00
Timing	2.2 0.85	1.6 1.00	2.4 1.00	1.2 1.00	2.4 1.00	2.5 1.00
Clearing Down	3.1 1.00	3.5 0.95	3.5 0.90	3.7 1.00	4.4 1.00	5.5 1.00
Procedural Instruction	12.9	9.3	10.6	10.7	0.4	2.5
Transactions/hr.	32	32	30	37	34	32
Call Value/hr.	153	166	180	169	169	187

TABLE VI

ACTIVITY PROFILE OF SUCCESSFUL TRAINEE IN NORTHAMPTON

Activity \ Day	40	50	58	75	108	129	163
Plugging In	7.0 1.00	9.4 1.00	11.4 1.00	8.9 1.00	9.9 1.00	6.7 1.00	9.7 1.00
Operating Keys	6.5 1.00	5.0 1.00	5.2 1.00	5.0 1.00	6.9 1.00	5.9 1.00	5.9 1.00
Dialling	15.7 1.00	16.0 1.00	15.6 1.00	16.7 1.00	14.4 1.00	11.0 1.00	12.5 1.00
VIF	14.9 1.00	9.4 1.00	8.4 1.00	9.9 1.00	9.9 1.00	10.8 1.00	7.4 1.00
Ticket	16.1 1.00	11.9 1.00	13.8 0.99	17.4 1.00	13.3 1.00	12.5 1.00	11.9 1.00
Speaking	2.7 1.00	8.1 1.00	5.6 1.00	4.7 1.00	6.2 1.00	8.0 1.00	8.1 1.00
Listening	8.4 1.00	19.1 1.00	16.6 1.00	9.9 1.00	14.6 1.00	15.6 1.00	15.4 1.00
Speaking +	5.3 1.00	3.7 1.00	4.7 1.00	6.6 1.00	4.9 1.00	5.7 1.00	5.9 1.00
Listening +	14.5 1.00	10.0 1.00	9.3 1.00	11.2 1.00	12.8 1.00	16.2 1.00	14.5 1.00
Filing	1.4 1.00	1.5 1.00	3.4 1.00	1.9 1.00	1.2 1.00	2.3 1.00	2.8 1.00
Timing	2.2 1.00	1.9 1.00	2.4 1.00	2.3 1.00	2.4 1.00	2.1 1.00	1.8 1.00
Clearing Down	5.3 1.00	3.9 1.00	3.4 1.00	5.4 1.00	3.5 1.00	3.2 1.00	4.0 1.00
Procedural Instruction	0.0	0.0	0.4	0.0	0.0	0.0	0.0
Transactions/hr	44	32	41	51	48	40	41
Call Value/hr.	265	167	214	289	240	241	254

TABLE VII

ACTIVITY PROFILE OF SUCCESSFUL TRAINEE AT RODWELL HOUSE/ TOTTENHAM

Activity / Day	2	3	4	5	8	11	12
Plugging in	5.2 0.92	5.3 1.00	7.8 1.00	9.1 1.00	14.2 0.94	7.4 1.00	5.6 1.00
Operating Keys	6.3 0.82	7.7 0.90	5.9 0.86	6.1 0.94	8.1 1.00	8.5 0.91	2.8 1.00
Dialling	8.9 1.00	6.3 1.00	10.5 0.96	10.5 1.00	13.1 1.00	6.0 1.00	6.0 1.00
VIF	14.1 0.97	11.6 0.90	7.0 0.94	7.8 0.95	5.8 1.00	9.9 0.92	8.9 1.00
Ticket	24.4 0.89	23.2 0.93	26.2 0.88	21.6 0.87	18.8 0.91	30.4 0.88	25.4 0.93
Speaking	10.0 0.81	10.2 0.93	11.3 0.72	9.1 0.70	15.0 0.94	11.0 0.90	12.9 0.87
Listening	13.0 1.00	12.7 1.00	13.3 1.00	16.2 1.00	8.8 1.00	8.8 1.00	19.0 1.00
Speaking +	0.7 1.00	0.7 1.00	1.6 1.00	1.7 1.00	0.8 1.00	1.4 1.00	3.2 1.00
Listening +	4.1 1.00	3.2 1.00	3.1 1.00	5.1 1.00	2.7 1.00	4.6 1.00	4.8 1.00
Filing	0.7 1.00	1.4 1.00	0.8 1.00	0.0 -	1.5 1.00	1.1 1.00	0.8 1.00
Timing	4.1 0.81	7.7 0.90	2.3 1.00	0.7 1.00	1.9 1.00	2.5 1.00	1.6 1.00
Clearing Down	2.6 0.85	3.5 1.00	3.5 1.00	5.4 1.00	5.0 1.00	2.1 1.00	3.2 1.00
Procedural Instruction	5.9	6.3	6.6	6.8	4.2	6.4	5.6
Transactions/hr	12	12	18	14	16	20	16
Call Value/hr	72	94	82	64	54	122	84

TABLE VII

ACTIVITY PROFILE OF SUCCESSFUL TRAINEE IN RODWELL HOUSE/ TOTTENHAM

Activity \ Day	15	16	17	18	19	22*	23
Plugging In	5.6 1.00	8.9 1.00	6.5 1.00	4.5 1.00	6.3 1.00	10.4 0.95	7.6 1.00
Operating Keys	5.2 0.96	6.1 0.93	2.3 1.00	5.3 1.00	4.3 1.00	6.4 0.96	5.0 1.00
Dialling	6.9 1.00	5.7 1.00	6.9 1.00	5.7 1.00	5.1 1.00	9.1 0.97	7.0 1.00
VIF	9.3 0.96	4.9 0.96	13.4 1.00	9.0 1.00	13.4 1.00	6.2 0.85	3.7 1.00
Ticket	25.9 0.85	20.2 0.94	32.2 0.97	28.9 0.91	39.3 0.89	31.2 0.82	17.9 0.91
Speaking	11.9 0.87	9.3 0.73	9.6 0.96	13.1 1.00	6.7 0.82	9.3 0.85	9.8 0.82
Listening	8.9 0.97	17.8 1.00	11.9 1.00	15.9 1.00	7.1 1.00	6.2 1.00	19.2 0.93
Speaking +	2.00 1.00	2.8 1.00	1.9 1.00	2.9 1.00	2.4 1.00	0.2 1.00	3.7 1.00
Listening +	5.8 1.00	5.7 1.00	4.6 1.00	4.9 1.00	3.9 1.00	7.3 1.00	6.1 1.00
Filing	1.1 1.00	1.2 1.00	0.8 1.00	0.8 1.00	1.2 1.00	1.1 1.00	2.0 1.00
Timing	3.9 0.85	1.2 1.00	4.6 0.75	2.0 1.00	4.3 0.81	1.8 1.00	1.1 0.81
Clearing Down	2.8 0.86	6.1 0.93	2.7 1.00	2.0 1.00	2.0 1.00	3.5 1.00	3.9 1.00
Procedural Instruction	10.2	10.1	2.7	4.9	3.9	7.1	13.1
Transactions/hr.	20	16	14	16	16	17	17
Call Value/hr.	84	64	64	100	94	85	88

* Transfer from Rodwell House to Tottenham on Day 22

TABLE VII

ACTIVITY PROFILE OF SUCCESSFUL TRAINEE IN RODWELL HOUSE/ TOTTENHAM

Activity \ Day	24	25	26	30	33	45
Plugging In	6.8 1.00	7.6 1.00	6.6 1.00	8.1 1.00	7.3 1.00	7.0 1.00
Operating Keys	5.1 1.00	5.6 1.00	4.6 1.00	5.1 1.00	2.3 1.00	6.8 1.00
Dialling	7.4 1.00	8.9 1.00	10.7 1.00	10.3 1.00	10.6 1.00	10.7 1.00
VIF	11.1 0.87	5.6 1.00	5.0 1.00	7.6 0.82	7.1 1.00	6.6 1.00
Ticket	24.2 0.84	18.2 0.92	14.9 0.95	24.6 1.00	26.6 0.99	17.0 0.96
Speaking	7.6 1.00	9.3 1.00	10.9 1.00	6.7 1.00	7.5 1.00	7.7 1.00
Listening	13.1 1.00	17.6 1.00	19.3 1.00	15.4 1.00	13.9 1.00	19.3 1.00
Speaking +	2.9 1.00	3.5 1.00	2.6 1.00	2.0 1.00	5.0 1.00	3.4 1.00
Listening +	7.6 1.00	5.0 1.00	8.5 1.00	10.1 1.00	8.9 1.00	10.4 1.00
Filing	1.6 1.00	1.2 1.00	0.9 1.00	0.4 1.00	2.1 1.00	1.6 0.85
Timing	2.3 1.00	2.1 1.00	2.1 1.00	2.5 1.00	5.0 1.00	2.3 1.00
Clearing Down	2.7 1.00	2.3 1.00	3.3 1.00	4.5 1.00	3.5 1.00	3.9 1.00
Procedural Instruction	7.4	13.2	10.5	2.7	0.2	3.4
Transaction/hr.	17	21	22	17	23	21
Call Value/hr.	94	85	109	99	128	112

TABLE VII

ACTIVITY PROFILE OF SUCCESSFUL TRAINEE AT RODWELL HOUSE/ TOTTENHAM

Activity \ Day	51	59	94	122	183
Plugging in	8.6 1.00	8.8 1.00	8.3 1.00	9.4 1.00	10.0 1.00
Operating Keys	4.9 1.00	5.0 1.00	4.7 1.00	5.4 1.00	5.3 1.00
Dialling	12.7 1.00	12.3 1.00	11.2 1.00	11.9 1.00	11.9 1.00
VIF	7.3 1.00	5.6 1.00	7.9 1.00	4.9 1.00	11.1 1.00
Ticket	13.5 1.00	14.6 1.00	13.2 1.00	9.4 1.00	8.4 1.00
Speaking	8.8 1.00	10.9 1.00	10.4 1.00	9.6 1.00	10.0 1.00
Listening	18.4 1.00	22.0 1.00	18.7 1.00	18.0 1.00	20.3 1.00
Speaking +	5.7 1.00	5.2 1.00	4.7 1.00	6.6 1.00	5.5 1.00
Listening +	11.4 1.00	7.9 1.00	13.2 1.00	14.1 1.00	9.8 1.00
Filing	2.2 1.00	1.3 1.00	2.2 1.00	2.3 1.00	1.4 1.00
Timing	1.8 1.00	0.8 1.00	2.0 1.00	3.0 1.00	2.3 1.00
Clearing Down	4.7 1.00	4.4 1.00	3.7 1.00	5.4 1.00	3.9 1:00
Procedural Instruction	0.0	1.0	0.0	0.0	0.0
Transactions/hr	22	26	30	32	25
Call Value/hr	125	94	173	189	149

TABLE VIII

ACTIVITY PROFILE OF FAILURE DURING TRAINING

Day / Activity	3	4	5	8	9	10	11	12
Plugging in	8.0 0.22	11.6 0.59	9.3 0.75	7.9 0.84	11.9 0.83	6.9 1.00	7.7 0.95	12.5 0.85
Operating Keys	2.2 0.00	9.4 0.34	5.1 0.53	6.2 0.53	6.5 0.70	6.3 0.50	5.4 0.50	5.4 0.58
Dialling	11.3 0.34	7.6 0.71	11.7 0.83	11.6 0.82	9.6 0.92	8.5 0.87	13.1 0.85	7.6 0.94
VIF	6.9 0.78	8.7 0.70	17.9 0.78	10.0 0.79	11.9 0.87	14.3 0.70	8.9 0.91	14.7 0.72
Ticket	28.6 0.43	22.5 0.75	17.1 0.81	22.0 0.88	15.8 0.68	12.2 0.86	21.2 0.69	16.1 0.72
Speaking	2.9 0.00	8.3 0.30	5.8 0.13	6.6 0.12	8.5 0.68	19.0 0.30	10.0 0.38	8.9 0.50
Listening	5.1 0.00	8.3 0.86	7.8 0.90	7.5 0.38	9.6 0.88	8.5 0.68	9.3 1.00	7.6 0.94
Speaking +	2.2 0.00	0.0 -	1.9 0.80	2.5 0.66	1.9 1.00	1.1 1.00	1.9 1.00	1.8 1.00
Listening +	1.8 0.20	1.1 1.00	2.7 0.57	2.5 1.00	3.1 0.87	3.2 0.66	2.7 1.00	1.3 1.00
Filing	1.8 0.60	2.5 0.57	2.3 1.00	2.1 0.60	3.5 0.44	2.6 1.00	2.7 0.71	1.3 1.00
Timing	6.9 0.05	5.1 0.50	3.9 0.70	1.7 1.00	5.8 0.73	2.6 0.60	3.1 0.50	0.4 1.00
Clearing Down	2.5 0.00	3.6 0.60	2.3 0.83	3.3 0.75	4.6 0.66	6.9 0.76	2.7 0.85	1.8 1.00
Procedural Instruction	19.6	11.2	12.1	16.2	7.3	7.9	11.2	20.5
Transactions/hr	14	12	16	16	18	18	10	16
Call Value/ hr.	54	64	78	72	104	70	72	66

TABLE IX

ACTIVITY PROFILES OF EXPERIENCED OPERATORS

Activity	Percentage of time spent on activity	
	Northampton	Tottenham
Plugging In	8.8	8.3
Operating Keys	5.6	5.8
Dialling	15.9	12.0
VIF	7.0	5.6
Ticket	14.9	13.0
Speaking	6.1	9.7
Listening	10.3	14.8
Speaking +	8.9	7.4
Listening +	13.3	15.3
Filing	2.4	2.1
Timing	1.8	1.6
Clearing Down	5.0	4.4

c. VIF proportions show different effects in the two locations. In Northampton, starting from above the experienced operator level, the percentage increases with some suggestion of a superimposed periodic variation up to about day 40, then seems to start a downward movement lasting to the end of observations. In Tottenham, the mean level stays reasonably constant, although there are some large fluctuations.

d. Ticket percentages start above experienced operator level, rise to a peak and then decline, settling to experienced operator standard after about 100-120 days. The peak at Northampton comes soon after the start of training, whereas that at Rodwell House comes at the end of the initial training period. For the failure, the trend is generally downwards.

e. Speaking+ and Listening+ rise very slowly from a low starting value. Only for the failure is there a case of zero percentage. It takes at least four months to reach experienced operator levels in these activities, with Speaking+ taking longer to achieve than Listening+.

f. Other percentages seem to remain steady. There is, perhaps, a rise in the Dialling figure at Tottenham (day 22 onwards), but the corresponding one for Northampton stays steady with, generally, small fluctuations.

4.6 Differences between outcome and prediction

One problem associated with the use of percentages in measuring changes is that the total adds to 100 so that an increase in one percentage must be balanced by decreases elsewhere. This is seen as the most likely cause of the difference between actual Plugging In values and those expected, that is, the increased time taken over Plugging In is masked as a percentage by larger increases of time taken on other activities.

In the case of Listening, this effect may contribute to the discrepancy, but there is a further factor in that trainees seek help in the early days if they cannot interpret what they hear, but as their experience increases they are able to interpret for themselves after some mental searching. An ultimate drop is to be expected as speed of recognition improves, but observations were not taken beyond six months.

The VIF figures are different for Northampton and Tottenham, and may be accounted for by the relative importance of the VIF in the two locations. Northampton traffic is predominantly trunk traffic which the customers are unable to dial because of restricted STD facilities. A routing is needed for such calls, so that VIF reference occurs in the majority of cases. As proficiency increases in other areas, the proportion of time spent on the VIF rises slightly. However, experienced operators memorise a number of the most-frequently-used routings, so that the percentage falls as more routings are committed to long-term memory. The periodic variation, if it is genuine, may stem from some periodic factor in the traffic itself, but this was not investigated further. In Tottenham, the traffic is predominantly local, with no need to refer to the VIF for routings in most calls. Reference for other purposes, such as call charges, Freefone numbers, credit cards and so on, occurs randomly.

As expected, Ticket proportions start above the experienced operator levels, but then increase before dropping back. In Northampton, the increase is rapid. In the first day or so, the trainee is restricted in the type of ticket which she can complete, but is instructed on the board for calls which she has not yet met in the classroom. Errors in tickets are corrected whilst at the board. In Rodwell House, the calls are related to the classroom teaching of the previous half-day. Only towards the end of the third week is there variety in the calls, which causes the trainees greater difficulty in completing tickets.

The above-zero starting values of Speaking+ and Listening+ may be the result of the initial demonstration given by the ASr. After explaining the functions of the board, the ASr demonstrates a number of calls to the trainees during which, for example, she records information on the ticket whilst listening to the customer. Alternatively, it may be that most trainees already possess some facility in these areas, derived, perhaps, from their schooling.

Nonetheless, it takes longest to reach experienced operator figures in these activities, which represents the greater difficulty of successfully doing two things at once. Common experience shows that it is more difficult to speak and simultaneously attend to another task.

4.7 Differences between Wing School and Exchange training

The figures highlight the differences between the two systems of training. The Rodwell House trainee, practising on calls with which she is familiar, needs less instruction on individual activities, rapidly achieving total own initiative observations in almost all categories. The exceptions are Speaking and Ticket, activities in which the Northampton trainee also receives a considerable measure of instruction. However, in Rodwell House, tickets are corrected in the classroom after the practise period whereas in Northampton they are corrected at the switchboard, since they are used to raise charges on customers' accounts and so must be correct. Similarly, in Northampton, there is a frequent need for the ASr to take over a call, if only to preserve good customer relations; this is reflected in the higher instruction content for Speaking in Northampton.

The specialised nature of the practice in Rodwell House also shows in the profiles. A good example of this is on day 8, when the practise dealt with "no tone" calls; this increased the time spent on Plugging In, Speaking and Dialling and, to a lesser extent, Operating Keys, whilst there is a marked decrease in Ticket activity. This means that it is not possible to trace the development of the trainee during the first 19 days through the profile itself.

Time spent on Procedural Instruction also reflects the difference between practice on live and simulated traffic. During the first 19 days, the Rodwell House trainee gets Procedural Instruction at a steady rate of about 6%. On transfer to the exchange, there is a rise in the proportion of time spent on this activity, which then decreases to zero beyond day 60. The figures for the Rodwell House trainee after day 22 follow the trend for the Northampton trainee, whose proportion of time given to Procedural Instruction tends to fall steadily from the start of training. The rise at day 22 for the Rodwell House trainee is

explainable in terms of local procedures which have to be taught within the exchange. An example at Tottenham was the verification of coin-box numbers from a special list in the VIF. The similarity between the two sets of data from day 22 onwards as shown in Figure 12 suggests that there is no particular advantage to either scheme of training in terms of time taken to become proficient in knowledge of procedures. This question is discussed further in Chapter 5.

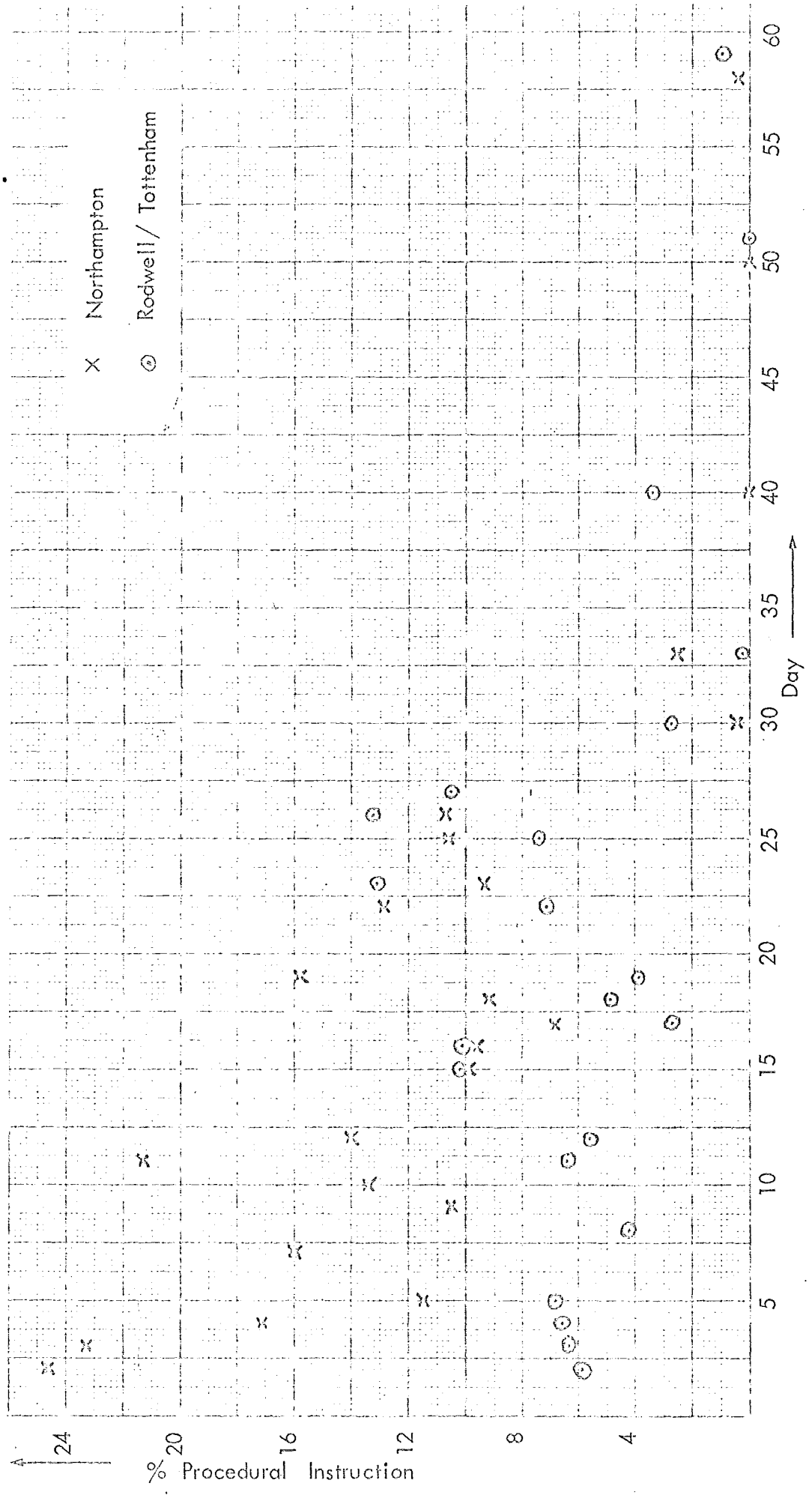


Figure 12 - Procedural Instruction.

CHAPTER 5

FAILURE AND SUCCESS

5.1 The expertise of the ASr

Of the three failures, in every case the ASr concerned was able to predict failure well before the event. In the case of the trainee who withdrew from training at the end of the first week, the prediction was made on the second day of training. Informal discussion with other ASrs usually elicited a claim to similar powers of prediction, although no one could specify pointers to impending failure. The possibility that this is another case of the self-fulfilling prophecy can not be overlooked, but is discounted in this case. Training in Wing School or AMC is always done to fill existing vacancies, so that the ASr always has the incentive to train successfully.

It was observed that there was some lack of confidence on the part of failed trainees when speaking to customers, but this may be the result of an inability to cope with the training rather than the cause of it. The profiles themselves offer little help, since the failures do not remain long enough to develop a discernible profile. However, the own-initiative ratios give some indication of the areas of difficulty.

5.2 Critical Activities

The ratio of own initiative to total of observations in any activity is some indication of the degree of mastery of that activity, and so can point to the critical activities, difficulty in mastering which contributes to failure during training. There are four activities for which there is an obvious difference between the successful trainees and the failure. The own-initiative ratios up to day 12 are plotted for these activities in Figures 13 to 16. Figures 17 and 18 are for two other activities, in which the difference is less clear-cut.

