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SERIES E: OVERALL NETWORK OPERATION,
TELEPHONE SERVICE, SERVICE OPERATION AND
HUMAN FACTORS

Operation of the international service

**Modelling of an experimental test design for the
determination of inexperienced user difficulties
in setting up international calls using nationally
available instructions, or to compare different
sets of instructions**

ITU-T E.300-series Recommendations – Supplement 5

(Formerly CCITT Recommendations)

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Supplement 5 to ITU-T E.300-series Recommendations

Modelling of an experimental test design for the determination of inexperienced user difficulties in setting up international calls using nationally available instructions, or to compare different sets of instructions

Summary

The objects of the tests are to obtain information on inexperienced user difficulties and to test the efficacy of different forms of instruction available for use in any country by observing, in a controlled laboratory environment, ordinary telephone users dialling live international calls.

Source

Supplement 5 was approved in Malaga (1984) and originally published in Red Book, Fascicle II.2.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSC Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this publication, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Supplement 5 to ITU-T E.300-series Recommendations

Modelling of an experimental test design for the determination of inexperienced user difficulties in setting up international calls using nationally available instructions, or to compare different sets of instructions

1 Object

The objects of the tests are:

- to obtain information on inexperienced user difficulties,
- to test the efficacy of different forms of instruction available for use in any country by observing, in a controlled laboratory environment, ordinary telephone users dialling live international calls. In this document dialling refers to both dial and pushbutton telephones, either of which may be used.

The tests will yield information on certain sources of difficulty:

- a) prior to dialling, i.e. in finding out the number and knowing how to make the call;
- b) during setting-up of the call, i.e. in dialling the number and dealing with the responses from the system.

2 Selection of subjects

Subjects should preferably have no prior experience of international dialling. If this proves impossible, then people with limited experience should be used.

It is considered that a minimum of 32 subjects will be required to provide sufficiently reliable information on inexperienced user difficulties. To compare two or more sets of instructions, a similar minimum of 32 subjects per set is considered necessary to reveal differences in effectiveness.

3 Experimental procedure

- a) If instructions are to be compared, subjects should be assigned at random to the groups using the different instruction sets. The effectiveness of the random assignment can be checked using the data from c).
- b) The subject is seated at a desk on which the telephone is placed together with the telephone directories and other instructional information normally available to the subject in his own home.
- c) The experimenter asks the subject the questions contained in a pre-dialling questionnaire.

The object of this questionnaire is to ascertain the extent of the subject's experience and his knowledge of international dialling procedures.

- d) The subject is then given the written instructions for the experiment.

In these instructions it is specifically pointed out that:

- *It is essential that this task be performed exactly as it would be done in reality.*
 - The numbers the subject is asked to dial are connected to answering machines (such as the speaking clock) in the country he is calling.
 - He will not be able to call an operator for assistance.
- e) When the subject is ready to begin, the experimenter presents the first number card and asks the subject to dial this number. On each number card the country name followed by a telephone number is written. The telephone number should be presented in the way recommended by the instructions of the country concerned.

- f) When the subject gets through to the correct number, the experimenter requests him to dial the next number.

If the subject makes the same error on two consecutive call attempts, he is prompted indirectly. The object of the prompt should be to make the subject go back to the instructions, not to tell him what to do.

If the subject has dialled correctly but has met with system congestion conditions, he is advised to continue with the next card number. After attempts have been made to obtain all the numbers, those meeting congestion should be tried again in rotation. If, after four correctly dialled attempts, a particular number cannot be reached due to congestion, the effort to reach that number should be abandoned.

- g) Having completed the task the experimenter asks the questions in a post-dialling questionnaire. The object of this questionnaire is to find out whether the subject's opinion on dialling of international calls has changed and what difficulties he encountered.

4 Experimental design

For determining user difficulties, subjects are asked to call N numbers (where N lies between 4 and 10 inclusive), one in each of N countries. The order of presentation of the N numbers should be varied between subjects according to a Latin square design. The total number of subjects will need to be a multiple of N.

In the case of comparing instructions, particularly where the most common types of error are already known and the new instructions are specially intended to reduce their frequency, it may be appropriate to select deliberately the types of foreign telephone numbers that produce these errors. This may lead to using a relatively low value for N.

As far as possible experimenters should avoid periods of congestion when running their experiments.

Note – A complete description of the experiment can be found in CCITT Contribution COM II-No. 93 of Study Period 1973-1976. It may, however, be considered useful to present numbers to subjects in the recommended notation of Recommendation E.123.

5 Measurements and observations

5.1 General

A standardized interview approach will be used, with the experimenter first logging subject performance on each call attempt and then, on the unsuccessful calls, interviewing the subject on the outcome.

5.2 Equipment

The experimenter should have a means of checking digits as they are dialled. A digit display is suggested but other methods, e.g. data logger or pen recorder, may be used. Direct observation by the experimenter of the digits dialled is an exacting task, particularly if a push button telephone is used, and should be avoided.

The experimenter should have a parallel speech connection to the telephone line so that he may:

- a) monitor line conditions e.g. tones and announcements;
- b) intervene on the call where necessary.

A permanent record of the experiment should be kept. This may include tape recordings of:

- i) conversations between the subject and the experimenter, and
- ii) telephone line conditions and system responses.

Timing information may be extracted from the latter recording, for example, by using a stop watch, but Administrations may wish to use a data logger or a computer to give a more comprehensive time/event history and hence more precise results.

6 Publication of results

Administrations which participate in this experiment are asked to make their results available, through the CCITT Secretariat, to the rapporteur entrusted with the study of the Question so that he may coordinate the results prior to publication as Study Group II contribution. The rapporteur will ensure the confidentiality of the information recieved as far as called countries are concerned by publishing only pooled information, unless he has obtained specific authority from relevant Administrations on particular aspects of their results.

Administrations wishing to conduct their experiment should contact the rapporteur to obtain details of the most recent experimental design and the telephone numbers that can be used.

7 Results obtained with this test

Tests with this experimental design have been completed in four countries¹. The test has reliably isolated the major points of customer difficulty in dialling international numbers by artificially exaggerating their effects to some extent through the use of inexperienced subjects. Even with this exaggeration there remains at the end of a concentrated learning period enough evidence to regard the points of difficulty as sufficiently well established to seek ways of alleviating them. These findings are supported, even in detailed aspects, by the subjects' responses to the questionnaire given after the tests.

Of some 20 forms of difficulty, the most frequent error made on about 10% of call attempts was the failure to omit the national prefix. Less frequent but equally harmful aspects include omission of international prefix (about 1%), country code (1 to 2%) and trunk code (0.4 to 4.5%) together with several variants of these.

Other significant types of error include premature abandonment of calls for various reasons. One of these may be an embarrassment arising from the national use of second dial tones, i.e. when a subject "abandons" expecting dial tone during the setting-up of the international call, in other words when his expectancy is upset by departures from the procedures he normally follows in setting-up calls.

Consideration of all the forms of error leads to the conclusion that upwards of 90% of error would be reduced, at least to some extent, by carefully worded forms of instruction.

Subject views on the ease of dialling international calls were surprising. Before the test, about 83% thought it would be easy or very easy. After the test, this percentage was increased to about 86% although appreciable difficulty was experienced in the test. This disparity between subjective opinion and actual performance needs to be investigated further.

A study² by one Administration has determined that this test is satisfactory in detecting improvement due to a revised form of instructional material.

¹ More detailed results may be found in Contribution COM II-No. 94 of Study Period 1973-1977.

² Details are given in Contribution COM II-