In Figure 13, the activity Operating Keys is considered. The Rodwell House trainee shows a high level of own initiative from an early stage, higher than that for the Northampton trainee. This reflects the need for the ASr in Northampton to take over some calls or hasten the progress of others by direct

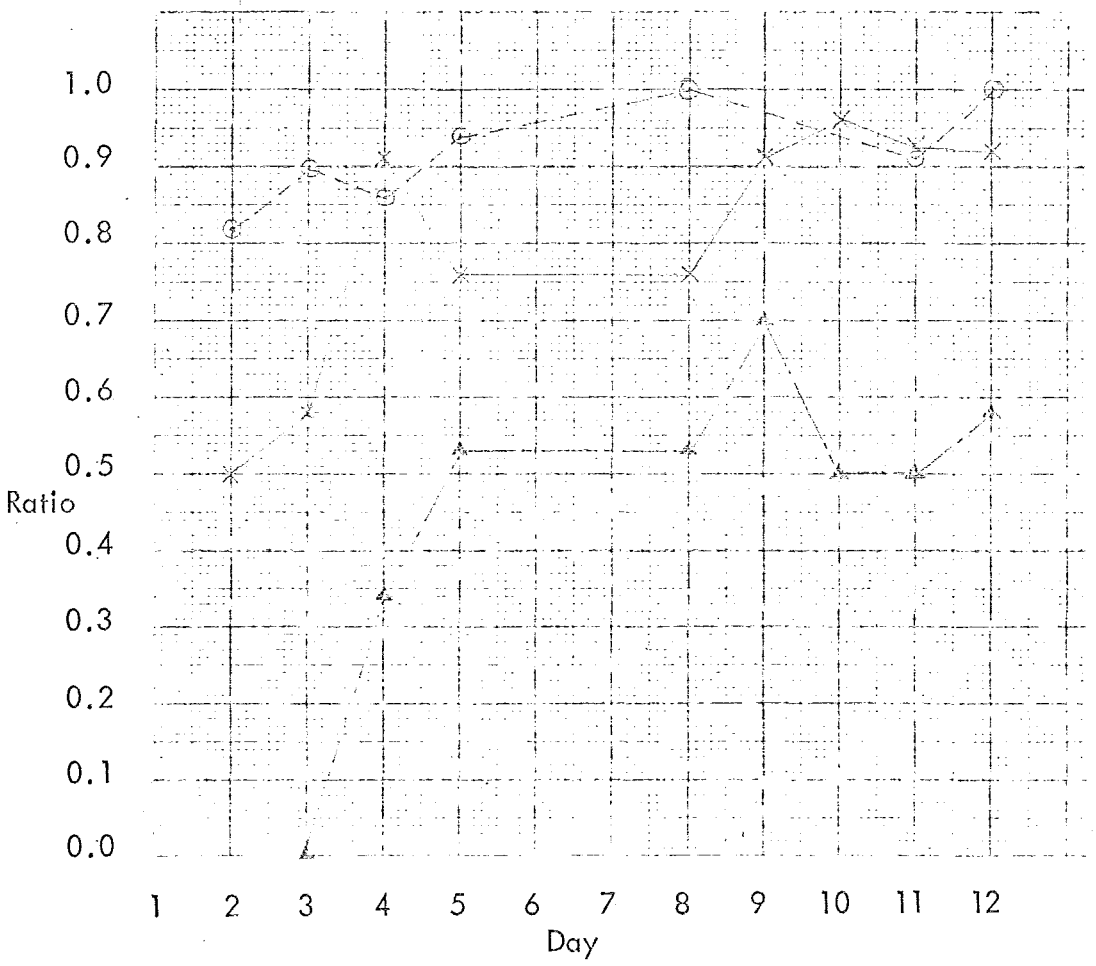


Figure 13 - Own-initiative ratios, Operating Keys.

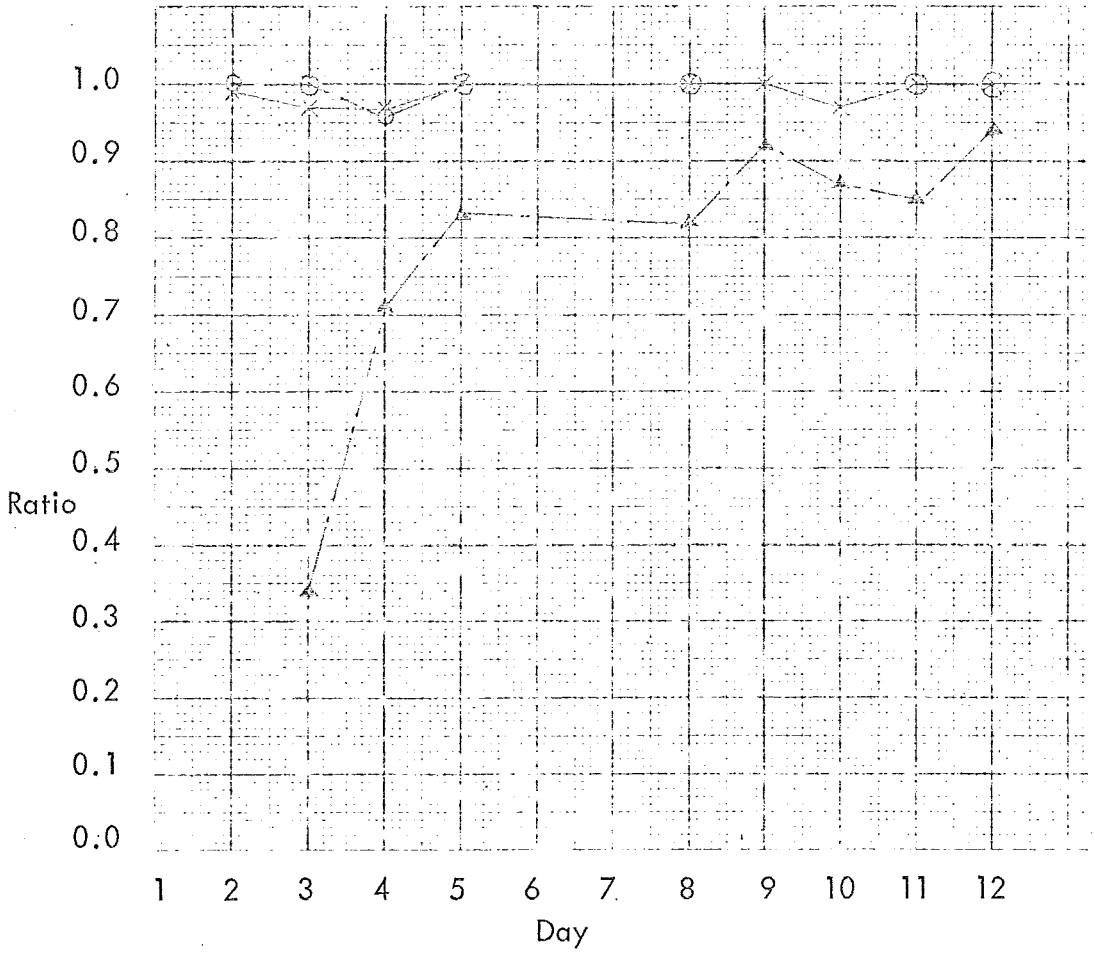
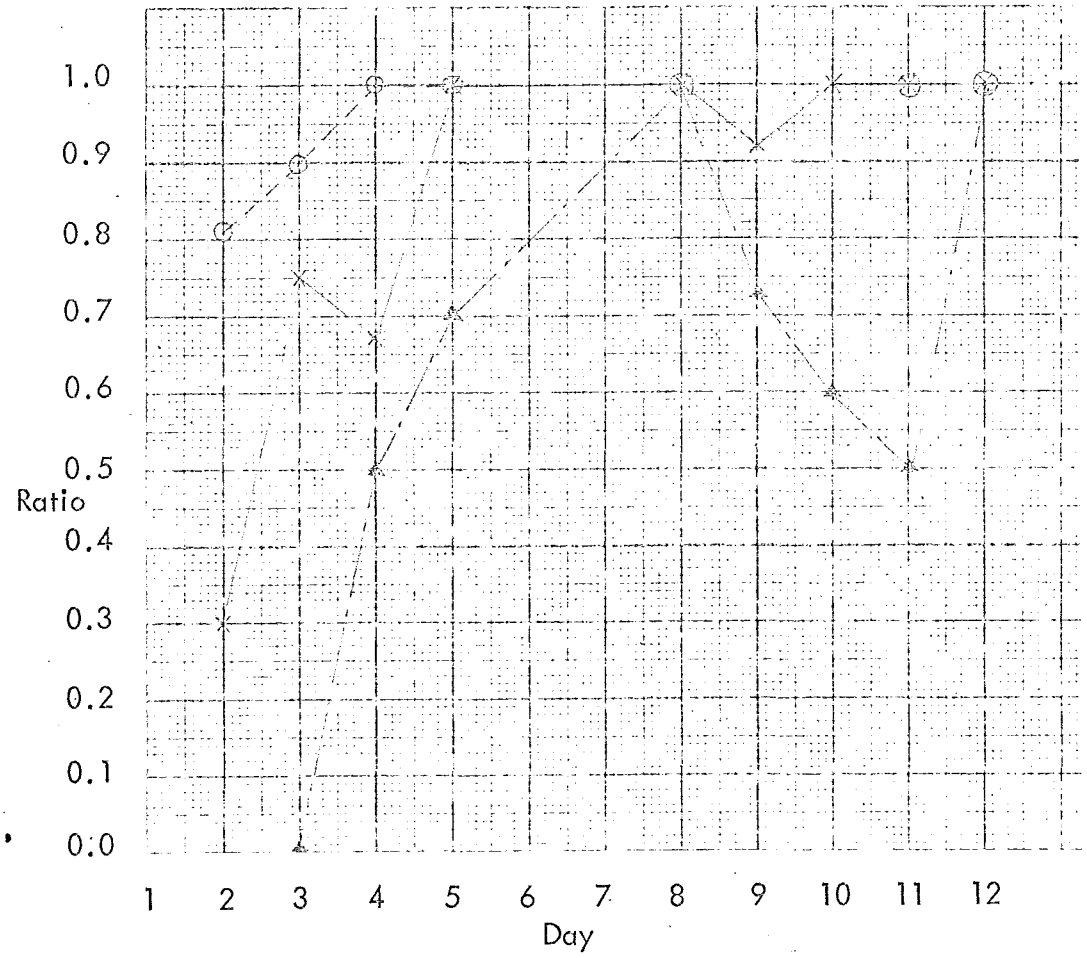


Figure 14 - Own-initiative ratios, Dialling.

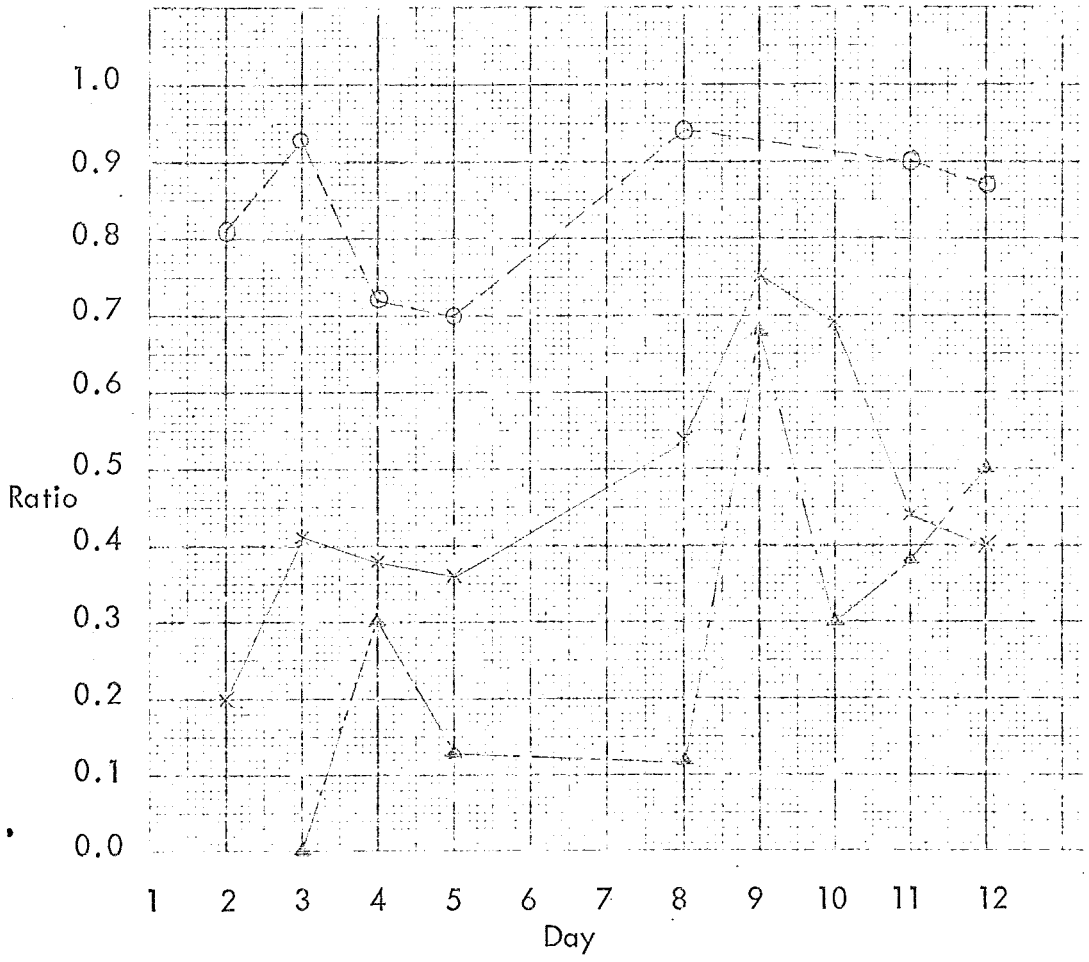


Key:- —X— = Successful trainee, Northampton

— — -⊙- — — = Successful trainee, Rodwell House

- —△— - - = Failure during training

Figure 15 - Own-initiative ratios, Timing

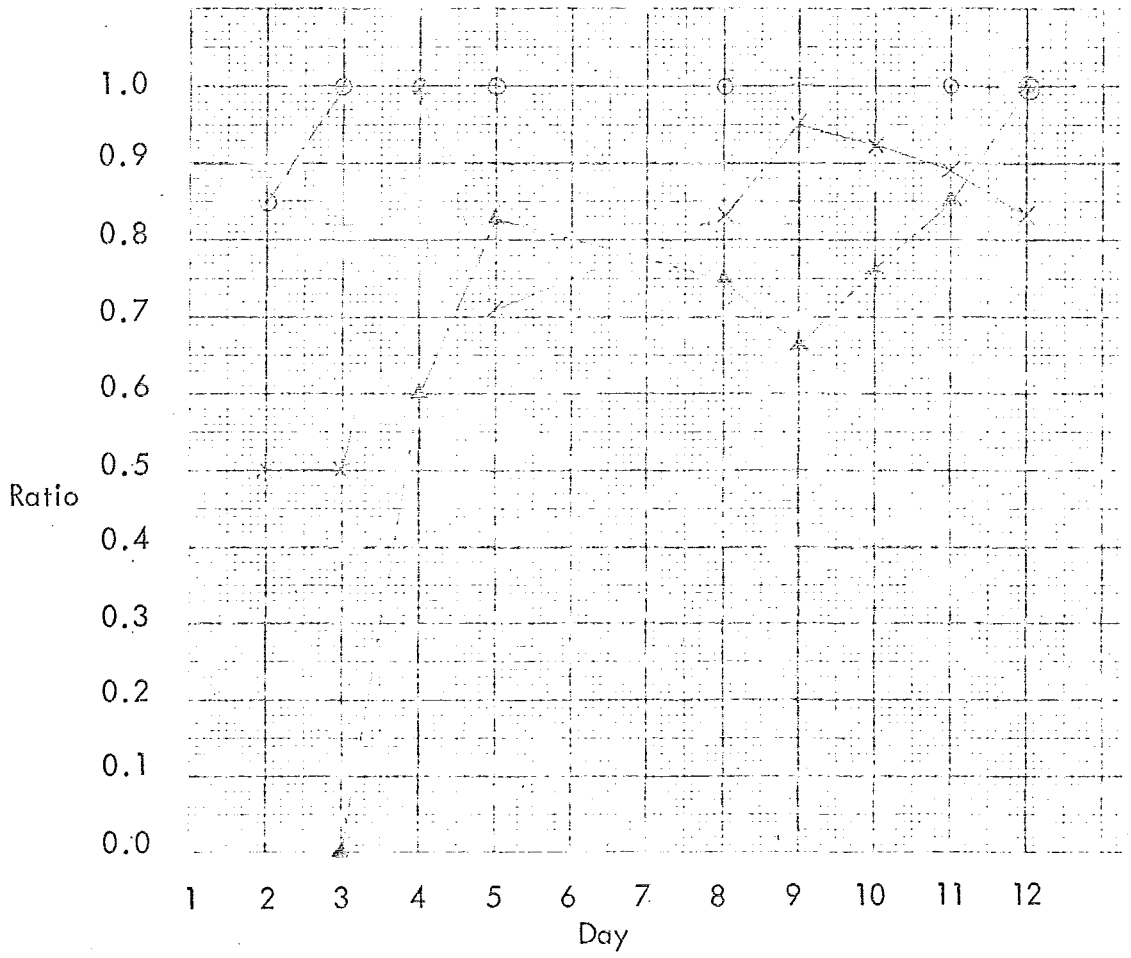


Key:- —X— = Successful trainee, Northampton

—⊙— = Successful trainee, Rodwell House

—△— = Failure during training

Figure 16 - Own-initiative ratios, Speaking.

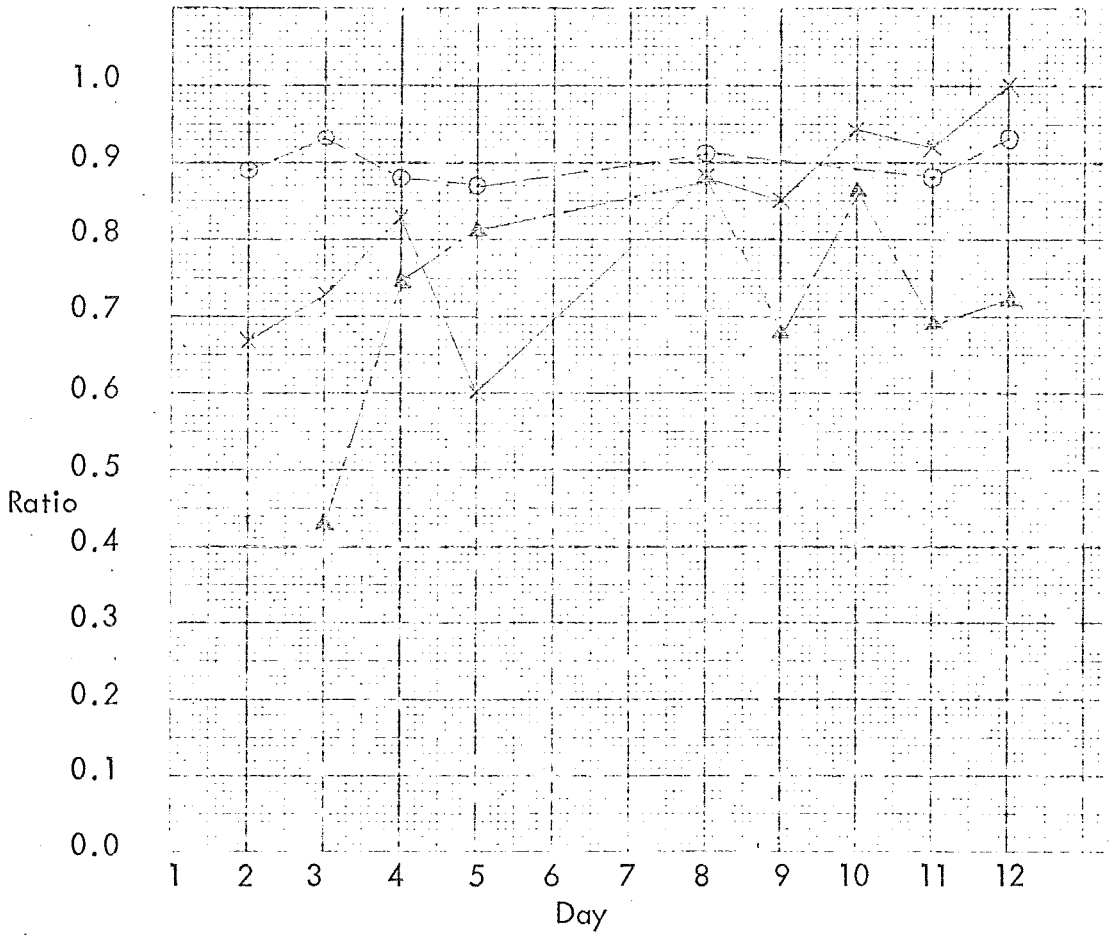


Key:- —×— = Successful trainee, Northampton

— — -⊙- — = Successful trainee, Rodwell House

- - - - -△- - - - = Failure during training

Figure 17 - Own-initiative ratios, Clearing Down.



Key:- = Successful trainee, Northampton

= Successful trainee, Rodwell House

= Failure during training

Figure 18 - Own-initiative ratios, Ticket

action. However, by day 12, there is little to choose between them. For the case of the failure, however, considerable help or instruction is being given in this activity at day 12.

In Figure 14, a similar picture is presented for Dialling. Here the difference between the two successful trainees is eliminated, but the failure still lags behind. In Timing (Figure 15) the gap is narrower, but still detectable. Speaking (Figure 16) shows again the difference between practising on live traffic and simulated traffic, as well as that between success and failure. In Clearing Down (Figure 17) and Ticket (Figure 18) the difference between success and failure is less distinct.

These six activities suggest that the difficulty experienced by those who fail in training is related to the learning of the sequence of operation. Timing is a comparatively unimportant activity, occupying little of the operator's time, but, for the failure, more instruction is needed. The same is true of Operating Keys. Speaking is again part of the sequence, the right thing must be said at the right time.

This inability to master the sequence is borne out in observations. A typical action in a failure is that the right words are spoken but the trainee omits to throw the key to the SPEAK position, or, if the key is operated correctly, the trainee is lost for words. The typical failure seems unable to put together the "theory" learned in the classroom with the manipulative element learned at the board; it is likely that the ASr becomes aware of this inability and from experience, associates it with failure.

5.3 Trainee or Training?

When a recruit fails in training, it may be that the recruit is not suited to the work or that the training is not suited to the recruit. In all of the critical activities, there is evidence of improvement, but it is not sufficiently rapid. Hence, for the failure, the problem is that, with the method of training used, the pace is too great. Now, the speed of training is determined by economic factors so that the trainee must be suited to the training. Although the selection procedures (both current and proposed) examine abilities in the parts of the task, they do not look at the applicant's ability to assemble the parts into a whole. For this purpose, a trainability test of the type propounded by the ITRU (20) could be devised. Appendix E is a proposed test based on the RQ procedure used in almost all AMCs.

However, although it is advisable to improve selection where an adequate supply of applicants is available, there are many places where the Post Office is faced with fierce competition for labour. In these places, the Post Office may have to reduce recruitment standards which will, in turn, call for a change in the training. In the light of this study, a relaxation of the pace merits first consideration among the alternatives. This would incur extra cost although, as will be shown later, the amount is small.

5.4 The Greatest Success

It is clear that both types of practise have advantages, and may be expected to produce different outcomes in terms of success. On the one hand, practise on simulated traffic ensures maximum reinforcement of the previous classroom work, and at the same time allows, where necessary, selective revision of those parts of the work in which the trainee has an apparent weakness. It enables an element of heuristic training to be used and, it may be argued, develops the confidence of the trainee because she is able always to handle the work presented.

Practice on live traffic, though, immediately introduces the trainee to the real work environment. She can learn the layout of the OJM and not be faced with an unlearn-and-relearn situation at a later date. The demonstration of calls by the ASr in the early stages speeds the classroom learning of those calls in the later stages. The duration of practice periods can be extended as training progresses, and there is no limit on the rate at which the trainee can work other than that of her own ability. (Note that the transaction rate at Rodwell House was never observed above 22 per hour, whereas this rate was achieved by the Northampton trainee on day 3). It may be argued that the confidence of the trainee is developed because she is dealing with customers from the start.

Despite their relative merits, the profiles show that there is little to choose between the two schemes of training. At the end of the formal training period, the trainees from both Rodwell House and Northampton have still far to go before they develop the activity profile of the experienced operator. They may achieve

high output rates, but do so by the use of "brute force" methods. What is more, although the rates are high in relation to the 200 valued calls/hr. standard, they are low in comparison with the potential work rates of the experienced operator.

Figures 19-25 plot the progress of four trainees at Northampton in relation to the experienced operator profile. The circle denotes the mean percentage of time spent by experienced operators on each activity, the full lines are at ± twice the standard deviation. The crosses represent the percentages for the four trainees. Figures 26-32 do the same for three trainees at Tottenham, after initial training in Rodwell House. (Note, in Figures 30 and 32, only two trainees' results are given). The results are strikingly similar. In each case, it takes six months to reach a reasonable, experienced-operator profile. (The apparent result at day 51 at Tottenham hides the fact that Procedural Instruction is still being given at this time). In each case, less Speaking+ and more Listening than for experienced operators is the continuing tendency.

This assessment of the equality of the two methods is reinforced by the observations of Procedural Instruction. There is first the jump in the proportion of time on this activity when the Rodwell House trainees move out to the AMC, which brings it up to the level of the trainees in Northampton, but there is also the length of time for which it is given. Constant supervision by the ASr ends at day 33, but thereafter the trainees can consult the ASr if they wish. In some matters, for example, the allowance of sums of money more than ten pence on coin-box calls, the ASr has to be consulted for a decision, but it was observed that trainees frequently asked for help on other matters of a procedural nature. The last such observation was made on the 59th day in Tottenham and the 58th day in Northampton, which suggests that the two sets of trainees were at a comparable stage of training.

5.5 The Tricks of the Trade

In terms of the time taken to achieve an experienced operator profile neither in-exchange nor Wing School training is the greatest success. It may be said fairly that they are equally bad in teaching the "tricks of the trade". It was noticed, for example, that trainees were being taught to write routings on the ticket during the first two weeks of training. Since there is no general

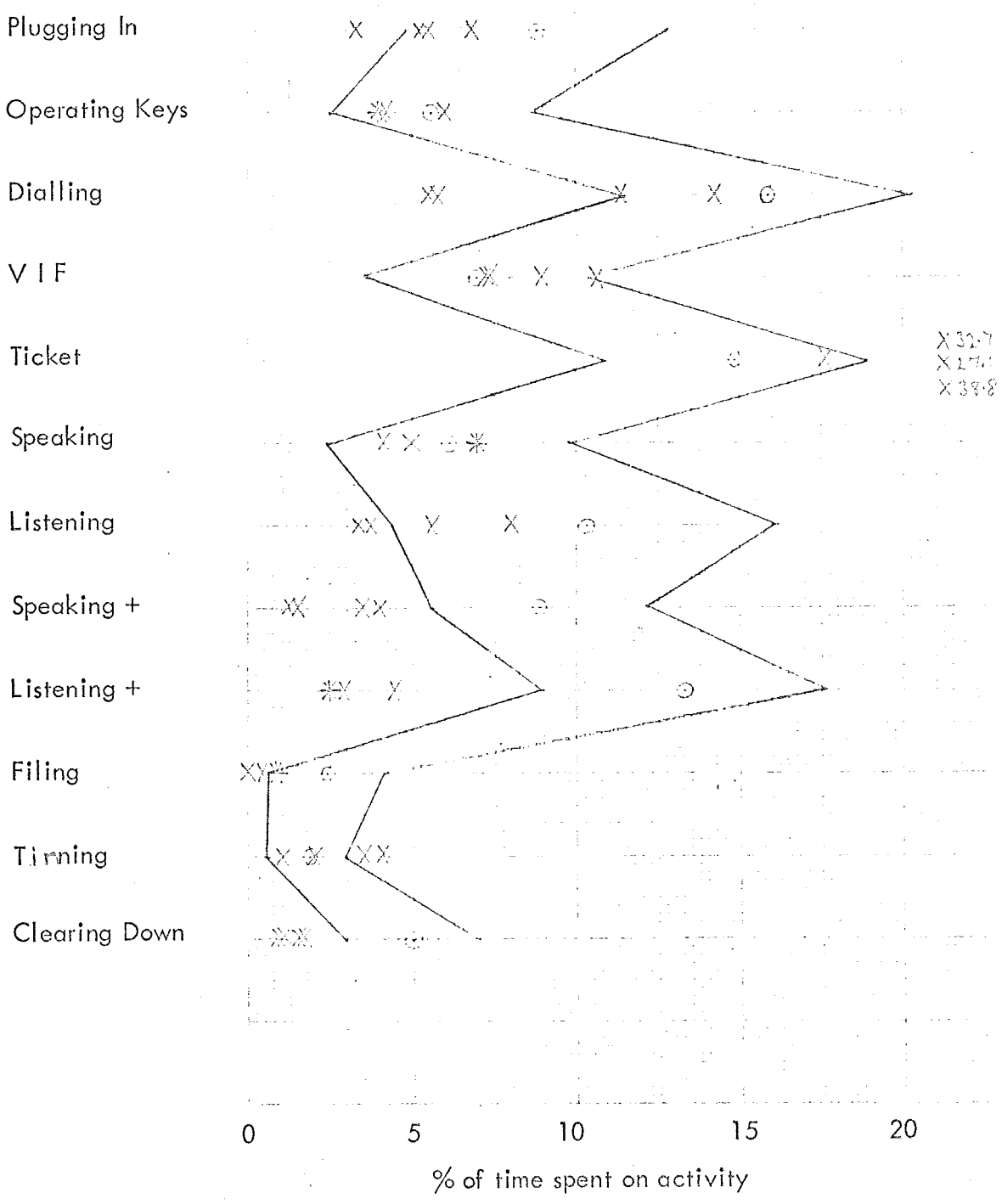


Figure 19 - Trainee Progress, Northampton. Day 2

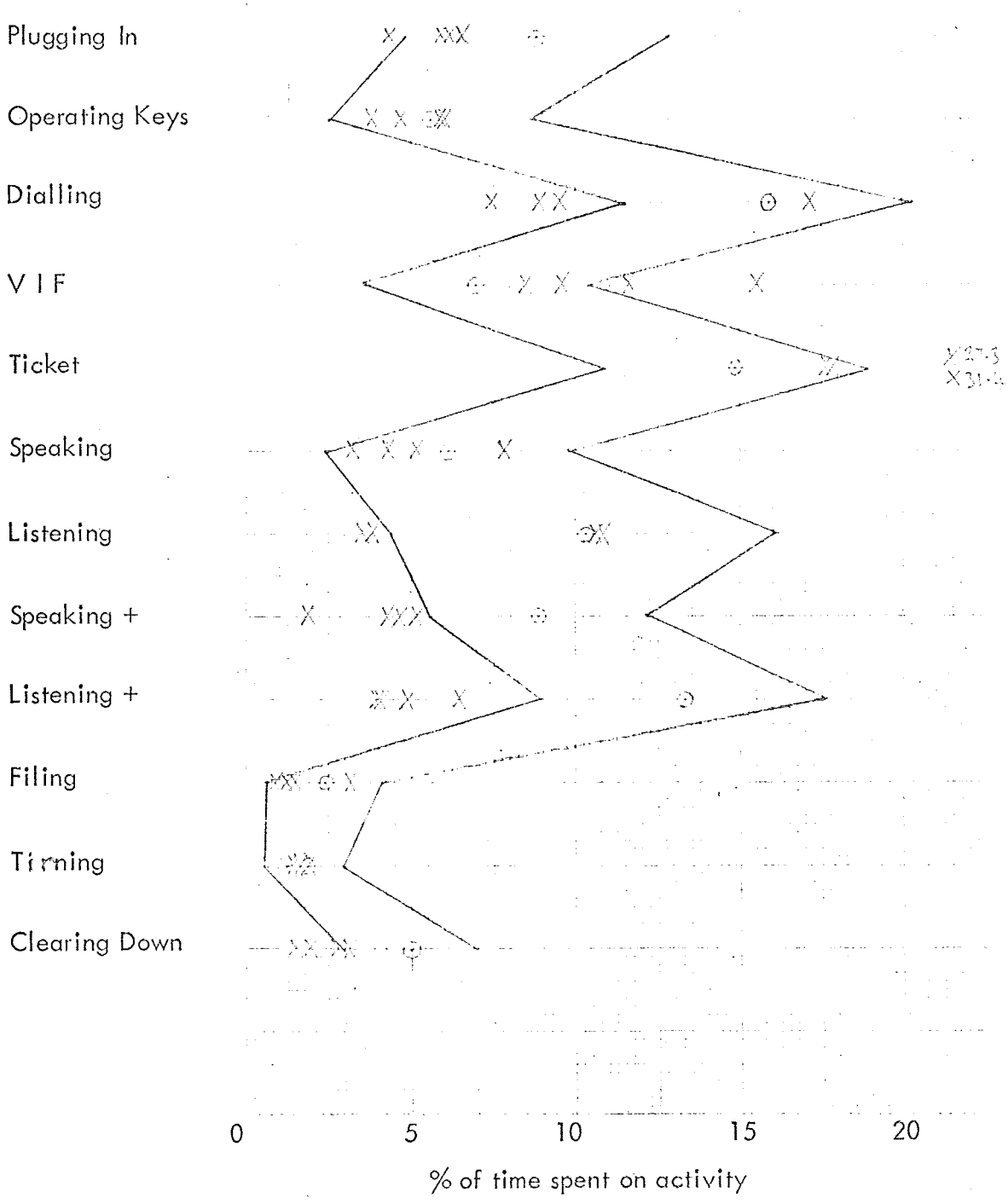


Figure 20 - Trainee Progress, Northampton. Day 11

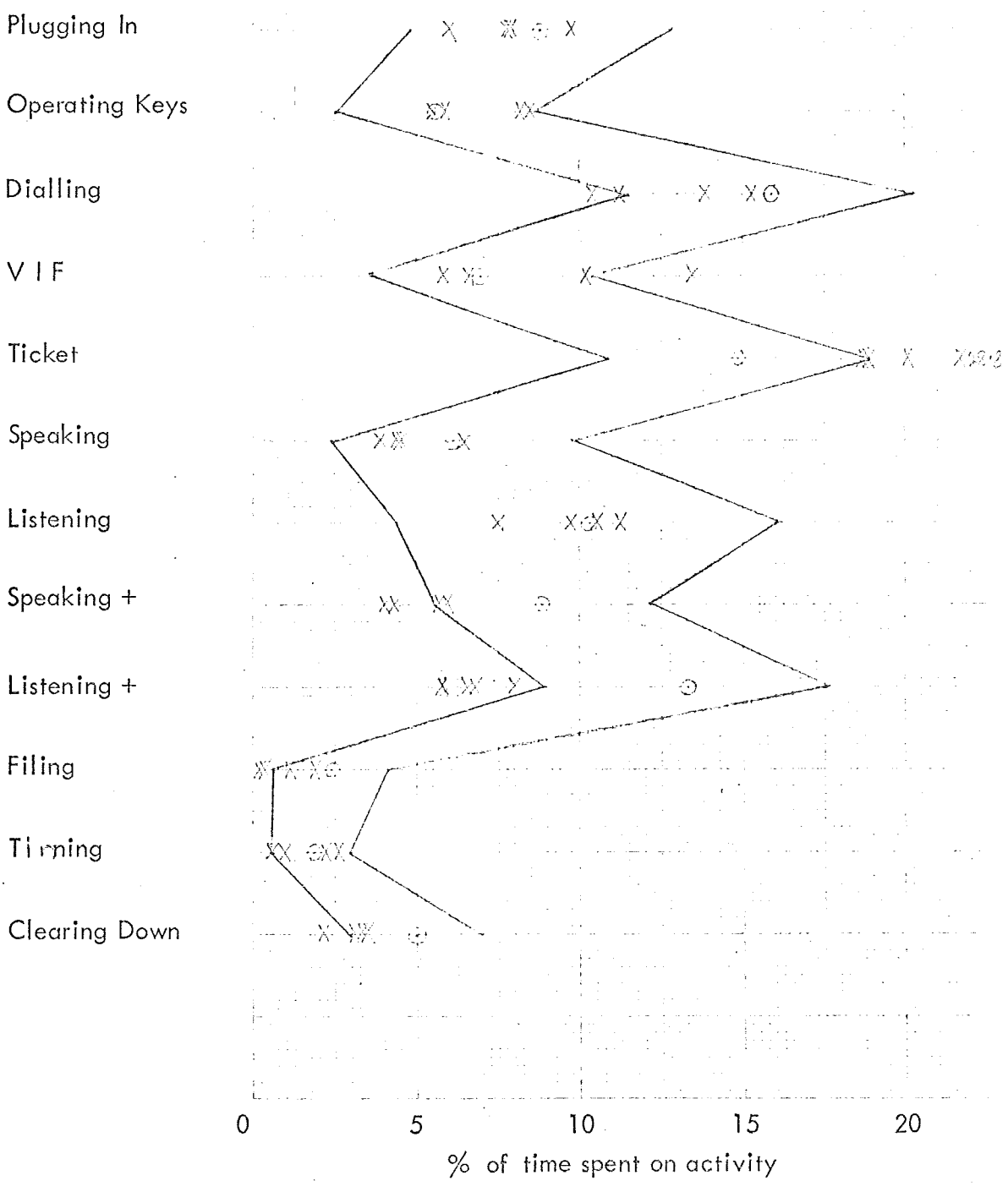


Figure 21 - Trainee Progress, Northampton. Day 22

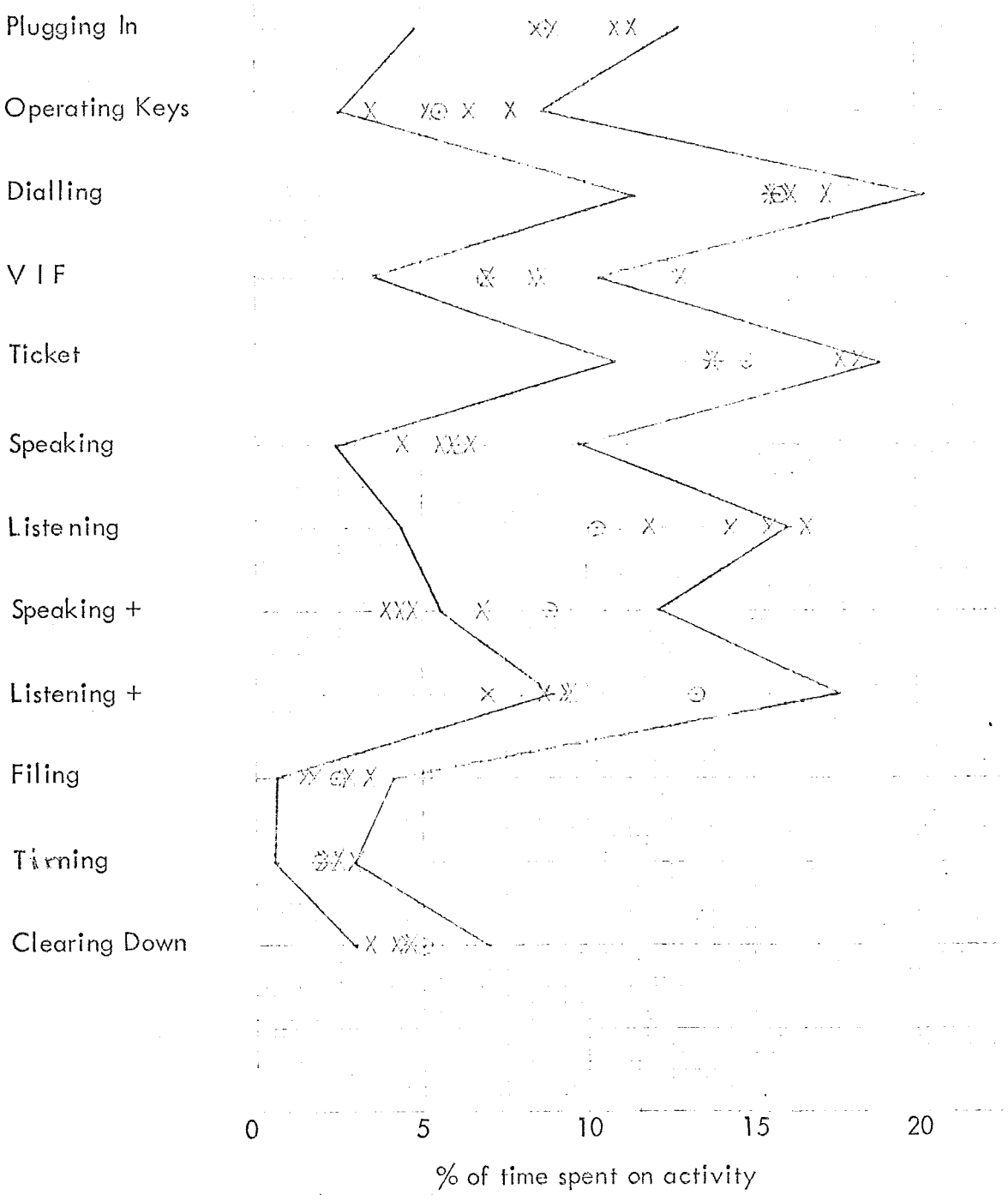


Figure 22 - Trainee Progress, Northampton. Day 54/58

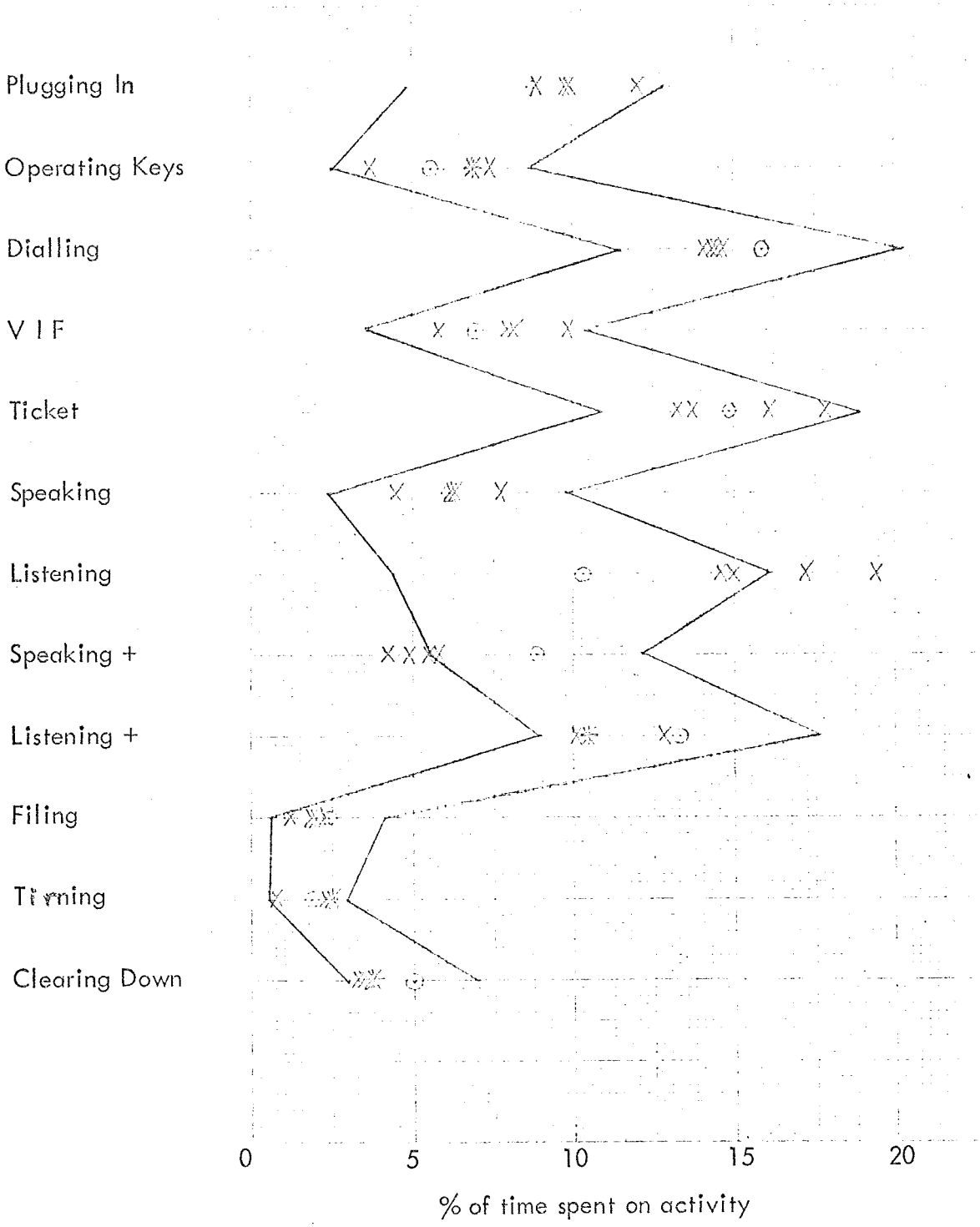


Figure 23 - Trainee Progress, Northampton. Day 108/115

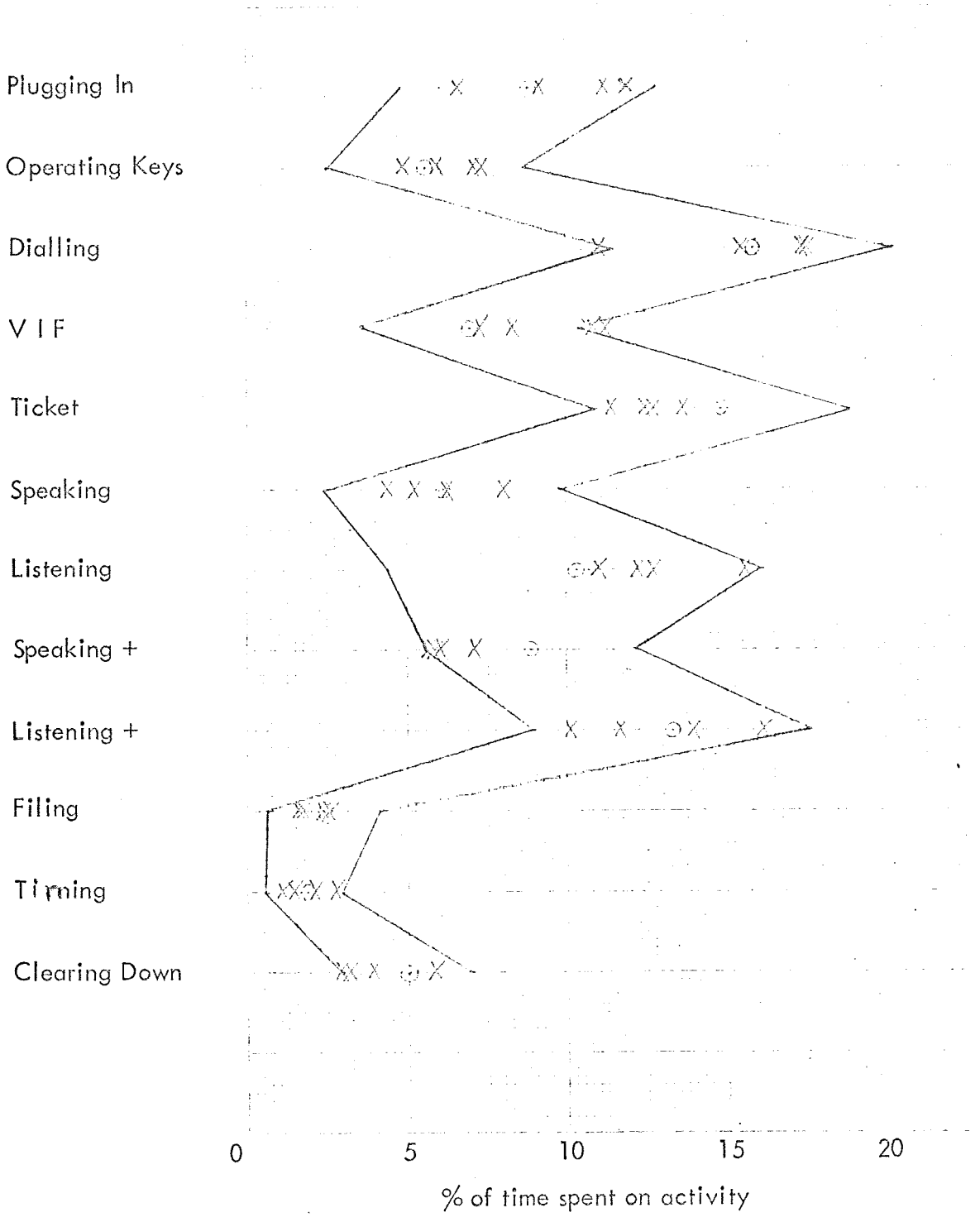


Figure 24 - Trainee Progress, Northampton. Day 129/136

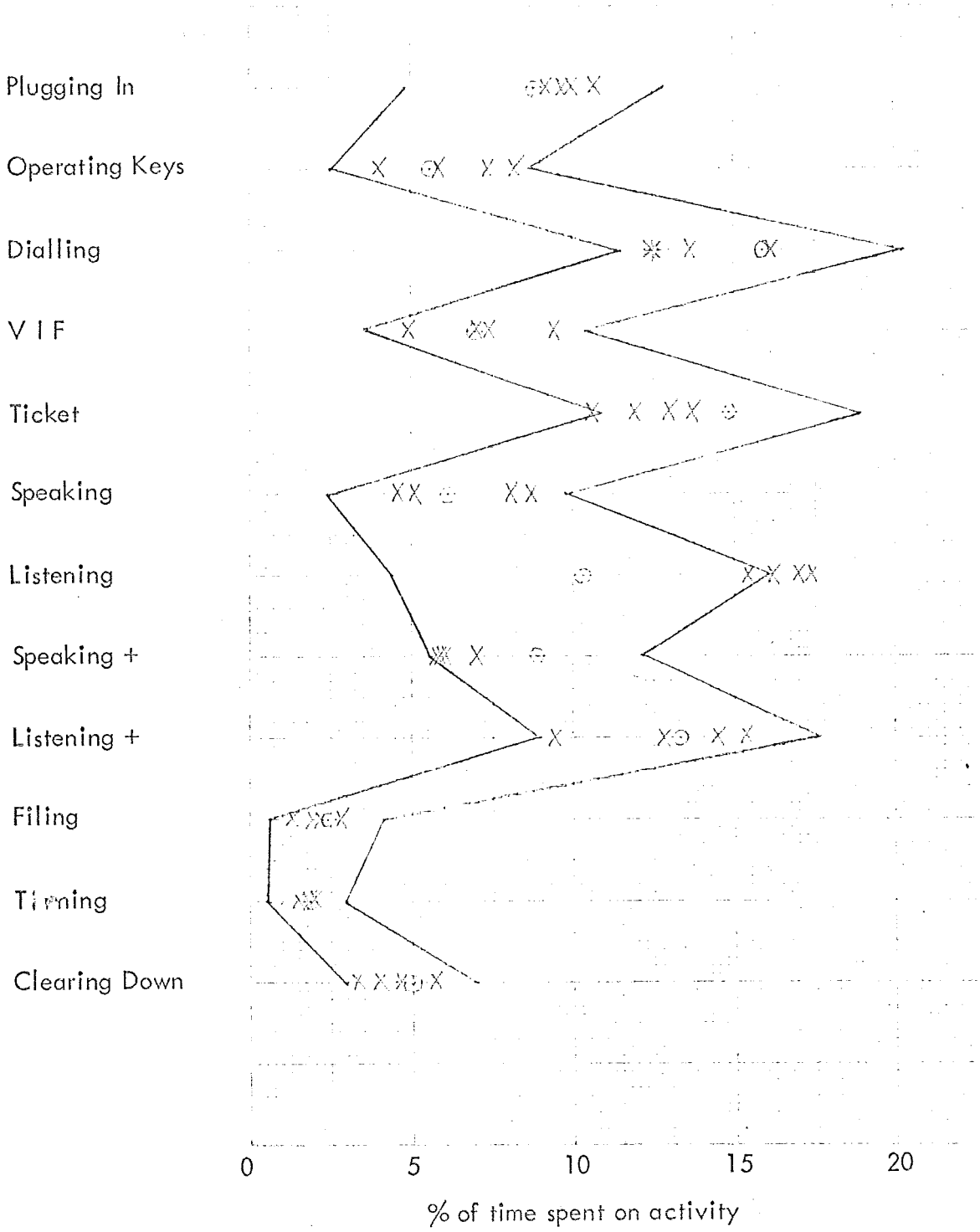


Figure 25 - Trainee Progress, Northampton. Day 158/163/165

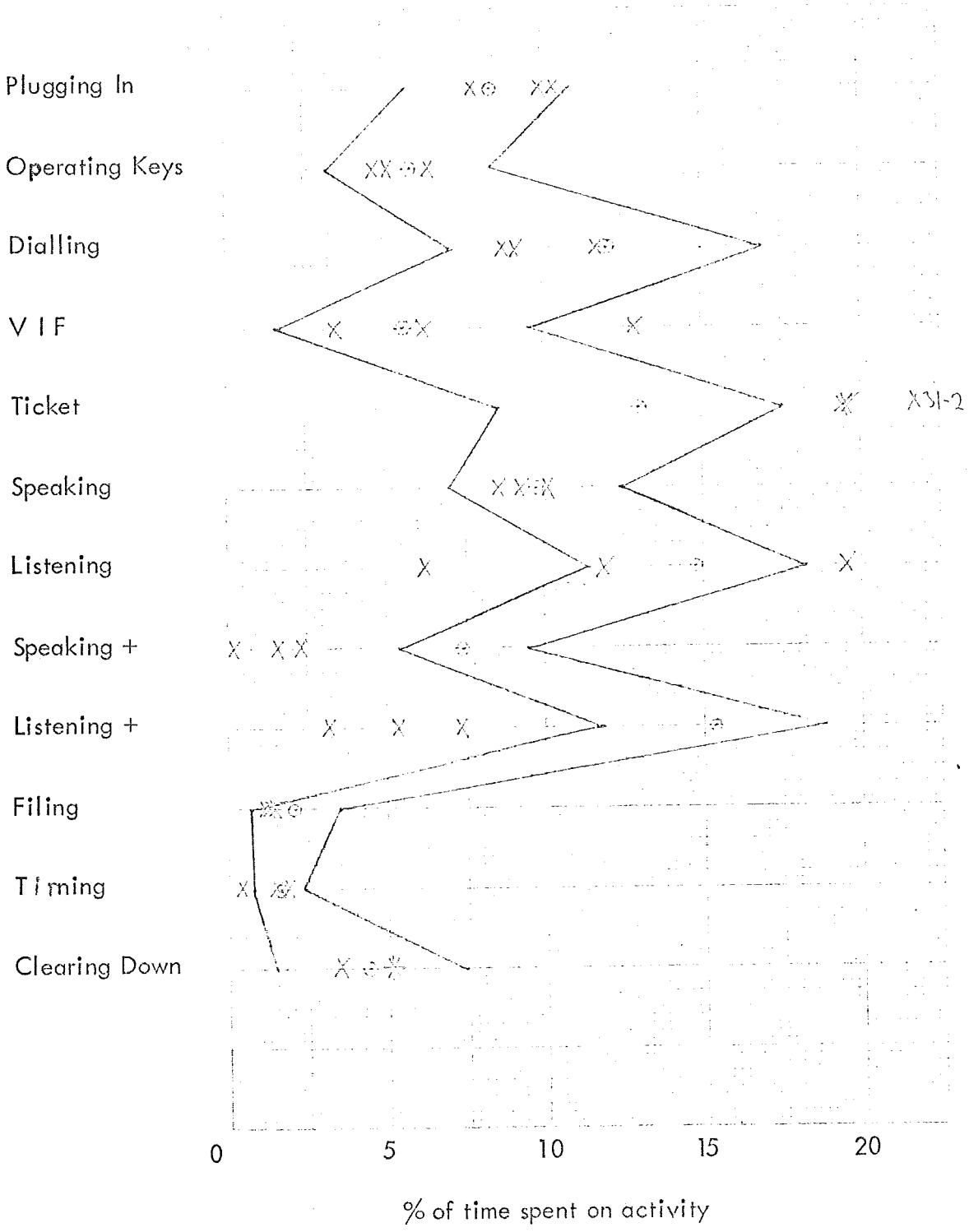


Figure 26 - Trainee Progress, Tottenham. Day 22

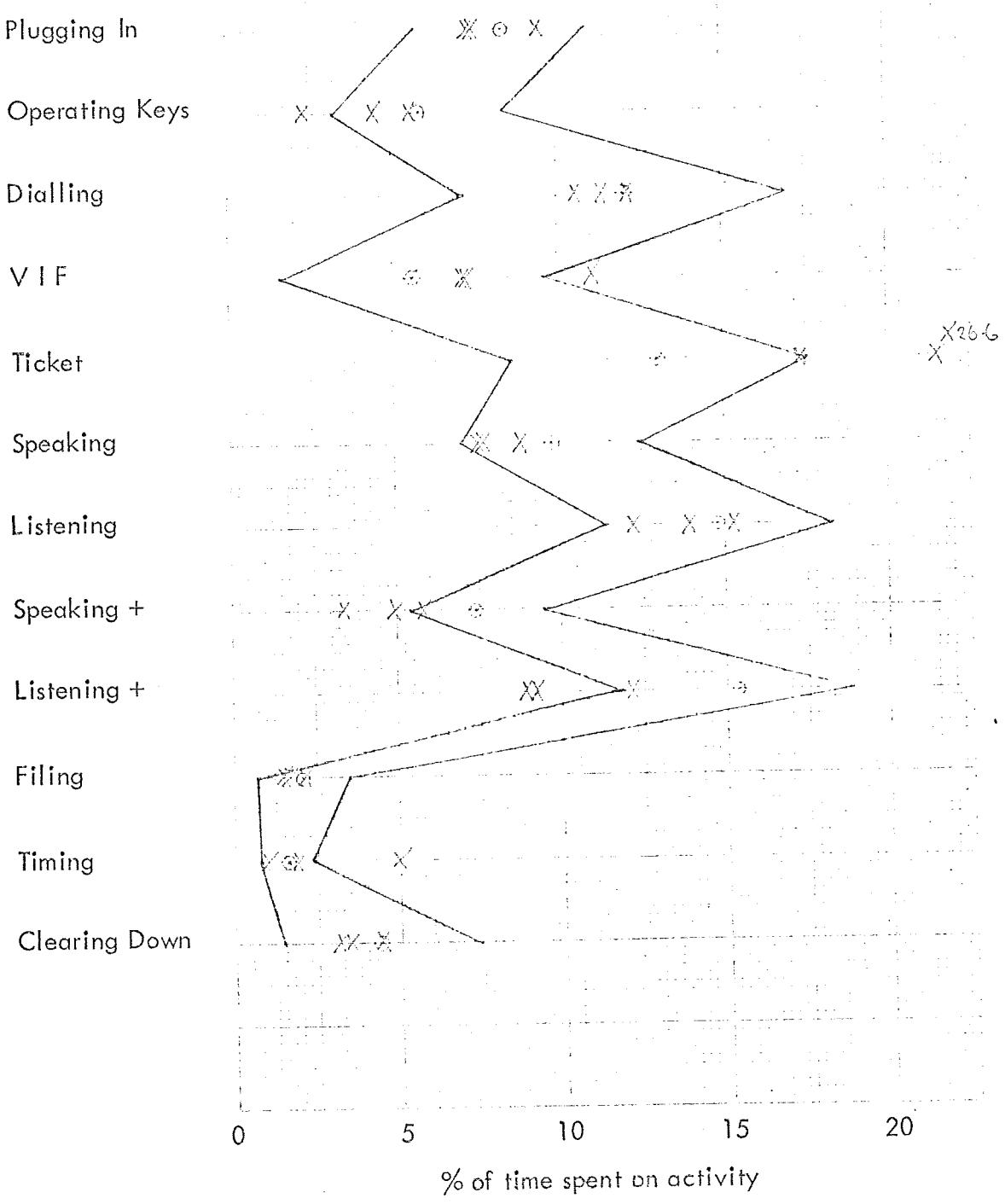


Figure 27 - Trainee Progress, Tottenham. Day 33

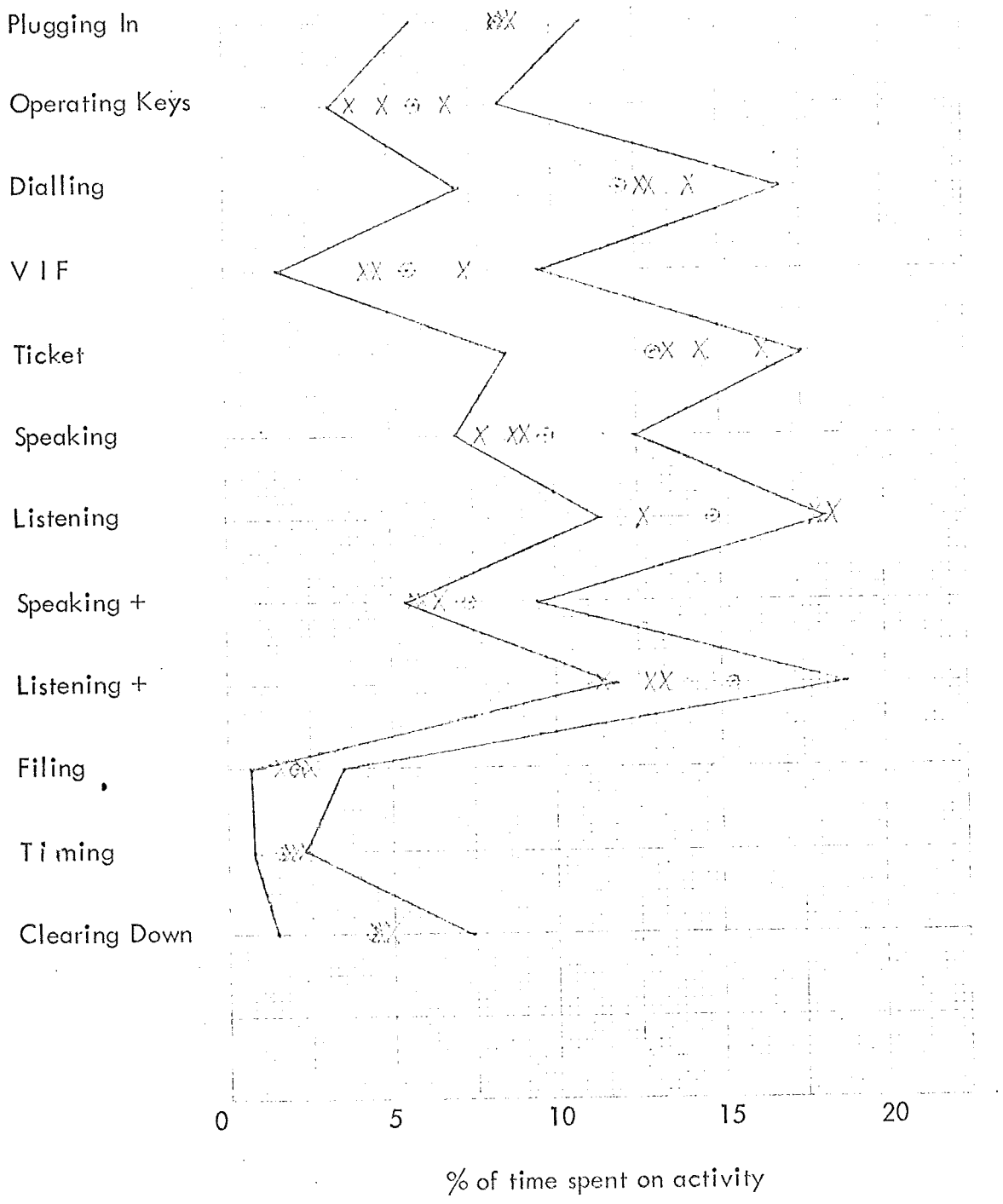


Figure 28 - Trainee Progress, Tottenham. Day 51

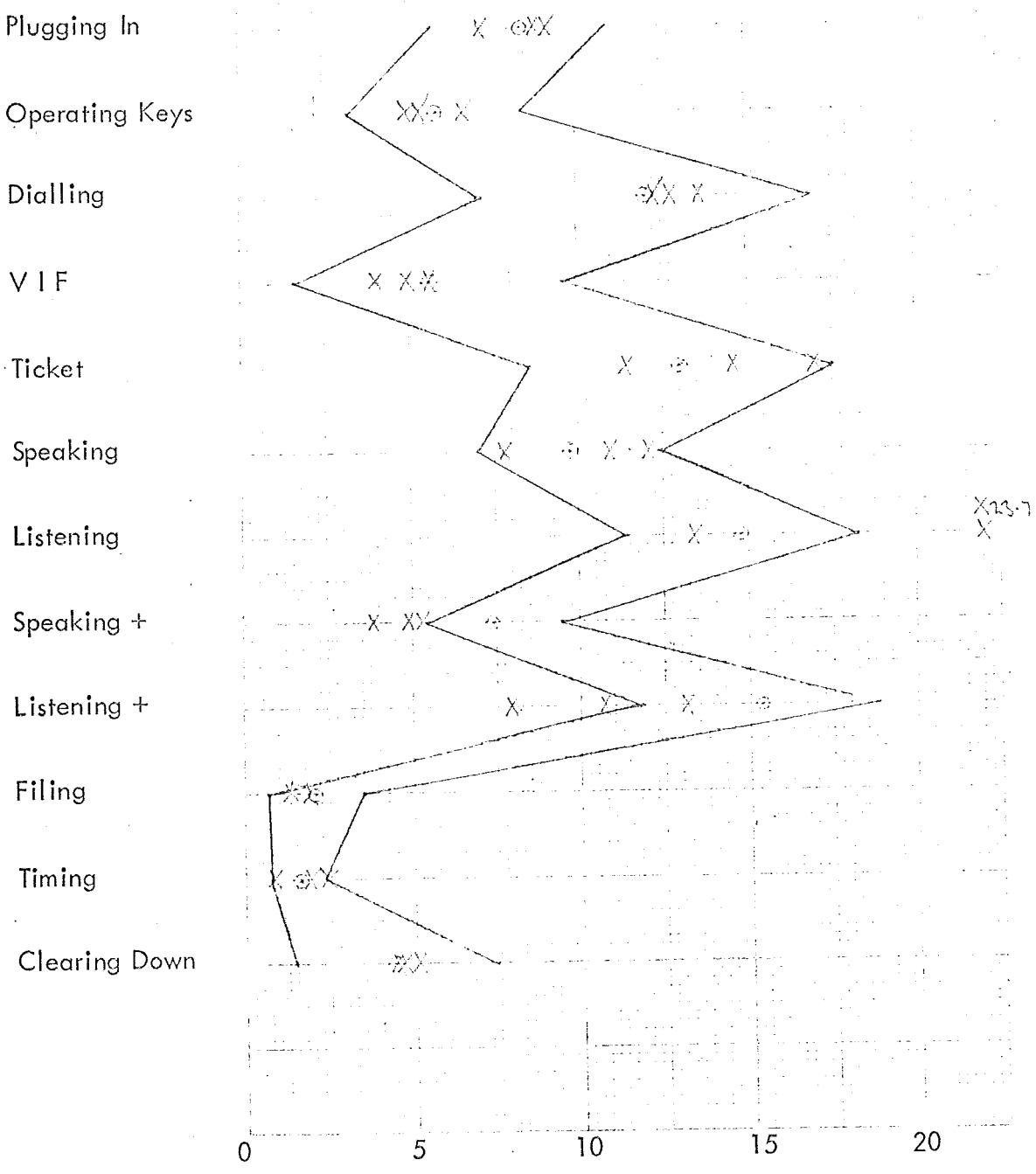


Figure 29 - Trainee Progress, Tottenham. Day 59/65

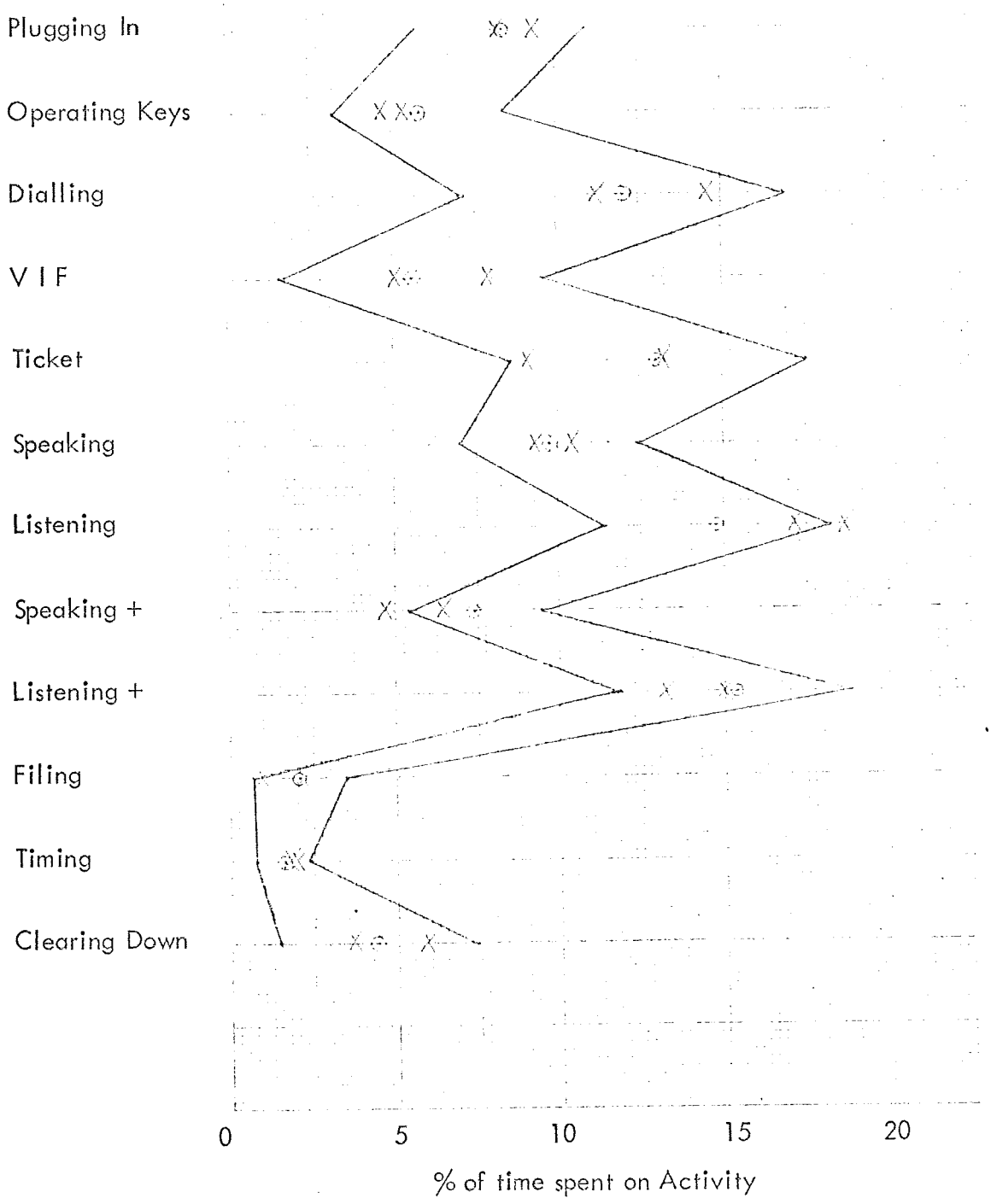


Figure 30 - Trainee Progress, Tottenham. Day 94.

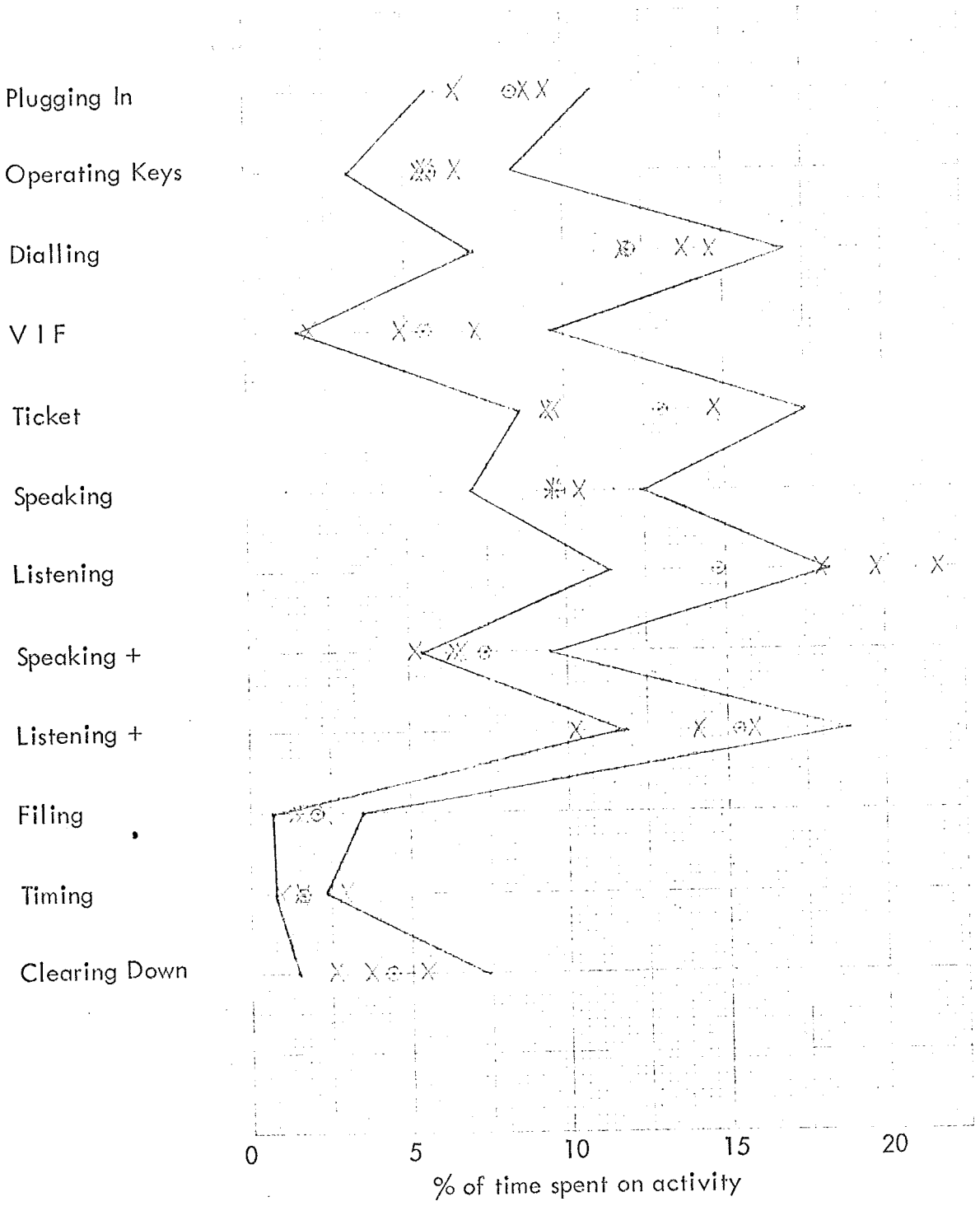


Figure 31 - Trainee Progress, Tottenham. Day 122

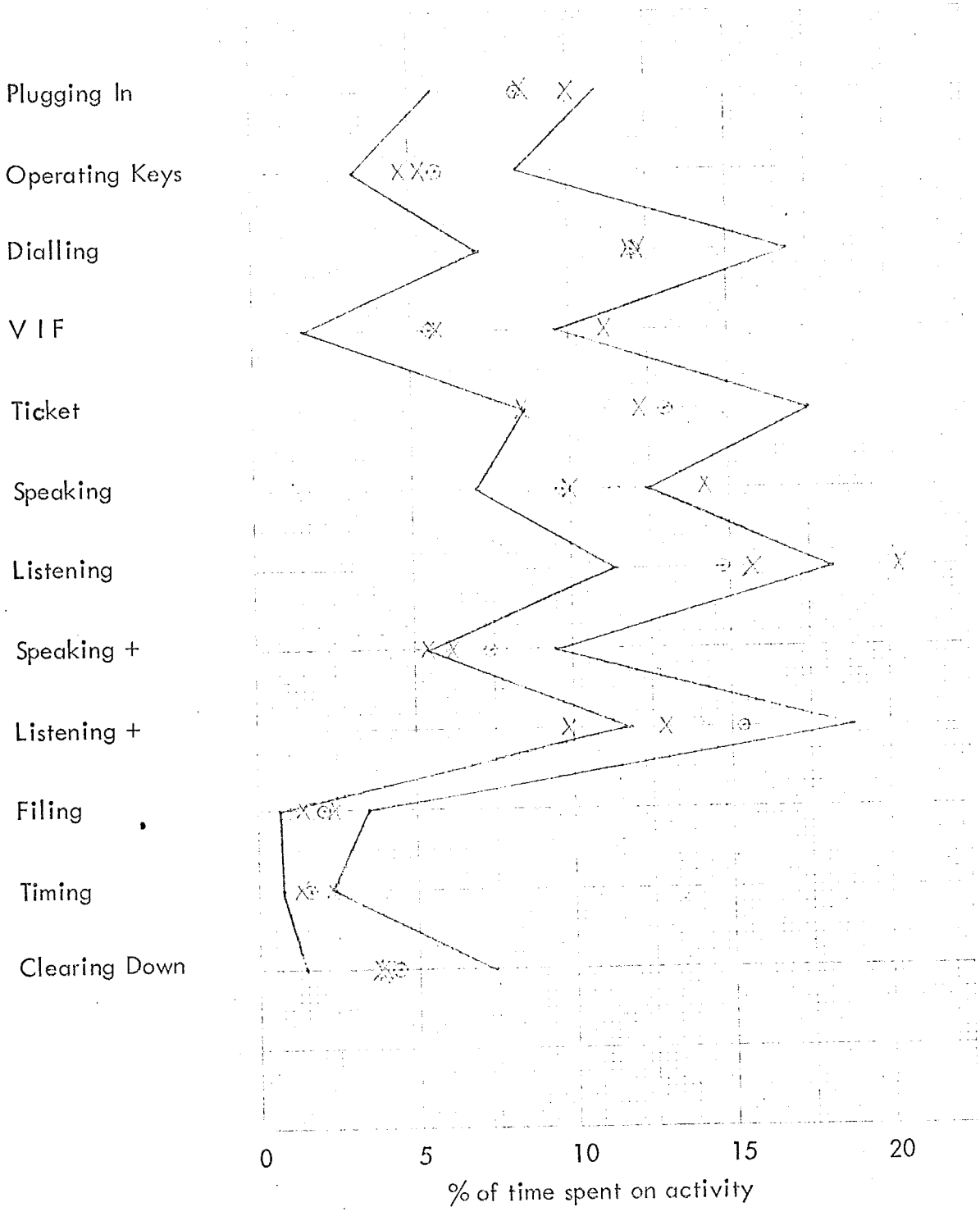


Figure 32 - Trainee Progress, Tottenham. Day 172/183

necessity to do this, the learned habit had then to be broken; experienced operators either check the routing in the VIF and hold it in short-term memory, or read off the routing as they dial or key the digits. A report to the Post Office (21) corrected this situation.

More might be done to speed the process. The + ability in Speaking+ and Listening+ is most frequently the writing of information on the ticket. No training is given in these activities; admittedly they are demonstrated by the ASr, but the trainee is then left to her own devices. A tape recorder is used already during training and could be used to develop these activities. Short tapes of exchange names and numbers could be prepared locally to give practice at recording and telling back information at the same time. Similarly, some attempt could be made to improve the short-term memory span for digits, a facility which is used extensively by experienced operators.

5.6 Limitations of the method

Activity sampling observations give a very detailed picture not only of the training but of the job itself. They reveal the differences between the various methods, but the penalty is in the small sample size. Individual characteristics can distort the profile and so should have an effect on the development of the profile in a trainee. Larger samples would reduce the likelihood of error from this source, but would demand either more observers or longer periods of observation. In this study, two observers studied fifteen trainees for periods varying from one week to six months. This occupied them almost full-time for three months and part-time for the remaining three months. With better luck, the number studied might have been increased to eighteen, but this is still small.

Increasing the period of study introduces a further factor. The profile is related to the traffic mix in any AMC, and the traffic mix is changing in most AMCs. This is, in part, the result of changes in the automatic network, but there is also a change in users' habits. In some cases, the period over which a discernible change in the profile occurs is of the order of a year, which would restrict the period of study. On the other hand, increasing the number of observers introduces a further element of variability. The two successful trainees

whose progress is discussed herein were studied by the same observer. The failure was studied by the other observer , which may reflect already on the conclusions drawn about the causes of failure, although in this case both observers had exhaustive discussion on the categorization of activities. Nonetheless, it was felt that some approach capable of dealing with larger numbers in a shorter time was desirable.

CHAPTER 6

SIMULATED-CALL TESTS

6.1 A Problem of Standardization

With any attempt to increase the numbers comes a problem of standardization. Conditions of working differ from exchange to exchange. Both measures of work and profiles of activity are peculiar to location, yet the training given is essentially common throughout the United Kingdom. Because of the differences, it was concluded that any standardized assessment would have to be based on special tests.

The tests would ideally relate to the whole task rather than its parts, that is, they would be concerned with complete calls. However, the use of live calls was ruled out, since this would remove all possibility of standardization, even if the type of call was restricted by some system of filtering. The use of a full-scale simulator was considered but rejected because of cost. As a compromise, the format chosen was audio-tape simulation of calls.

6.2 Call simulation

The principal disadvantage of call simulation using audio-tape is the absence of certain visual and tactile cues. This is offset to some extent by associated audible cues - dialling has an easily-recognised associated sound, as do many of the other activities. To establish whether these were sufficient to enable operators to follow the progress of a call, some live calls were recorded in which various difficulties were met. These calls were then played to both experienced operators and trainees in their last week of initial training. In all cases, both classes of operator were able to monitor the stages in the connection of the calls. Indeed, one experienced operator went so far as to diagnose the cause of failure of one of the calls.

Now, Martin (22) states that tests must meet three requirements, in that they must be scientifically sound, administratively convenient and politically defensible. The result of the preliminary trial showed that the tests went some way towards meeting the first and last of the requirements. However, a straightforward "talkthrough" test would not meet the second requirement.

Accordingly, it was planned to carry the test calls through to some predetermined stage, and then ask the operator under test to state what her next action would be. To eliminate the problem of interpretation of answers, a multiple-choice arrangement was used with a correct answer and three distractors for each question.

An equally-important factor for administrative convenience was the time taken to administer the tests. The first three weeks of training is a period when time is at a premium. It was decided that no more than two hours could be spared in all, and that this could not be used on a single occasion. Six sets of questions were prepared, for use during the second and third weeks. No set ran for more than 15 minutes. ASrs were asked to give the tests at any convenient time during the particular afternoon, giving a measure of flexibility.

The simulation aimed at a high level of realism. Wide band (50-12000Hz) recording was used for the operator's voice and narrow band (300-3000 Hz) for customers and remote operators. A variety of real tones was used where necessary, and pauses in the action similar to those produced by the automatic equipment were inserted when appropriate. After the complete sequence had been assembled, background noise recorded in an AMC was mixed in. The effectiveness of the result may be judged by the fact that one ASr remarked that it must have taken some time to get just the type of call that was wanted.

6.3 Test situations

The situations used in the tests were chiefly ones in which some difficulty was met in connecting the call, which, if three out of every four calls is straightforward (according to the Operating Handbook), calls for some justification. In fact, the straightforward timed call is dealt with at an early stage of training, and nearly two-thirds of the time is given to the study of likely difficulties and how to overcome them. However, not all of the questions relate to difficulties; there is an element of straightforward working.

To introduce this element, it was necessary to restrict the application of the tests to what are termed non-director areas. In London and the five major cities, the automatic network uses the director system, for which the STD access is better than in the rest of the country. Trunk calls handled by the operator

which can not be dialled by customers in director areas are usually to remote places with unfamiliar names (in the depths of Wales or the Highlands). Experience shows that this in itself is often the cause of difficulty, so by excluding the director-area AMCs a more realistic mixture of situations is possible.

The second factor determining the choice of situation was that it should either be of universal application or be capable of being adapted to a particular locality merely by changes of detail. As has been stated, realism was a primary aim, so that the use of an artificial VIF and OJM with fictional exchange names was excluded. Hence, where routings and exchange names and numbers occured, they had to be adjusted for each AMC, but these were changes of detail and the underlying principles were untouched.

The third factor bearing on the choice of situation was that the situation had to have a reasonable frequency of occurrence in real life. The training sets out to teach the recruit most of the contents of the Operating Handbook, but some of the situations for which standard procedure exists are met but rarely. There seemed no justification for testing on some abstruse point which the trainee was unlikely to meet during her entire period of PO service. The situation scripts were checked for this by the THQ group concerned with telephonist training, as well as for correctness of terminology and reasonable coverage of the syllabus, which latter was the fourth factor influencing the choice of situation.

In all, there were sixty questions in six sets of ten. These were chosen to cover the work adequately, and, at the same time, each set was graded to ensure that it only covered topics taught by the time the set was to be used. Topics taught in the morning immediately before the afternoon in which the question set was to be administered were excluded.

The final factor bearing on the choice of situations was the need to find suitable distractors. A good distractor should be a plausible alternative and not merely a play on words. Finding three such for every situation proved impossible. Although it was appreciated that fewer distractors could have been used in some cases, uniformity was deemed important, particularly since the tests were to be administered by ASrs unfamiliar with this method of testing.

6.4 Political Defensibility

As in earlier studies, the mainstay of political defensibility was anonymity. In this case, the anonymity was, if anything, more effective, since there was no direct contact between the researchers and the test subjects. Each subject received an identifying serial number by choosing from a large number of sealed envelopes. She alone knew the number; answer sheets were sealed by the subjects without scrutiny by the ASr and sent direct to the researchers for marking (in the event, two answer sheets were lost in the post), hence there was no association of names with serial numbers.

The subjects each received a letter, outlining the aims of the research, and before the first test series they listened to a tape recording which gave further information and instructions on how to answer the questions, as well as a worked example. The texts of the letter and the tape recording are given in Appendix F.

Supervisory staff at Regional and local levels were briefed in advance by the researchers, using a demonstration tape. The local representatives of the Union of Postal Workers and the Post Office Management Staffs' Association were included in local briefings. It was stressed that there would be no immediate feedback of results, and that the long-term feedback would be general and not relate to specific individuals.

6.5 Scientific soundness

Before being used on trainees, each question set was tried by experienced operators with the two-fold aim of ensuring that the questions could be answered by experienced operators and that there were no errors in the tapes or answer sheets. However, the use to which the tests were to be put was the comparison of two, slightly-different training methods.

The activity-sampling approach had looked chiefly at the effect of two different methods of practice. In this study, what was to be examined was the effect of two different methods of program-reading. The test sets themselves examine knowledge of procedures rather than ability to carry out the work (although it is necessary to be able to do the work to follow accurately with audible cues only), and the knowledge of procedures is taught by program-reading. Practice reinforces (hopefully) the lessons of the program, but the basic knowledge

comes from the program itself.

6.6 The Experiment

As statedearlier, the programes are linear. Questions in the programs are posed either in connection with ticket preparation, or are concerned with more general matters, such as standard expressions. Ticket-orientated questions usually ask for the preparation (at least in part) of a ticket, and it has been practice in the past that the trainees write answers to the other questions as well. When each trainee has completed a program she has an answer sheet together with a number of practice tickets. These are marked later by the ASr, who tends to use them as a "second opinion" on the progress of the trainee. However, since the correct answers are given in the program, trainee errors are corrected as reading continues.

The writing of answers to the general questions takes time, particularly when the answer calls for some measure of self-expression, rather than some stock phrase. In the context of program-reading, it serves little purpose. Accordingly it could be omitted. (A similar argument might be applied to the preparation of practice tickets, but this is weakened by the fact that ticket preparation is a part of the job, whereas answer writing is not). The THQ group concerned with telephonist training had run a trial in one Telecommunications Region which, using call-valuation scores as the criterion, suggested that training was not impaired by omitting written answers. This provided a chance to test the method, by comparing the scores of trainees who did write answers with those of trainees who did not write answers.

6.7 Experimental details

The tapes were used in three AMCs, Coventry (Greyfriars), Leamington Spa and Wolverhampton. The end of the experiment was set for mid-December, 1973, because of the introduction of major changes in operating procedure. By the time the tapes were ready, some three months was left before the end date. In each AMC this period was roughly halved; in the first half the trainees wrote answers, but in the second half they did not. The dividing line was drawn to give, as nearly as possible, equal numbers of trainees in the two groups.

Once the tapes had been checked and corrected, and the ASrs instructed in their use, no further routine visits were made, except to exchange tapes for ones with updated call charges, until the equipment used was collected at the end of the experiment. The instruction to change over to the experimental method (no written answers) was sent by letter. Each AMC was given a telephone number to contact for advice. A number of calls was made, and one visit made to clarify a particular matter. Otherwise, the adminstration of the tests by local staff went without difficulty.

One important difference existed between trainees in Coventry and those in Leamington and Wolverhampton. In the latter, the trainees were recruited immediately before the start of their training for switchboard duties, whereas in Coventry, the trainees had been recruited several months beforehand and been trained as DQ operators. They had each about two months experience of working on the DQ service. Although DQ work involves customer contact, there is little resemblance between that and the work of a controlling operator, particularly in terms of procedures.

6.8 Pace.

It was decided to pace the tests by the simple method of instructing the subjects not to turn off the recording until told to do so by a recorded instruction at the end of the tape. At the appropriate point in each situation a distinctive warning tone sounded, followed by a period of silence. The length of the silent period was adjusted to allow an average reader enough time to read the four alternatives and make a choice, after which the next situation was presented.

Pacing was justified on the grounds that

a. It would improve the standardization of the tests,

b. Speed of response (or decision) is one of the aims of training.

CHAPTER 7

TEST RESULTS

7.1 Analysis of Results

When the idea of using paced tests arose, it was thought that it would be possible to develop learning curves for each trainee. The curve parameters would then form the basis of comparison. However, as the tests developed, it became apparent that the conflicting constraints discussed in the previous chapter would not allow sufficient repetition of test material for a learning curve to apply. In effect, each test series is an independent event.

An alternative analysis could have calculated means and standard deviations of scores in each set of questions, comparing them by t and F tests. Now, in this case the variate is discrete, of limited range and unknown distribution, so that this procedure is of doubtful value. The decision was made to use non-parametric techniques, namely the Kolmogorov-Smirnov test (23) for scores achieved on each question set and the Fisher exact-probability test (24) for individual questions.

7.2 Test Scores

In all, twenty-four trainees attempted the tests. Fourteen, the control group, wrote answers to questions in the program; the other ten, the experimental group, did not write answers. Because of absence through sickness and loss of answer sheets in transit, the full numbers of trainees did not answer the fourth, fifth and sixth sets of questions, but this does not affect the analysis of results. Table X gives the score distributions achieved by the two groups, the cumulative distributions (and the differences between them, and the values of X^2 calculated from the maximum differences.

For two degrees of freedom and a one-tail situation, the value of X^2 at the 0.10 level is 4.605. It is clear that none of the calculated values approaches this level. The differences between the groups favour the control group in the first, second and third series and the experimental group in the remainder. The

TABLE X

Simulated Call Test Scores.

Test Series	Test Score	No. of trainees achieving score		Cumulative Distributions		Differences	X^2
		Control	Experimental	Control	Experimental		
1.	0	-	-	0/14	0/10	0	
	1	-	-	0/14	0/10	0	
	2	-	1	0/14	1/10	-1/10	
	3	1	1	1/14	2/10	-9/70	
	4	-	-	1/14	2/10	-9/70	
	5	2	3	3/14	5/10	-20/70	2.10
	6	4	3	7/14	8/10	-21/70	
	7	5	1	12/14	9/10	-3/70	
	8	2	1	14/14	10/10	0	
	9	-	-	14/14	10/10	0	
	10	-	-	14/14	10/10	0	
2.	0	-	-	0/14	0/10	0	
	1	-	-	0/14	0/10	0	
	2	-	-	0/14	0/10	0	
	3	-	1	0/14	1/10	-1/10	
	4	-	1	0/14	2/10	-2/10	
	5	3	2	3/14	4/10	-13/70	0.93
	6	4	2	7/14	6/10	-7/70	
	7	3	2	10/14	8/10	-6/70	
	8	2	1	12/14	9/10	-3/70	
	9	2	1	14/14	10/10	0	
	10	-	-	14/14	10/10	0	

TABLE X (Cont'd)

Test Series	Test Score	No. of trainees achieving score		Cumulative Distributions		Differences	X^2
		Control	Experimental	Control	Experimental		
3.	0	-	1	0/14	1/10	-1/10	
	1	1	-	1/14	1/10	-2/70	
	2	-	-	1/14	1/10	-2/70	
	3	2	3	3/14	4/10	-13/70	
	4	3	1	6/14	5/10	-5/70	
	5	4	1	10/14	6/10	8/70	1.07
	6	1	4	11/14	10/10	-15/70	
	7	2	-	13/14	10/10	-5/70	
	8	-	-	13/14	10/10	-5/70	
	9	1	-	14/14	10/10	0	
	10	-	-	14/14	10/10	0	
4.	0	-	1	0/14	1/9	-1/9	
	1	1	1	1/14	2/9	-19/126	
	2	4	-	5/14	2/9	17/126	
	3	4	2	9/14	4/9	26/126	
	4	2	1	11/14	5/9	29/126	
	5	1	2	12/14	7/9	10/126	1.16
	6	-	1	12/14	8/9	-4/126	
	7	-	-	12/14	8/9	-4/126	
	8	2	1	14/14	9/9	0	
	9	-	-	14/14	9/9	0	
	10	-	-	14/14	9/9	0	

TABLE X (Cont'd)

Test Series	Test Score	No. of trainees achieving score		Cumulative Distributions		Differences	X^2
		Control	Experimental	Control	Experimental		
5.	0	-	-	0/14	0/9	0	
	1	-	-	0/14	0/9	0	
	2	-	-	0/14	0/9	0	
	3	2	2	2/14	2/9	-10/126	
	4	2	-	4/14	2/9	8/126	
	5	7	3	11/14	5/9	29/126	2.43
	6	3	1	14/14	6/9	1/3	
	7	-	1	14/14	7/9	2/9	
	8	-	2	14/14	9/9	0	
	9	-	-	14/14	9/9	0	
	10	-	-	14/14	9/9	0	
6.	0	-	-	0/12	0/10	0	
	1	-	-	0/12	0/10	0	
	2	1	1	1/12	1/10	-1/60	
	3	2	3	3/12	4/10	-9/60	
	4	5	-	8/12	4/10	16/60	
	5	1	4	9/12	8/10	-3/60	1.55
	6	-	-	9/12	8/10	-3/60	
	7	3	1	12/12	9/10	1/10	
	8	-	-	12/12	9/10	1/10	
	9	-	1	12/12	10/10	0	
	10	-	-	12/12	10/10	0	

hypothesis of no difference between the two groups can not be rejected at any reasonable level of significance.

Individual question results reinforce this view. Comparing the ratios of correct to incorrect answers using the Fisher exact-probability test, in one question only (in the first set) was there a significant difference between the two groups. The difference favoured the control group; the common error made by the experimental group was failure to notice that there was a request for advice of call charges (ADC). The reason for this is not clear. It seems unlikely that any causative relation could be established between this error and the omission of written answers to program questions.

7.3 The Effect of DQ Training

As there is no rejection of the null hypothesis from the comparison of the two groups, the results were re-grouped to examine the effect of DQ training and experience. In Table XI, Group 1 consists of trainees in Leamington Spa and Wolverhampton (that is, ab initio) and Group 2 is the trainees from Coventry (with previous DQ training). As in Table X, the cumulative distributions and differences, with values of X^2 based on the maximum difference, are calculated for each test series.

The differences now favour Group 2 in every question set. For sets 4 and 6, the X^2 values are significant with probabilities less than 0.05. In discussing the use of the X^2 approximation with small samples, Seigel emphasises that the test is conservative, that is, it tends to err in favour of the null hypothesis. In consequence, the null hypothesis may be rejected at better than the 95% confidence level for these two sets of questions. With this property of the test in mind, the X^2 values for sets 2 and 5 suggest that the two groups are drawn from different populations.

Individual questions show more differences when the two groups are compared by the Fisher exact-probability test. In one question in the second set, two in the third set, four in the fourth set and three in the sixth set, the proportions are significantly different, with probability less than 0.05. In all except one of these the Coventry score is better. There is no common factor in these questions beyond a greater complexity in the procedures involved.

TABLE XI

Simulated Call Test Scores - Effect of DQ Experience.

Test Series	Test Score	No. of trainees achieving score		Cumulative Distributions		Differences	χ^2
		Group 1	Group 2	Group 1	Group 2		
1.	0	-	-	0/18	0/6	0	
	1	-	-	0/18	0/6	0	
	2	1	-	1/18	0/6	1/18	
	3	2	-	3/18	0/6	3/18	
	4	-	-	3/18	0/6	3/18	
	5	4	1	7/18	1/6	4/18	
	6	4	3	11/18	4/6	-1/18	
	7	6	-	17/18	4/6	5/18	1.38
	8	1	2	18/18	6/6	0	
	9	-	-	18/18	6/6	0	
	10	-	-	18/18	6/6	0	
2.	0	-	-	0/18	0/6	0	
	1	-	-	0/18	0/6	0	
	2	-	-	0/18	0/6	0	
	3	1	-	1/18	0/6	1/18	
	4	1	-	2/18	0/6	2/18	
	5	5	-	7/18	0/6	7/18	
	6	5	1	12/18	1/6	9/18	4.50
	7	3	2	15/18	3/6	6/18	
	8	2	1	17/18	4/6	5/18	
	9	1	2	18/18	6/6	0	
	10	-	-	18/18	6/6	0	

TABLE XI (Cont'd)

Test Series	Test Score	No. of trainees achieving score		Cumulative Distributions		Differences	X^2
		Group 1	Group 2	Group 1	Group 2		
3.	0	1	-	1/18	0/6	1/18	
	1	1	-	2/18	0/6	2/18	
	2	-	-	2/18	0/6	2/18	
	3	4	1	6/18	1/6	3/18	
	4	4	-	10/18	1/6	7/18	
	5	4	1	14/18	2/6	8/18	3.55
	6	3	2	17/18	4/6	5/18	
	7	1	1	18/18	5/6	1/6	
	8	-	-	18/18	5/6	1/6	
	9	-	1	18/18	6/6	0	
	10	-	-	18/18	6/6	0	
4.	0	1	-	1/17	0/6	1/17	
	1	2	-	3/17	0/6	3/17	
	2	4	-	7/17	0/6	7/17	
	3	6	-	13/17	0/6	13/17	
	4	3	-	16/17	0/6	16/17	
	5	1	2	17/17	2/6	4/6	15.71
	6	-	1	17/17	3/6	3/6	
	7	-	-	17/17	3/6	3/6	
	8	-	3	17/17	6/6	0	
	9	-	-	17/17	6/6	0	
	10	-	-	17/17	6/6	0	

TABLE XI (Cont'd)

Test Series	Test Score	No. of trainees achieving score		Cumulative Distributions		Differences	X^2
		Group 1.	Group 2.	Group 1	Group 2.		
5.	0	-	-	0/17	0/6	0	
	1	-	-	0/17	0/6	0	
	2	-	-	0/17	0/6	0	
	3	4	-	4/17	0/6	4/17	
	4	1	1	5/17	1/6	13/102	
	5	9	1	14/17	2/6	50/102	4.26
	6	2	2	16/17	4/6	28/102	
	7	-	1	16/17	5/6	11/102	
	8	1	1	17/17	6/6	0	
	9	-	-	17/17	6/6	0	
	10	-	-	17/17	6/6	0	
6.	0	-	-	0/16	0/6	0	
	1	-	-	0/16	0/6	0	
	2	2	-	2/16	0/6	2/16	
	3	4	1	6/16	1/6	5/24	
	4	5	-	11/16	1/6	25/48	
	5	4	1	15/16	2/6	29/48	6.37
	6	-	-	15/16	2/6	29/48	
	7	1	3	16/16	5/6	1/6	
	8	-	-	16/16	5/6	1/6	
	9	-	1	16/16	6/6	0	
	10	-	-	16/16	6/6	0	

7.4 Discussion

The absence of difference between the control group and the experimental group is to be expected. The nature of the questions in the programs is such as to render the writing of answers pointless, other than as a record of trainee performance. The questions relate, almost invariably, to the key point within the preceding page or pages of the test. Now, if the trainee knows the answer, which is essentially factual, writing it down will not improve the "correctness" of the answer. It may be argued that the process of writing the answer reinforces or, in some way, fixes the retention of the answer. Even if this is true for some, it is not true for all, (the author, for example, does not find it beneficial). Furthermore, if it is the case, its effect would be harmful when the trainee writes an incorrect answer.

If the programmed texts are used properly, reinforcement of the right answer comes in other ways. If the trainee does not know any answer, or is not sure that her answer is correct, she may re-read the appropriate section of texts. Otherwise she will turn the page to check her answer. If it is right, the reinforcement will usually come in a re-statement of the context of the question with the reason for the answer. If it is wrong, the program will usually direct the attention of the trainee to some key factor and return her to the question. The writing of answers affects neither of the foregoing processes.

Indeed, the absence of written answers seems to be felt most keenly by the ASr. Although the ASr has continuous observation of the trainee during practice periods, her assessments are predominantly subjective. No objective test of progress is made before the fifth day of training, and thereafter the frequency of such tests is not higher than every other day (for typical progress check data, see Hackett (25)). Hence, the answer papers provide a set of scores which the ASr can use to back her opinion. It may be noted that if a transaction count is used as a measure of trainee progress, continuous assessment becomes feasible, supplanting the answer sheets as an objective measure of performance.

The effect of previous DQ training and experience is also to be expected, to some extent. The work involves dealing with customers and may have a manipulative component, depending on the type of equipment. In the case of Coventry,

the manipulative component is small and not related closely to the sleeve-controlled board. The process of finding telephone numbers itself has little in common with switchboard work; probably the acquisition of confidence in dealing with customers is the most important outcome, although there is also the general acclimatization to the working environment. In this latter category is familiarization with jargon, which itself is an important part of the task-learning situation.

If the benefit to controlling-operator training is tentatively predictable, certain side-benefits of DQ training can be stated with certainty. The training time is significantly less, so that the recruit becomes acceptably productive in less time. Before the higher cost of controlling-operator training is invested in her, there is time to assess her performance in DQ working, which should improve the accuracy of the selection process. Her motivation, in particular, can be gauged more fully; in some places there is a small stream of "recruits" whose aim is to qualify for the title "P.O. trained" before taking up employment elsewhere.

Whilst not wholly conclusive, the results indicate that more investigation should be made of this order of training. If these results are verified, there are repercussions on policy, for the trend has been towards the establishment of specialist DQ Bureaux. Where the DQ and controlling-operator boards are physically or administratively separated, it becomes much more difficult to implement what is likely to be a better order of operator-training.

7.5 Errors in Training

Examination of wrong answers shows where trainees are finding difficulty. Comparison with the answers from experienced operators shows where the difficulties are carried over into subsequent experience, and where they are eliminated as experience increases.

The more-common errors which persisted in subsequent experience were

a. Confusion of Equipment Engaged and Engaged tones and their associated procedures

b. Confusion of procedures used when a customer asks for assistance on an STD call with those used for normal calls.

c. Where repeated failure to establish a connection occurs, the difference between second and third attempt procedures is not appreciated.

d. Uncertainty of the procedure for dealing with calls to All-figure Numbers(AFN) other than the director areas.

e. Incorrect allowance of time for money lost in coinboxes.

In addition to these major errors, there were several points of detail.

Of the errors which were corrected with experience, the more common were

a. Failure to notice requests for charge advice on either ordinary calls (ADC) or transferred-charge calls (ACS).

b. Inaccurate interpretation of VIF information.

c. Inadequate understanding of RQ procedure.

d. Confusion over the method of timing local calls.

e. Uncertainty of the procedure for handling Post Office Service (SV) calls.

7.6 Removal of Difficulties

The errors common during training but which disappear with experience seem to call for no action other than, perhaps, emphasis of the likelihood of their being made. Overlooking ADC or ACS seems to happen to most trainees in their early days; a similar commonplace occurrence is forgetting a request for transfer of call charges. There can be few operators who have not, at some time, helpfully advised some gruff long-distance lorry-driver or jocular commercial traveller that he can dial his call if he would like (STD call charges are less than operator-controlled call charges), only to be reminded "But then I'd have to pay for it meself, love !" An experience of this sort has far greater impact on the trainee than thirty pages of programmed text.

The persistent errors are a different matter. The question of allowance for money lost in coinboxes is related to the incidence of fraudulent calls. Whilst it is true that the present design of pay-on-answer coinbox mechanism is prone to

faults in which customers lose money, there is a significant number of persons who claim to have lost money in order to obtain free telephone calls. This is widely known and resented by operators, who adopt a suspicious attitude when dealing with such calls. Post Office policy is to make full allowance for money claimed to have been lost, but operators tend to implement this in the light of their own assessment of the situation. It is hard to see how this may be changed, or even whether change is desirable.

The AFN problem may cure itself as the use of AFN increases. As an interim measure, more emphasis could be given during initial training to this section of the VIF, but the solution lies in the problem-filled realm of customer-training.

Of the other three areas of difficulty, the best solutions are to be found in system changes. Use of, for example, tape-recorded tones during training could improve discrimination of Equipment Engaged and Engaged tones, but these two are very similar and are likely to cause confusion in any circumstance. Changing one to be more distinctive is a superior solution. There are wider implications, for the two tones are used in the STD network. If they are a source of confusion to the trained operator, their effect on the public must be worse.

Similarly, the confusion existing over repeat attempt and customer assistance call procedures suggests a rationalization of the procedures rather than attempts to improve training. The procedures are similar; the main difference is that where a customer complains of, say, No Tone conditions on an STD call, this is treated as the "first attempt" under current procedure, so that the operator's own first attempt is interpreted as the second attempt if the No Tone condition is met again. From the customer's viewpoint, it is not critical if the operator treats it as a first attempt; assistance has been sought and is being given. From a system viewpoint it is less than optimum, but the problem becomes serious only if the incidence of such calls is high. If this is the case, the system has problems in other areas as well, for example, maintenance. Thus, the adoption of common procedures is advocated as the best solution.

CHAPTER 8

TRAINING COSTS

8.1. Areas Where Costs Are Incurred.

Much has been written and said about costing training. The areas where costs are incurred are well-known and documented (for example, Talbot (26)). However, some of the traditional considerations do not apply in the cost of telephonist training. For example, there is little to be gained from considering whether, had the money spent on training been invested elsewhere, a greater return could have been obtained. There is no other source of trained telephonists, the demand for operators' services is increasing so that alternative investment is totally hypothetical.

Accordingly, the cost of training is seen as arising from four main headings:

a. Trainees' pay and associated overheads

b. Instructors' pay and associated overheads

c. Training equipment costs

d. Accommodation costs.

Wing school and in-exchange training costs will be considered in these areas. The period is, in all cases, the financial year 1972-73.

8.2. Trainees' Pay

Trainees are paid according to age up to a maximum on entry at age 21. The scales are uniform throughout the UK, although additional fixed sums are paid to workers in Inner and Outer London (the "London Weightings"). Using the age distribution from Table 1, the national average gross pay for trainees would have been £15.81 per week on the pay scales then in force. Holiday entitlement adds £1.05 per week to this figure. Inner and Outer London weightings are a further £2.57 and £1.84 respectively, although it is probably more useful to omit these amounts and compare the UK figures. Against this, it must be observed that most of the Wing School training was at Rodwell House in the Inner London area.

The foregoing are the amounts accruing to the trainee. Above this, there is the employers National Insurance contribution, which is averaged at £0.94 per week, assuming that all trainees pay the maximum rate of contribution, plus the PO contribution to superannuation at 9% of gross pay, which comes to £1.52 per trainee per week. London Weighting additions are £0.32 and £0.16.

The cost of administering these staff services must be added. The PO uses a percentage addition (27) which was 2% for the period concerned. This is a valid figure for the Wing school, but is unfair for the in-exchange training scheme. Here, the administration costs are unlikely to be raised by the presence of trainees, so that the marginal administration costs are zero.

The final element is for travelling and subsistence allowances, which, again, should not arise for the in-exchange trainees. It is difficult to set an accurate figure for this quantity without knowing whether attendance at the Wing school involves overnight absence from home. This should not be the case for Rodwell House, but may be true for provincial schools. Where only day subsistence is involved, a cost per trainee week of £5.00 might be a reasonable guess, although this is offset, in the case of trainees aged less than eighteen, by the need to subsidise mid-day meals.

The foregoing figures give total trainees' pay and allowance costs per week as follows:-

£19.32 - provincial exchange, no travelling and subsistence.

£21.32 - Outer London exchanges, no travelling and subsistence.

£28.67 - Inner London school, daily travelling and subsistence.

These figures are lower than the PO Staff Costs figures (28) which are based on different age distributions and include an element for training costs. Whilst there are various reasons for increasing the figures, it may be said with certainty that they cannot be reduced.

8.3. Instructors' Pay

The ASrs pay scale has three points. Assuming that the distribution centres on the midpoint, an ASr's basic weekly pay is £31.30. This may be a risky assumption; promotion does not seem to come rapidly in the operating

business. If all ASrs are on the maximum rate, the pay rises to £32.78. Holiday entitlement adds a further £2.86 or £3.00.

London weightings are identical with those for telephonists, as is the rate for superannuation contribution. However, the actual contribution becomes £3.07 or £3.22. Employers National Insurance contribution for the ASrs is assumed to be £1.16; there are no ASrs aged less then eighteen. The staff administration factor remains at 2%. Finally, travelling and subsistence costs are nil, regardless of location.

Combining these figures give ASr costs of

£38.39 - Provincial exchange
£40.39 - Outer London exchange
£43.12 - Inner London school

based on the mid-scale pay. These figures are again below those used by the PO for costing purposes; as for trainees' pay, it is certain that these figures can not be reduced by more-accurate analysis.

8.4. Training Equipment Costs

Equipment costs are, in general, low. On the practical side, the trainees need a switchboard. In the exchange, the real thing is used. The switchroom is normally over-provided with positions, to allow for growth (or as a result of shrinkage) of traffic. The capital cost against training of the trainees' use of the board is nil; the current cost is also nil, since useful work is being done, indeed, the trainees may accrue a small revenue by their efforts.

In most Wing schools, the equipment used has been recovered as surplus or obsolete. Its capital value is thus its scrap value, which is negligible, although some cost may be attributed to labour in recovering the equipment. However, the plant life is long, at least ten years, so that the cost per student week can only be of the order of a few pence. Maintenance costs are low; the board at Rodwell House does not demand even the full-time attention of one technician. An arbitrary estimate of £0.20 per student week for maintenance and depreciation should cover this element of school cost.

For the texts themselves, printing costs in 1972-73 were some £8000. The re-writing of texts occupied the time of five program writers at an annual cost of £2900 each. With the addition of distribution costs, the total cost of

the texts was about £30,000. Paper 2 of the Training Budget Cost Study (29) gives rather more than 31,000 student weeks spent in initial training during this period. Hence, an approximate cost of £1.00 per student week for provision and maintenance of programmed learning texts is obtained. The cost write-off over the short period of one year is justified because of the frequent incidence of amendments.

Finally, in the equipment category, there are the recorders, tapes, headsets and other small items. These are long life equipment, usable by many trainees. In the exchange, the trainee retains her headset on completion of training, but headsets are recovered and re-used when operators leave employment. The PO cost of headsets is £2.53 each and a life of five years is to be expected. A similar life obtains for recorders and tapes, the initial cost of which should not be more than £30 (including recording costs). Assuming a 50% duty cycle (that is, usage by students 26 weeks of the year) and a five year life, the cost per student week is £0.25. A similar figure could be expected for consumable stores, such as stationery.

8.5. Accommodation Costs

In the area of accommodation costs, the school is again at a disadvantage compared with the exchange. Training accommodation is a small part of the total in an AMC; frequently it is used also for purposes other than initial training. The marginal cost may be taken as nil. This is not the case for the Wing School, where, in general, the full cost of accommodation is attributable to training. The effect is offset when several training functions are combined within the one building to give more efficient use of some facilities (such as a canteen). Nevertheless, accommodation costs are high for schools.

The cost per student week depends on usage as well as basic costs. Of the three schools conducting initial training in 1972-73, the best usage factor was 66% (Rodwell House). Even so, because of its location, its cost per student week was highest at £56.20, although this figure included instructor's costs. The weighted mean school cost (derived from Paper 2 of the Training Budget Cost Study) is £52.16 per student week. However, higher utilization would decrease this figure considerably. The mean cost for the provincial schools was £43.00 per student week.

8.6 Overall Costs

Combination of the costs arising from these four areas give some indication of the total cost of training. Table XII gives comparison of costs of in-exchange and Wing school training. In the first column, in-exchange training is costed on the basis of half an ASr per trainee, as opposed to one ASr per trainee for the second column.

Location	In-Exchange 1.	In-Exchange 2.	School
Inner London	£46.48	£68.04	£86.12
Outer London	£42.77	£62.97	-
Provincial	£39.77	£58.97	£68.57

TABLE XII - Comparison of Training Costs

As would be expected, school costs are higher. The provincial school cost includes an assumption of daily travel. If overnight accommodation is needed, an additional £20 is incurred. It is emphasised that any errors in the costing are most likely to result in the figures being too low. Even so, they are likely to be accurate for comparison purposes.

8.7 Comparisons

Comparisons between the same scheme in different geographical locations are unreasonable, since they involve factors outside the control of the training organisation. On the other hand, comparisons within one geographical location are relevant. It can be seen that, with best use of the ASr, school costs are almost double those of the exchange. Even where the ASr's time is used inefficiently, it is still worthwhile spending money on accommodation at the exchange to carry out training there. When the relative time spans are taken into account, the advantage of in-exchange training is still greater. Since there is little difference detectable between the outcomes of the two schemes of training, school closure is ultimately in the interest of the PO.

Voge (30) quotes an empirical relationship that the cost of training which a trainee can absorb satisfactorily is equal to the trainee's gross pay. In-exchange training can be seen to conform closely to this relationship, whereas school

training would seem extravagant by comparison. At first sight this appears to negate the relationship since there is no indication that there is an overload for school trainees. However, an alternative explanation is that trainees do not need the close control of practice which exists in the school, and obtain enough reinforcement from live traffic. It has been observed that the synthetic traffic rate is inadequate after about the first week of training. It is likely that the higher rate in the exchange, combined with the longer periods of practice, gives a reasonable chance of getting the appropriate type of call.

8.8. The Cost of Failure

Curiously, the cost of failure is less for a school than for the exchange. This is because the ASr cost is distributed over more trainees in the school. In the exchange, if one of a pair fails, the ASr costs are doubled for the survivor, which is a "hidden" cost of failure. Even so, it is still important to detect and cease the training of failures as early as possible. This is unlikely to be possible in less than a week, regardless of the scheme of training used.

This can be used to give some idea of the amount that could be spent on improving the selection process. In the small sample of fifteen trainees observed in this study, three failed in training. Other evidence on recruiting suggests that the number of applicants interviewed is about twice the number who enter training. Hence, some thirty applicants would have been interviewed (that is, undergone the selection process) to obtain the fifteen entrants. If an extra £1 per applicant was spent on the selection process, the PO would still gain financially if only one of the three failures was detected before starting training. This is on the assumption of the cheapest cost of training at about £40 per student week. Any higher figure increases the amount which can be used to improve selection methods and still give a saving to the PO.

Put into context, an extra £1 per head corresponds with an extra hour of ASr's time; this is the time that an ASr might take over a trainability test of the form suggested in Appendix E. It may be noted in passing that the cost of recruitment has not been included in the cost analysis.

The cost of recoursing (that is, partial failure) is less for the school because of the continuity of courses. The usage factor can never reach 100% so that there is always space on the next course (chronologically). On a marginal basis, the cost of recoursing at a school becomes merely the cost of the trainee's pay

and allowances. However, the cost of lengthening the course for all trainees must stand at virtually the full cost per student week. The offsetting factor would be that, for the same number of trainees passing through the school on a longer course, the usage factor would be effectively increased so that the fixed costs would be divided among a larger total of student weeks. The reduction caused by this effect would be small.

In an exchange, recoursing is often difficult under the present administrative arrangements. The inherent flexibility of the programmed text is suppressed by the way in which it is applied in the exchange. In general, there is no chance to cost recoursing in the exchange on a marginal basis, since extra ASr's time is needed. The same is true of lengthening the course. However, if, by extending the course by one week, a trainee becomes successful who would have failed otherwise, the PO is not paying an excessive financial penalty for an additional operator.

8.9 The Cost of Labour Turnover

Even the lowest-costed in-exchange training costs more per week than the PO staff costing for a trained telephonist. The lost output penalty worsens the differential. Since most training is undertaken to replace staff losses, it is clear that keeping existing staff longer is a better financial proposition than training new recruits.

Now, reduction of labour turnover is often associated with improvement of training. Typically, Jones and Moxham (31) report a reduction from 70% to 30% per year, coupled with increased output. The traditional view is that this effect is due, in some way, to the training itself, but it seems more likely that it stems from the improved earnings obtained from an output-related payments scheme.

At the end of the five-year period of the Jones and Moxham study, the turnover had reverted to its original value. It is true, as they say, that for a particular cohort the effects of training on turnover are greatest in the first few years after training, but this would not explain why the turnover among trainees should increase again a few years after the introduction of an improved training scheme. If the general upward movement of earnings and prices overtakes the improvement in earnings caused by a specific training scheme, though, then the increase in labour turnover is to be expected.

The PO does not relate telephonists' pay to output, so there is no chance to increase incentive to stay by this means. What the figures do show is that the pay of experienced telephonists could be increased substantially to try to retain them in PO employment without necessarily increasing the overall cost to the organisation. Against this, it must be observed that telephonists' pay is, basically, the same throughout the UK. This means that in some areas the PO would be paying out money unnecessarily. Further, in those areas where there is competition for labour, other wage rates could be expected to increase.

8.10 Cost Reduction

It is hard to see where costs of training could be reduced, particularly for in-exchange training, unless there is some radical change in the way the training is organized. The dominant factors in the weekly costs are trainees' and instructors' pay, neither of which is likely to fall in the foreseeable future. If the weekly cost can not be reduced, the only chance for overall cost reduction is in total time of training.

However, the present schemes do not allow this, since they depend on well-defined timetables and uniformity of progress among trainees. Greater flexibility is needed before any shortening of time scale is possible. In a school, where everything hinges on use of the practice switchboard, this is almost impossible. In the exchanges, a fundamental change of attitude to training must occur before flexibility can be achieved.

8.11 Cost-effectiveness

In summary, the analysis of costs, taken in association with the results of the trainee observations, shows that the cost-effectiveness of training is better in an exchange than in a school. There is a margin for increased spending in the exchange which might be used in some exchanges to provide the needed increase of training accommodation to allow the quantity of training to be increased.

What is also shown is that more money could be spent on improving the selection process and/or retaining trained telephonists whilst still giving a greater benefit to the organisation.

CHAPTER 9.

9.1. Attitudes to Training

Instructors in Wing schools are volunteers seconded to the school from operating for a finite period. There is an incentive of promotion associated with the duty, but it may be claimed with some justification that the ASrs are dedicated to training. This is not always so for training in an exchange.

In some exchanges, it is true, the ASrs are just as committed as their counterparts in schools. In others, though, training is not treated so favourably. For example, in some exchanges, each ASr, in strict rotation, takes a turn at training a pair of trainees. For many of them, training becomes an unpleasant necessity, and it must be assumed that the quality of training will suffer in consequence. This may be a compromise when volunteers to undertake training are not forthcoming, although sometimes it is at the insistence of the staff association concerned.

One result of this system is that the ASrs do not build up expertise in training since they are not concerned with it often enough. Rotating the duty over longer periods, say a year, removes this difficulty whilst still sharing the load.

However, even where the allocation of training duties is satisfactory the approach to programmed instruction is often wanting. The attitude to the programmed texts is generally that they are a superior form of classroom instruction. Even though the Regional training course given to exchange Training Supervisors on the introduction of the PL course to the exchange mentions the inherent flexibility of the method, much of the time is given to the construction of a rigid timetable for the initial training course. Hence, the pace is adjusted to that of the slowest trainee, and arrangements are made to occupy fast learners with classroom exercises rather than letting them progress at a greater pace.

Often the attitude of the trainees' staff association does not help. It has been said, of another PO course converted to PL, that if trainees are allowed to complete the course at their own rate and then return to duty the slow learners are likely to be regarded as indolent by their supervisors. This may or may not be true; in either case it shows an unsatisfactory attitude to this method of training.

9.2 Practical Limitations

Regardless of attitudes, the organization of the training creates practical impediments to exploitation of the flexibility of PL. Each pair of trainees has an ASr instructor. They cannot be separated because neither in classroom nor at switchboard can they be left without supervision, particularly in the first fortnight of training. Hence, the slowest learner sets the pace.

Where the exchange has a high turnover of operators, the need to interleave courses is another obstacle. The one set of training accommodation has simultaneously to serve two or three groups of trainees at different stages of training. Under present arrangements, if one group is reading a program, other groups must be elsewhere.

9.3 Towards Greater Flexibility

The inherent flexibility of the course could be used to better advantage if some division of duties between classroom and switchboard is accepted. Where there is a large training commitment, the ASrs divide duties. One remains in the classroom area where she can deal with the queries of as many as a dozen trainees at different stages in program reading. The others remain at the switchboard to oversee the practice periods. The fixed time intervals are for practice and conventional teaching; program reading times become variable, according to the pace of the trainee.

Where only one pair of trainees is taking the course at one time, the ASr covers the classroom as first priority. If one trainee draws ahead of the other, and so needs supervision at the switchboard, a senior experienced operator should be capable of meeting this need. (This is an arrangement that seems to be used already in many exchanges as an ad hoc solution to temporary difficulties). If both trainees are at the switchboard, the ASr also can be at the board. For short periods, at the start of reading a program, a single trainee could be left unsupervised.

In this way the trainees could determine their own speed of learning, which would, in particular, enable the fast learners to reach qualifying standard more rapidly. This approach would go some way towards meeting the criticism of school-leavers, often met, that work is just like an extension of school. However, such a scheme represents a radical departure from existing practices, and could not be introduced into an exchange without the consent of many people.

9.4 The Headquarters Organization

During the early stages of the research, someone described the PO method of telephonist training as "a Rolls-Royce of training schemes", as at first sight it seemed to be. There was a prevailing sense of complacency in the THQ group responsible for telephonist training which included the writing and distribution of programs. The results of the various experiments show that this complacency is unjustified.

" The actual validation of programs is presently carried out only at redraft stage. It consists of an analysis of 10-30 student response sheets from about 30 exchanges chosen from those which have a fairly high throughput of trainees " (32). This states the position of the group in relation to program validation. The validation instrument hence was only the normal response sheet. Suitable levels of performance in the progress checks were regarded as proof that overall the training program was valid.

However, it is obvious that this validation procedure does not detect the mis-training produced by the program which taught trainees to write in routings unnecessarily, neither does it show that trainees are unable, in many cases, to differentiate between Engaged and Equipment Engaged tones. Indeed, further investigation showed that no attention was being given to the wide variety of nominally-identical tones that exist in the network.

This seems indicative of the gap that exists between those who determine policy and those who have to execute it. Those who write programs for telephonist training (and those who determine how telephonists shall work) are some years removed from operating switchboards themselves, if, indeed, they ever have had to do the work. In consequence, their thinking is oriented towards how things should be, rather than how they are.

9.5 Improving Validation

In the DEPs definition of terms (33) the validation described above is internal. What is needed is external validation. However, there is reason to doubt whether an initial identification of training needs was undertaken. There is always a risk that past masters of the task rely too much on their own experience which, as well as being atypical, is often out of date.

Equally, though, a change of attitude is needed. It has to be accepted that the fact that trainees achieve the prescribed performance levels is not a validation of the programs. It could be argued that in the past, trainees have achieved targets despite the training given by the programs (emphasizing again that programmed instruction is not a substitute for a good instructor). Such extreme pessimism is unjustified, although there is little doubt that the training could be improved.

What may be done to improve validation? The DEP's definition suggests tests and assessments. The questions in the programs themselves are clearly unsatisfactory for this purpose; their function is that of reinforcement and consolidation, so that wrong answers may be more indicative of bad questions rather than bad programs. Objective tests of the type used in the research are better, but purely pencil-and-paper questions would probably suffice. Similarly, behavioural observations are better than call-value scores. These alternatives cost more than the existing method, but validation is, in any case, an expensive business. On the other hand, failure to validate properly may cost even more.

9.6 Improving training

Improving validation will not necessarily improve training, although it should pick out the shortcomings in the programs. Gagne has said, of the problem of how to improve training " . . . . I should not look for much help from the well-known learning principles like reinforcement, distribution of practice, response familiarity and so on. I should look instead at the technique of task analysis, and at the principles of component task achievement, intra-task transfer and the sequencing of subtask learning . . . " (34). Now, this research has produced a number of suggested changes, ranging from selection procedures to the method of progress assessment, which will improve the cost-effectiveness of training but which are of an administrative or organizational nature in that they do not affect the content or method of training.

Gagne's key item is task analysis; in this, he is advocating the technique used by occupational psychologists and ergonomists for many years. Taylor, for example, notes that, in a man-machine system, proper attention to the engineering variables can reduce the dependence of system performance on selection and training (35). Clearly, it is possible to carry this technique to extremes, as in the production-line situation where the analysis forms the basis of task division.

No exact parallel of the production-line is possible for the operator service, but it would be possible to divide up the work so that no operator has to handle every possible variant of calls. Indeed, this is done already for the DQ and EQ services which have their own dialling codes, distinct from that for assistance.

However, any improvement in training resulting from such a division of work would again be of an organizational nature, since it would come primarily from the splitting of the present training into smaller, more-digestible packets. It would still be necessary to train sufficient operators in all aspects of the work, although this could be done in stages, and there is reason to believe that earlier experience, although limited, would give considerable benefit in the later stages of training (as seems to be the case for DQ experience). This means, though, that the content overall would remain unchanged and it is unlikely that any change in method would arise. There are two disadvantages pertaining to such a system. The first is the reduction of operational flexibility, although this might be offset in part by the chance to devise a better career-structure for telephonists. The second, and most damning, is the increase in need for customer training. In effect, the scheme would shift the training burden from the controlled environment of the exchange to the wide-open spaces of the business and domestic user. This is unacceptable.

As matters stand, there seems to be little prospect of improving on the present methods of training, other than by small refinements. The programmed instruction texts and the associated conventional instruction have reduced by two weeks the time previously taken for initial training using only conventional instruction. It is hard to see how any other method could cut the time further. It has been shown that there is little to choose between the two methods of practice. The inherent limitation of the existing method of simulation is speed; where live traffic is used, speed is no problem, but there is no control over the type of call presented for practice. A more-automated simulator might be developed, similar to that described by Reese (36), so removing the speed limitation. However, it must be observed that the simulator developed for the North American system relates to a switchboard of which the engineering and operation are totally different from those of the sleeve-control switchboard. The differences are such as to increase the cost and complexity of a sleeve-control switchboard simulator of comparable capability.

Thus, the cost-effectiveness of an improved simulator might well be worse than that of the existing arrangement. In any case, the flexibility of an automated simulator is inferior to that of the present system with an ASr controlling the responses.

Indeed, the best aid for practice may be a more-simple rather than a more-advanced device. As the observations of trainee activity showed, the difficulty experienced by the unsuccessful trainees is mastery of the manipulative sequence. A simple simulator would enable these sub-tasks to be practised in isolation and under closely-controlled conditions. The responses of such a simulator would be restricted to, say, a buzzer to indicate error and a lamp which would light at the end of a complete, correct sequence.

The content of the training is determined by operational policy. This is subject to continuous change. The 1973 edition of the Operating Handbook has many differences from the 1971 edition used in this study, relating chiefly to the introduction of keysenders in place of dials. Here is where the techniques of task analysis could be applied. The overwhelming impression of switchboard operating is that, if task analyses have been made, they have been made piecemeal. A critical examination of the task as a whole is sure to show more areas of confusion and inefficiency than have been revealed by this study. This would give, at the same time, a chance to increase the element of realism in training which, although presently dealing at some length with difficulties arising from system technology, gives little attention to the parallel problems generated by the human element.

9.7. A problem for the future.

The matter of difficulties created by the system or the users provides a future problem for training. Fewer than forty manual exchanges remain in the UK network, and STD facilities are being improved so that by 1980 it is hoped that 95% of all trunk calls will be capable of being dialled by customers. However, although in the past decade there has been a decline in demand for operator services, the forecast is for an increase, which seems to have started already.

Some of the demand will fall on the DQ service, and some will be for the special facilities, such as Transferred Charge and Credit Card calls, but much also will be from difficulties. Now, all indications are that the results of

technological change in the automatic network will include a decreased fault liability, so that it is reasonable to hope that difficulties caused by plant failure will be, proportionately, reduced. On the other hand, as the complexity of the system increases, difficulties arising from human error will increase. In the future, then, the assistance operator's role will include problem-solving in a large measure. To both meet this need and be effective, training will have to change; the techniques that have been used in this research could be the base from which such change is initiated.

9.8. Recommendations

In the area affecting training, the recommendations are that

(a) Transaction counts be used for assessing the progress of individual trainees.

(b) Consideration be given to sequence training, with emphasis on the development of simple, sub-task simulators.

(c) Attempts be made to develop a trainability test as an aid to selection.

(d) Further investigation be made of the effect of Directory Enquiry training on subsequent training for controlling operator duties.

Recommendations affecting the system are that

(a) The Equipment Engaged tone be changed to make it more easy to differentiate from Engaged tone.

(b) An attempt be made to rationalize and simplify procedures for use when difficulties are met.

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APPENDIX A

TYPICAL SCHOOL TRAINING TIMETABLE

A.1. The following pages give the timetable for the first three weeks of telephonist initial training in a typical Wing School.

A.2. Accommodation. Three locations for the training are shown. The Switchroom houses the switchboard. The difference between the Machine Room and the Reading Room is that the former is equipped with tape recorders to play the tapes associated with some of the programmed texts.

A.3. In the column "Programme, Guide, Tape" the associated training material is listed. "PR" denotes a programmed text, "Tape" shows that there is an associated tape. "PLB" and "PLC" denote Instructors' guides. The former is related to a programmed text, the latter to conventional instruction.

APPENDIX A

1ST WEEK

MONDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Machine Room	Welcome and Reception	
8.45		COFFEE	
9.00	Machine Room	Welcome and Reception continued	
9.15	Machine Room	CONVENTIONAL TEACHING SESSION	
		Introduction to Programme Learning	PLC 1
		" " " "	Tape 6
		Consolidation	
10.00	Machine Room	PROGRAMME	
		The Telephone System	PR 1
		Consolidation	PLB 1
11.00	Machine Room	PROGRAMME	
		Speaking to Customers	PR 2 Tape 3
		Consolidation	PLB 2
12.00		LUNCH	
12.45	Reading Room	PROGRAMME	
		Tools of the Trade Pt. 1	PR 3
		The Ticket	
		Consolidation	PLB 3
3.00		TEA	
3.15	Reading Room	Chief Supervisor's Welcome Talk	
3.45	Switch Room	Visit Sw/Rm - Demonstrate Equipment	
4.15	Reading Room	Recap Equipment Demonstrate Board	
4.41		Close	

APPENDIX A

1ST WEEK

TUESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Show Trainees VIF - Give brief explanation in readiness for next programme	
8.45		COFFEE	
9.00	Reading Room	PROGRAMME	
		Tools of the Trade Pt. II	PR 4
		VIF Pt. I	
		Consolidation	PLB 4
11.10	Reading Room	CONVENTIONAL TEACHING SESSION	
		Setting up straightforward operator controlled call using types of Rtgs already learnt	PLC 2 Items 1-10
12.00		LUNCH	
12.45	Reading Room	PROGRAMME	
		Tools of the Trade Pt. III	PR 5
		VIF Pt. II	
		Consolidation	PLB 5
2.30	Reading Room	CONVENTIONAL TEACHING SESSION	
		Items 11 and 12 Straightforward operator controlled trunk call	PLC 2 Items 11 & 12
3.00		TEA	
3.15	Reading Room	CONVENTIONAL TEACHING SESSION	
		Remainder straightforward operator controlled trunk call (A) to (E)	PLC 2(A) to (E)
3.45	Switchroom	Switchboard Practice	
4.41		Close	

APPENDIX A

1ST WEEK

WEDNESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap Routing Symbols	
8.45		COFFEE	
9.00	Reading Room	PROGRAMME	
		Tools of the Trade Pt. IV Completed Ticket Operator Controlled Call	PR 6
		Consolidation	PLB 6
10.50	Switchroom	Switchboard Practice	
11.40	Reading Room	CONVENTIONAL TEACHING SESSION	PLC 4
		Items 1-6 only Call Charges	Items 1-6
12.00		LUNCH	
12.45	Reading Room	CONVENTIONAL TEACHING SESSION	
		Long Duration Calls	PLC 3
3.00		TEA	
3.15	Reading Room	CONVENTIONAL TEACHING SESSION	
		Requests for calls not normally handled at the Position	PLC 6
3.45	Switchroom	Switchboard Practice	
4.41		Close	

APPENDIX A

1ST WEEK
THURSDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap request for calls not normally handled at the position	PLC 6
8.45		COFFEE	
9.00	Reading Room	PROGRAMME	
		Engaged Consolidation	PR 8 Tape 4 PLB 8
10.50	Switchroom	Switchboard Practice	
11.40	Reading Room	Complete Secrecy Forms	
12.00		LUNCH	
12.45	Reading Room	PROGRAMME	
		ADC Consolidation Recap call charges calculating charges	PR 13 PLB 13 PLC 4 Items 1-6
2.30	Reading Room	CONVENTIONAL TEACHING	
		Alternative Routings	PLC 12
3.00		TEA	
3.15	Reading Room	Recap all Routings	
3.50	Switchroom	Switchboard Practice	
4.41		Close	

APPENDIX A

1ST WEEK

FRIDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Consolidate Alternative Routings	
8.45		COFFEE	
9.00	Machine Room	PROGRAMME	
		No Lines Consolidation	PR 9 Tape 4 PLB 9
10.50	Switchroom	Switchboard Practice	
11.40	Machine Room	Consolidate on any necessary points	Use the appropriate PLB or PLC
12.00		LUNCH	
12.45	Machine Room	PROGRAMME	
		No Reply Consolidation	PR 11 Tape 1 PLB 11
2.25		TEA	
3.00	Switchroom	Switchboard Practice	
3.30		Close	

APPENDIX A

2ND WEEK

MONDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap NR Calls	PLB 11
8.20		COFFEE	
8.35	Reading Room	PROGRAMME	
		NT Consolidation	PR 22 PLB 22
10.05	Switchroom	Switchboard Practice	
10.55	Reading Room	CONVENTIONAL TEACHING SESSION	PLC 4
		Irish Service - Request for Basic Charge	Remainder Items 7-9
11.55		LUNCH	
12.40	Machine Room	PROGRAMME	
		NR Disputed Consolidation	PR 12 Tape 6 PLB 12
2.15		TEA	
2.30	Machine Room	Cont. Consolidation	
3.00	Switchroom	Switchboard Practice	
3.50	Reading Room	PROGRAMME	
		Difficulties in Recalling Caller	PR 28 PLB 28
4.41		Close	

APPENDIX A

2ND WEEK

TUESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap Difficulties in Recalling Caller	PLB 28
8.20		COFFEE	
8.35	Machine Room	PROGRAMME	
		Calls from POA coinboxes (Effective Part I) Consolidation	PR 7 Tape 5 PLB 7
10.05	Switchroom	Switchboard Practice	
10.55	Reading Room	PROGRAMME	
		Calls from POA Coinboxes (Effective Part II) Consolidation	PR 10 PLB 10
11.55		LUNCH	
12.40	Reading Room	CONVENTIONAL TEACHING SESSION	
		Items omitted from Programme 7	PLB 7
1.00	Reading Room	PROGRAMME	
		P Calls Part I Consolidation	PR 19 PLB 19
2.15		TEA	
2.30	Reading Room	CONVENTIONAL TEACHING SESSION	
		Items omitted from Programme 19	PLB 19
3.0	Switchroom	Switchboard practice	
3.50	Reading Room	Recap POA Coinboxes	PLB 7 & 10
4.41		Close	

APPENDIX A

2ND WEEK

WEDNESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap straightforward P Call	PLB 19
8.20		COFFEE	
8.35	Machine Room	PROGRAMME	
		P Calls Part II Consolidation	PR 20 Tape 2 PLB 20
10.05	Switchroom	Switchboard Practice	
10.55	Reading Room	CONVENTIONAL TEACHING SESSION	
		Items omitted from Programme 20	PLB 20
11.55		LUNCH	
12.40	Machine Room	PROGRAMME	
		P Calls Part III Consolidation	PR 21 Tape 2 PLB 21
2.15		TEA	
2.30	Machine Room	CONVENTIONAL TEACHING SESSION	
		Items omitted from Programme 21	PLB 21
3.00	Switchroom	Switchboard Practice	
3.50	Reading Room	Recap all P Calls	PLB 19, 20,21
4.41		Close	

APPENDIX A

2ND WEEK

THURSDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room		
8.20		COFFEE	
8.35	Reading Room	PROGRAMME	
		Cut Off Part I	PR 17
		Consolidation	PLB 17
10.05	Switchroom	Switchboard Practice	
10.55	Reading Room	PROGRAMME	
		Cut Off Part II	PR 18
		Consolidation	PLB 18
11.55		LUNCH	
12.40	Machine Room	PROGRAMME	
		Xfc Part I	PR 14 Tape 1
		Consolidation	PLB 14
2.15		TEA	
2.30	Machine Room	Recal Xfc Calls	
3.00	Switchroom	Switchboard Practice	
3.50	Reading Room	CONVENTIONAL TEACHING SESSION	
		Continental - International	PLC 9
4.41		Close	

APPENDIX A

2ND WEEK

FRIDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room		
8.20		COFFEE	
8.35	Reading Room	PROGRAMME	
		Xfc Calls Part II Consolidation	PR 15 PLB 15
10.05	Switchroom	Switchboard Practice	
10.55	Reading Room	PROGRAMME	
		Xfc Calls Part III Consolidation	PR 16 PLB 16
11.55		LUNCH	
12.40	Reading Room	CONVENTIONAL TEACHING SESSION	
		Items omitted from Programme 16	PLB 16
1.35	Switchroom	Switchboard Practice	
2.10	Reading Room	Recap on any points	
2.15		TEA	
2.30	Reading Room	CONVENTIONAL TEACHING SESSION	
		Xfc P Calls	Operating Handbook
3.30		Close	

APPENDIX A

3RD WEEK

MONDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap Xfc P Calls	Operating Handbook
8.50		COFFEE	
9.20	Switchroom	Switchboard Practice	
10.10	Reading Room	CONVENTIONAL TEACHING SESSION	
		Credit Card Calls	PLC 5
11.50		LUNCH	
12.35	Switchroom	PROGRAMME	
		Wrong numbers Consolidation	PR 23 PLB 23
1.55	Switchroom	Switchboard Practice	
2.45	Reading Room	Recap on any point	
2.50		TEA	
3.05	Reading Room	CONVENTIONAL TEACHING SESSION	
		Freefone	PLC 13
4.41		Close	

APPENDIX A

3RD WEEK

TUESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap difficulties in Recalling Caller	
8.50		COFFEE	
9.10	Reading Room	Continue Recap of the above	
9.20	Switchroom	Switchboard Practice	
10.10	Reading Room	CONVENTIONAL TEACHING SESSION	
		Service and Private Calls Public Calls to Official Telephones	PLC 11A & 11B
11.50		LUNCH	
12.35	Reading Room	CONVENTIONAL TEACHING SESSION Items 1-3	
		Special Services - Time - Tele Batch Bookings	PLC 10 Items 1-3
1.55	Switchroom	Switchboard Practice	
2.45	Reading Room	Recap NT	
2.50		TEA	
3.05	Machine Room	PROGRAMME	
		Number unabtainable Consolidation	PR 24 Tape 5 PLB 24
4.41		Close	

APPENDIX A

3RD WEEK

WEDNESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap Local Calls PA and ORD	PLB's 6 & 7
8.50		COFFEE	
9.20	Switchroom	Switchboard Practice	
10.10	Reading Room	PROGRAMME	
		POA Coinboxes Ineff. Part I Consolidation	PR 25 PLB 25
11.10	Switchroom	Recap Long Duration ADC	PLB 13
11.50		LUNCH	
12.35	Switchroom	PROGRAMME	
		POA Coinboxes Ineff. Part II Consolidation	PR 26 PLB 26
1.55	Switchroom	Switchboard Practice	
2.50		TEA	
3.05	Reading Room	CONVENTIONAL TEACHING SESSION	
		Items omitted from Programme 26	PLB 26
4.41		Close	

APPENDIX A

3RD WEEK

THURSDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	Recap E and NL	PLB's 8 & 9
8.50		COFFEE	
9.20	Switchroom	Switchboard Practice	
10.10	Reading Room	Recap NR and NR disputed	PLB's 11 &12
11.50		LUNCH	
12.35	Reading Room	PROGRAMME	
		POA Coinboxes Ineff. Part III Consolidation	PR 27 PLB 27
1.55	Switchroom	Switchboard Practice	
2.50		TEA	
3.05	Reading Room	PROGRAMME	
		Refundments Consolidation	PR 29 PLB 29
4.41		Close	

APPENDIX A

3RD WEEK

FRIDAY

Time	Accommodation	Subject	Programme Guide Tape
8.15	Reading Room	CONVENTIONAL TEACHING SESSION	
		Emergency Calls received on '100' Circuits	PLC 10 Item 4
8.50		COFFEE	
9.20	Switchroom	Switchboard Practice	
10.05	Reading Room	CONVENTIONAL TEACHING SESSION	
		Personal Calls from Coinbox Lines	PLC 8
11.00	Reading Room	UPW Talk	
11.30	Reading Room	Travel Claims	
11.50		LUNCH	
12.35	Reading Room	Complete Travel Claims	
1.00	Switchroom	Switchboard Practice	
1.40	Reading Room	Senior Instructor's Farewell Talk	
2.10	Reading Room	Give out Sick-Leave Leaflet	
2.50		TEA	
3.05	Reading Room	Exchange Reporting Instruction, etc.	
3.30		Close	

APPENDIX B

TYPICAL EXCHANGE TRAINING TIMETABLE

B.1. The following pages give the timetable for the first three weeks of telephonist initial training in a typical exchange.

B.2. The terminology used is the same as that of Appendix A.

APPENDIX B

1ST WEEK

MONDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Switchroom & Reading Room	Welcome and reception	
9.30	Reading Room	Visit from Training Supervisor	
9.45		COFFEE	
10.00	Machine Room	1) How to set up and use dictaphone 2) Introduction to Programme Learning Consolidation - recap how to use programme and answer questions, etc.	PLC 1 Tape 6
10.30	Reading Room	PROGRAMME Telephone System	 PR 1 PLB 1
11.15	Switchroom	Switchboard - Introduction to Switchboard Manner of calling and connecting	
12.00		LUNCH	
1.03	Machine Room	PROGRAMME Speaking to Customers Consolidation, Codes, etc. Show and explain V.I.F.	 PR 2 PLB 2 Tape 3
2.45		TEA	
3.00	Switch Room	Switchboard demonstration - operation and use of keys, cords, plugs, dial and supervisory lamps, tickets, etc. Allow trainee to plug into and answer one or two calls.	
5.00		Close	

APPENDIX B

1ST WEEK

TUESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Reading Room	PROGRAMME	
		The Ticket Tools of the trade - Part I Codes test, etc.	PR 3 PLB 3
9.45		COFFEE	
10.00	Switchroom	Switchboard Practice VIF Consolidation and recap at SW/BD	
12.00		LUNCH	
1.03	Reading Room	PROGRAMME	
		VIF Part I Tools of the Trade - Part II Consolidation - recap	PR 4 PLB 4
2.45		TEA	
3.00	Switchroom	Switchboard Practice with CONVENTIONAL TEACHING Straightforward timed calls at Switchboard	PLC 2
5.00		Close	

APPENDIX B

1ST WEEK

WEDNESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Reading Room	PROGRAMME	
		VIF - Part II Tools of the Trade - Part III Consolidation, Codes, etc.	PR 5 PLB 5
9.45		COFFEE	
10.00	Switchroom	Switchboard Practice with CONVENTIONAL TEACHING	PLC 2
11.00	Reading Room	CONVENTIONAL TEACHING Calls and Reference Charge and Irish Service	PLC 4
12.00		LUNCH	
1.03	Switchroom	Switchboard Practice with CONVENTIONAL TEACHING "Long Duration" at Switchboard	PLC 3
2.45		TEA	
3.00	Reading Room	PROGRAMME	
		Completed Ticket Times Calls. Tools of the Trade - Part IV	PR 6 PLB 6
4.00	Machine Room	PROGRAMME	
		"Engaged" Consolidation with conventional teaching TKO Check & Procedure for verifying engaged Consolidation	PR 8 PLB 8 Tape 4
5.00		Close	

APPENDIX B

1ST WEEK

THURSDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Reading Room	CONVENTIONAL TEACHING	
		Requests for calls not normally handled at your position (ITEM 5 SHOULD BE TAKEN AFTER APPROPRIATE DIFFICULTY, WN, CUT-OFF, ETC.)	PLC 6
9.45		COFFEE	
10.00	Machine Room	PROGRAMME	
		POACB (EFC) Part I Consolidation	PR 7 PLB 7 Tape 5
12.00		LUNCH	
1.03	Switchroom	Switchboard Practice Arrange visit to Engr.	
2.45		TEA	
3.00	Reading Room	PROGRAMME	
		ADC	PR 13
		Consolidation	PLB 13
5.00		Close	

APPENDIX B

1ST WEEK

FRIDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Machine Room	PROGRAMME XFC - Part I	PR 14 PLB 14 Tape 1
10.00		COFFEE	
10.15	Switchroom	Switchboard Practice	
12.00		LUNCH	
1.03	Reading Room	PROGRAMME XFC Part II Consolidation	PR 15 PLB 15
2.45		TEA	
3.00	Switchroom	Switchboard Practice Conventional teach Freefone	PLC 13
4.00	Reading Room	PROGRAMME XFC Part III	PR 16 PLB 16
5.00		Close	

2ND WEEK

MONDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Machine Room	Alt Routings	PLC 12
8.45		PROGRAMME	PR 9
		No Lines (NL)	PLB 9 Tape 4
10.00		COFFEE	
10.15	Switch room	Switchboard Practice and Consolidate 'No Lines'	
12.00		LUNCH	
1.03	Reading Room	Credit Cards	PLC 5
2.45		TEA	
3.00	Switchroom	Switchboard Practice	
5.00		Close	

2ND WEEK

TUESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Switchroom	Switchboard Practice	
9.45		COFFEE	
10.00	Reading Room	PROGRAMME	
		No Tone (NT) Consolidation	PR 22 PLB 22
12.00		LUNCH	
1.03	Switchroom	Switchboard Practice	
2.45		TEA	
3.00	Reading Room	PROGRAMME	
		Cut Off - Part I Consolidation	PR 17 PLB 17
5.00		Close	

2ND WEEK

WEDNESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Switchroom	Switchboard Practice	
9.45		COFFEE	
10.00	Reading Room	PROGRAMME	
		Cut -Off - Part II Consolidation	PR 18 PLB 18
11.00	Switchroom	Switchboard Practice	
12.00		LUNCH	
1.03	Switchroom	Switchboard	
2.45		TEA	
3.00	Machine Room	PROGRAMME	PR 11
		No Reply	PLB 11 Tape 1
5.00		Close	

APPENDIX B

2ND WEEK

THURSDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Machine Room	PROGRAMME	
		Wrong Numbers	PR 23
		Consolidation	PLB 23
9.45		COFFEE	
10.00	Switchroom	Switchboard Practice	
12.00		LUNCH	
1.03	Machine Room	PROGRAMME	PR 12
		Disputed NR	PLB 12
		Consolidation	Tape 6
2.45		TEA	
3.00	Switchroom	Switchboard (Incoming Calls)	
5.00		Close	

2ND WEEK

FRIDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Switchroom	Switchboard Practice	
9.45		COFFEE	
10.00	Switchroom	Switchboard Practice	
11.00	Machine Room	PROGRAMME Number Unobtainable	PR 24 PLB 24 Tape 5
12.00		LUNCH	
1.03	Machine Room	Switchboard and Prepayment Calls	PLC 7a
2.45		TEA	
3.00	Switchroom	Switchboard Practice	
5.00		Close	

APPENDIX B

3RD WEEK

MONDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Switchroom	Switchboard Practice	
9.45		COFFEE	
10.00	Reading Room	Consolidation - Re-Cap	
10.30	Machine Room	PROGRAMME	PR 19, PR 20
		Personal Calls - Part I	PLB 19
		Personal Calls - Part II	PLB 20
		Consolidation	Tape 2
12.00		LUNCH	
1.03	Switchroom	Switchboard Practice	
2.45		TEA	
3.00	Machine Room	PROGRAMME	PR 21
		Personal Calls - Part III	PLB 21
		Consolidation	Tape 2
		Conventional Personal Calls from CB's and XFC Personal Calls	PLC 8
5.00		Close	

3RD WEEK

TUESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Machine Room	POAC Eff - Part II	PR 10 PLB 10
9.45		COFFEE	
10.00	Switchroom	Switchboard Practice	
12.00		LUNCH	
1.03	Machine Room	Int. Telephone SV Special Services	PLC 9 PLC 10
2.45		TEA	
3.00	Switchroom	Switchboard Practice	
5.00		Close	

3RD WEEK

WEDNESDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Machine Room (No Tape)	PROGRAMME Recap on all Personal Calls Consolidation	
9.45		COFFEE	
10.00	Switchroom	Switchboard Practice	
12.00		LUNCH	
1.03	Reading Room	PROGRAMME POAC (INEFF) - Part I	PR 25 PLB 25
2.00	Reading Room	PROGRAMME POAC (INEFF) - Part II Consolidation	PR 26 PLB 26
2.45		TEA	
3.00	Switchroom	Switchboard Practice	
5.00		Close	

3RD WEEK

THURSDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Switchroom	Switchboard	
9.45		COFFEE	
10.00	Reading Room	PROGRAMME	PR 27
		POAC (INEFF) - Part III	PLB 27
11.00	Reading Room	PROGRAMME	
		Repayment Ineffective	PLC 7B
12.00		LUNCH	
1.03	Switchroom	Switchboard	
2.45		TEA	
3.00	Reading Room	PROGRAMME	PR 29
		Refundments	PLB 29
5.00		Close	

APPENDIX B

3RD WEEK

FRIDAY

Time	Accommodation	Subject	Programme Guide Tape
8.30	Reading Room	PROGRAMME	PR 28
		Difficulties in Recalling the Caller	PLB 28
9.45		COFFEE	
10.00	Reading Room	PROGRAMME	
		Conventional Teaching	PLC 11(a)
		Service Calls	11(b)
		Consolidation - Recap	
12.00		LUNCH	
1.03	Switchroom	Switchboard	
2.45		TEA	
3.00	Machine Room	Consolidation - Recap	
4.00		Switchboard	
5.00		Close	

APPENDIX C

EXTRACT FROM MSD REPORT 220 - STAFFING SYSTEM FOR TELEPHONE SWITCHBOARDS

C.1 The strategy of determining switchboard staffing requirements at present is as follows:

(a) Periodically a major observation exercise is undertaken to determine standard operating times. THQ observers sit in parallel with operators at about 20 exchanges in turn, and time calls by stopwatch. The average time taken for each work process is then used as a standard for staffing purposes in all exchanges.

(b) Once or twice a year a sample of tickets is analysed in each exchange to determine the average number of work processes carried out per call. The average operating time per call is then calculated by applying the standard operating times to this mix of traffic.

(c) Waiting time allowance is added (which includes a 5% allowance for personal needs), and the total average operating time is converted to a call value (one valued call = 18 seconds).

(d) The number of calls handled during each staffing period (usually 15 or 30 minutes) is determined by counting completed tickets on representative days in one week, usually once or twice a year (the incidence record). Using the calculated call value, and a national staffing standard of 200 valued calls per operator hour, staff requirements are then determined. A check is kept on the volume of operator work by a count every one or two months of the total number of calls dealt with during the day and evening (the bulk traffic record).

APPENDIX D

Definitions of Categories of Activity

D.1. Waiting call. The operator is ready and able to respond to calling signals in the multiple, that is, key forward and plug in hand. No other supervisories from calls in progress are lit. No calling signals exist in the multiple in front of or up to half the position width on either side of the operator.

D.2. Plugging in. The operator is in the act of inserting a plug in a jack in either the answering field or the Outgoing Junction Multiple (OJM). Provided the speak key is forward, this covers all movement from the time the plug is grasped until when it is released. It includes tap-testing to find a free line and also the changing-over of cord circuits, when this occurs.

D.3. Operating keys. The operation of any of the keys of the keyshelf is included in this category. It covers hand movements prior to the grasping of the key up to the point at which the key is released. If, however, the key is spring-loaded, only the movement to the off-centre position is in this category; while the key is held in this position, some other activity occurs (e.g. speaking or listening).

D.4. Dialling. This covers all activities between the time at which the operator positions her pencil to start dialling to the time at which the dial comes to rest. Short pauses between digits count as this category. However, if there is a pause in dialling for some other activity, such as operation of keys, the other activity takes precedence.

D.5. VIF. This category covers the period between the start of the search for an entry in the VIF and the time at which it is found. It includes the checking of credit card numbers against the matrix and the stop list, and any lengthy scrutiny of an entry. However, normal transcription of details to the ticket counts as ticket work, and the reading-off of routing digits whilst dialling is counted as dialling.

D.6. Ticket. This category covers the entry of information on the ticket carried out on its own (except for reading from the VIF).

D.7. Speaking. Speaking is any instance of speaking to the customer or another operator in forwarding the call, when no other activity is being carried out simultaneously.

D.8. Listening. Listening is any instance of listening to the customer or another operator in forwarding the call, or to automatic signals, when no other activity is being carried out simultaneously.

D.9. Speaking +. Speaking + is defined as the speaking of information relevant to the forwarding, supervision or accounting of the call, to the customer or another operator, whilst some other activity is in progress. "Information" includes called and calling numbers, requests for information (for example, concerning customers' difficulties), instructions to customers and the offering of transfer calls. It does not include the common platitudes "Trying to connect you" and "Sorry to keep you waiting". The other activity is commonly, but by no means exclusively, the entry of details on the ticket.

D.10. Listening +. Listening + is defined as listening for or to information relevant to the forwarding, supervision or accounting of the call, whilst some other activity is in progress. The information may be generated by the customer or another operator or the automatic system. Operating procedure must demand that listening occurs. For example, once ring tone is returned on a straightforward call the operator should preset the timer and leave the circuit. If she continues to listen to ring tone whilst completing the ticket, this is classed as Ticket. However, for a transfer charge call, the operator must offer the call to the called number. Thus, ticket work during the ringing out period of a transfer charge call becomes Listening +. As in the case of Speaking +, the second activity is often ticket work.

D.11. Filing. Filing covers all operations relating to the disposal of completed tickets, both in pigeon-holes or in the backs of chairs. It starts when the ticket is removed from the clip on the keyshelf and ends when it is clear that the operator has started a new activity. However, any lengthy scrutiny of the ticket (checking that all details are entered) counts as Ticket.

D.12. Timing. Timing applies to all activities concerned with timing the duration of a call. Most of these are setting or resetting of the automatic timing equipment but included in this category are looking at the exchange clock and recording of the time on the ticket, where a call is timed by the exchange clock. Note,

though, that recording a booking time, on a suspended call or when a Traffic Record is in progress, is counted as Ticket, since this is not related to the duration of the call.

D.13. Clearing Down. Clearing down is the unplugging of circuits and restoration of cords to their position on the keyshelf. It includes the unravelling of twisted cords, and also the tap testing of jacks to ensure that the other operator has stayed in circuit when two operators plug into the same call.

D.14. Inactive. The operator is categorized as inactive when work exists to be done but is not done or, although no work is available, the operator is not considered ready or able to carry out the work should it arise. This latter situation is the opposite of Waiting Call, where no work exists to be done but the operator is ready to act. This category covers all personal needs, and such activities as squaring-up tickets and excessive (compulsive?) operation of the timer re-set button, or any other time-wasting habits that the operator has acquired.

D.15. Procedural Instruction. Instruction of a more general nature, relating, for example, to a sequence of activities or the reason for a procedure. This includes questions asked by the trainees as well as the instruction given.

D.16. Other. This covers any other activity. Examples of the use of this category are discussions with supervisors, the completion of fault dockets and the placing of plastic rings on keys or supervisories as reminders.

APPENDIX E

A PROPOSED METHOD OF ASSESSING THE SUITABILITY OF APPLICANTS FOR TELEPHONIST TRAINING, BASED ON RQ PROCEDURE.

E.1. This appendix outlines a proposed method of assessing the suitability of applicants for telephonist training, to be used in addition to existing recruitment procedures. It is based on the RQ procedure according to the 1971 Operating Handbook. This has been superseded by the 1973 version with the introduction of new-style tickets. For this reason, an exact set of verbal instructions is not given since they would need to be changed for the new procedure. Although details will change, the essence of the method remains the same.

E.2. The assessment is to be made at the switchboard. The operating position should, for preference, be some distance from working operators to reduce distraction. Also needed are a supply of tickets, a headset for both the applicant and the ASr and a pen or pencil for writing.

E.3. In most exchanges, operators are expected to put on their headsets before entering the switchroom. The ASr should explain to the applicant how to adjust the headset for comfort outside the switchroom, and then conduct her to the position to be used for the assessment. After showing how the chair may be adjusted for comfort, the ASr should indicate where the applicant plugs in her headset cord.

E.4. When seated and plugged-in, the ASr will draw the applicant's attention to the VIF, explaining that it contains information that the operator needs when connecting calls. Indicating the list of exchanges, the ASr will ask the applicant to find the entry for a commonly-known exchange name, say Blackpool. When the applicant has found it, the ASr will point out the column containing the primary routing, explaining that this tells the operator the circuit and code needed to connect a call to a Blackpool number.

E.5. The ASr will next ask the applicant to find an exchange not listed in the VIF. After ensuring that the applicant is searching in the appropriate area of the VIF, the ASr will explain that not all exchanges are given there, and that there is a procedure for finding out routings not given in the VIF. The ASr will say that she is going to show the applicant how to carry out this procedure, after which she will give the applicant a number of exchanges, which may or may not be listed in the VIF, for which the applicant is to find the routing. The applicant may ask questions during the demonstration, but must carry out the assessment examples on her own (except as stated below).

E.6. The ASr will emphasise that, when finding a routing, the first place to check is the VIF. If the applicant is not certain of the spelling, she may ask for the name to be spelled and write it in the TO space on the ticket. If it is not to be found in the VIF, the ASr will continue, then another operator can be consulted who has information on all exchanges. This is the RQ operator, who may be spoken to using the appropriate circuits.

E.7. The ASr will point to the RQ jacks in the OJM and explain that when a cord is plugged into one of these (showing a cord, lifting the jack plug from its rest position) it is possible to speak to the RQ operator. Before plugging in the cord, though, the SPEAK/MONITOR key associated with that cord (showing the association at the same time) must be pushed forward to the SPEAK position. The ASr will also explain that the cord must be plugged into a free circuit, indicated by the lamp or free line signal. If there is not a free junction, the applicant must wait until there is one, and not overplug. The importance of this must be emphasised strongly.

E.8. Before actually plugging in to contact RQ, the ASr will explain the method of making the request and the expressions to be used. The applicant will be told that the RQ operator will reply as soon as possible after the applicant plugs in and will say, simply, "RQ". The name of the exchange for which the routing is wanted is given, with the place from which the call is being made. (Strictly this is the originating charge group, but there is no need to explain the concept to the applicant). The origin of the call will always be the same, namely the AMC concerned. Hence, for a call to, say, Helston, being made from Bedford, the expression to be used is "Helston from Bedford".

E.9. The RQ operator will then repeat the request, word for word, and, if the repetition is correct, the reply is "Right". If it is incorrect, the request is repeated by the operator, until the RQ operator's repetition is correct. There will then be a pause while the RQ operator finds the information, after which the RQ operator will give the routing as a name and a number, for example, "Truro 87" which the operator will repeat. The RQ operator will reply "Right" when the repetition is correct. When working through the sequence, the ASr will use the terms relevant to the exchange name chosen as the example to be demonstrated.

E.10. The ASr will show the applicant where the routing is written on the ticket (the RTG Space), and explain that the Truro routing is to be found in the VIF, after the connection to the RQ operator has been unplugged and the SPEAK/MONITOR key restored to its normal position. This clearing down after the information has been gained is to be emphasised. The ASr will repeat the sequence if asked to do so by the applicant, and when the applicant is satisfied, the ASr will demonstrate the procedure once, finishing by finding the Truro routing in the VIF.

E.11 After asking for any further questions, the ASr will now ask the applicant to find, say, five routings. Two of these will be for exchanges not listed in the VIF. The ASr may intervene if there is the possibility that the applicant will overplug a circuit in use, but otherwise will give no assistance during the assessment.

E.12 The ASr's assessment will be based on several aspects of the applicant's performance. The following list is not intended to be exhaustive:-

a. Does the applicant always check the VIF first?

b. How quickly does the applicant find the entry (if it exists), or the place where it would be?

c. Does the applicant use the correct sequence for plugging in (namely operate key then plug in to a free junction)?

d. Does the applicant use the correct phraseology?

e. What is the quality of the applicant's speech (is it clear and not subject to a strong accent?)

f. Does the applicant remember to clear down after the enquiry?

g. Is the plug grasped, rather than the cord, when clearing down?

h. Is the applicant's writing clear and legible?

j. Does the applicant use the correct spaces on the ticket?

k. Are the routings correct?

E.13. Using her experience, the ASr should be able to make an accurate forecast of the applicant's suitability for training. The most important attribute is the applicant's ability (of lack thereof) to reproduce the correct sequence of actions and speech involved in the RQ procedure.

APPENDIX F

PRELIMINARY INSTRUCTIONS TO TRAINEES TAKING PART IN TAPED CALL-SITUATION TESTS

F.1. The following is the text of the letter given to all trainees who took part in the tests using tape-recorded call-situations:-

"

Training Research Project

Telephonist Training Evaluation

Dear Trainee,

During the next two weeks, you will be asked to take part in an experiment which, it is hoped, will eventually result in an improvement in the training methods used by the Post Office. The idea of the experiment is to see if one method of training telephonists is better than a second method. We are trying to do this using tape recordings of telephone calls, which will be similar to those you have been taught recently, and during which you will have to decide on a future course of action. In a little while, you will listen to an explanatory tape which should make the method clear to you.

The tape recorded tests will be held on the afternoons of Monday, Wednesday and Friday of the next two weeks and will each last about ten minutes. A VIF and tickets will be provided for you to use as you see fit. ALWAYS assume STANDARD time.

You will realise as you do the tests that only one of the four answers offered is the correct one, but do not worry if you feel you are not doing well, because the results of the tests will only be used to assess the effectiveness of the training method used to train you, and will NOT be used as an indication of your ability. You have already had a Progress Check with your Training Supervisor - these will continue to be used in the usual way.

(cont'd.....)

To ensure that you are not identified from your answers, you will have chosen already an envelope from those offered to you by your Training Supervisor. Inside the small envelope within that envelope is a piece of paper with a serial number on it. Only you will know that you have that particular number. Always use the serial number at the top of every answer sheet you fill in (Top, Right-hand Side) and always fill in the Day and Week of training. Occasionally you may be asked by your Training Supervisor to include some papers with the answers you send to us. You will be given pre-addressed envelopes at the end of each test so that you can send your answers to us. "

F.2. The following is the text of the introductory tape recording, which includes a worked example. Where words or figures are shown in parenthesis, this indicates that the text was modified by substituting a different name or routing for the other two exchanges. This particular tape was made for Coventry. Passages in capitals are for sound effects and recording instructions.

F.3. " Hello. My name is Richard Lamb. You should by now have received the letter from my colleague and myself, telling you about the experiment in which you are taking part. The purpose of this recording is to tell you something about the nature of the tests which you will be doing.

You will hear tape recordings of an operator handling various calls. At some point during each call, a tone will sound like this - WARNING TONE BURST -. When that happens, you have to decide which of the four alternative actions listed on the question paper is the right one, and mark a tick in the appropriate box on the answer paper.

Only one of the four is the right action. You have some tickets to note down names and numbers and any other information you think is necessary, and also a VIF to look up any routings or charge letters that you need. To try and make sure that you know exactly what will happen, I have recorded an example for you which we'll do together. First of all you will hear the conversation between the operator and the customer.

OPERATOR :- "Number, please"
CUSTOMER :- "Kilmarnock 3875, please miss."
OPERATOR :- "Kilmarnock 3875?"
CUSTOMER :- "Yes, please, miss"
OPERATOR :- "What is your number, please?"
CUSTOMER :- "I'm on (Coventry 465211)"
OPERATOR :- "(Coventry 465211)?"
CUSTOMER :- "That's right, miss."

Now the operator is referring to the VIF for the routing. When she has found this, she will find a free junction on which to (dial) out.

SOUND OF PLUGGING IN, FOLLOWED BY (DIALLING). BRIEF PAUSE, ENDED BY EQUIPMENT ENGAGED TONE, FOLLOWED BY SOUND OF CLEARING DOWN.

WARNING TONE BURST.

You now have to decide what you would do if you were controlling the call. Look at the example sheet. There are four choices, a, b, c and d. The first is that you would say "I'm sorry, the line is engaged, shall I try the call later?" The signal which you heard was not Line Engaged, but Equipment Engaged, so this is wrong. Alternative b is that you would say "I am sorry, the lines are engaged, shall I try the call later?" Certainly you have received a tone which tells you the lines are engaged, but you have not tried all the possibilities.

In the VIF the letters (GW) appear in the Alternative Routings column, so you should try this. From the Alternative Routings inset, the routing for (GW) is (TK1 4599) so that the third choice, c, is correct, that is, plug into a free (TK1) junction and dial (4599 175) 3875. If you had chosen to plug into a free (AN) junction and dial (23 175) 3875, you would have been using the primary routing again. As you should always use the alternative routing, when it exists, for your second try, this alternative is also wrong.

In the example, the third alternative was the correct answer, so you should put a tick in the third box. In the tests, then, when the tone sounds - WARNING TONE BURST - you have to read the alternatives, decide which is the right one and put a tick in the appropriate box. If you want to change your mind, convert the tick to a cross with another line and put the tick where you think it should have been.

Remember that you remain anonymous during the experiment, so do not be concerned if you find that you are not able to keep up with the pace of the tests. If you miss a question, leave it and try the next one. Once the tape has started, do not stop it until you hear the instruction to do so which comes at the end of the tape.

All of the tests are of this type, so I hope you understand fully what you have to do. If you want to, you can run this tape again, or ask your supervisor if you are at all unsure. You do not have to write tickets; if you do so, though, please enclose them with the answer papers. Please, also, write only on the answer sheets and never on the question papers. When you are ready, your supervisor will give you the test tape for today, together with the question paper and answer sheet.

Finally, let me say again that you must not worry if you find these tests too difficult. They are not being used to assess you personally, but only to measure the effectiveness of the method of training."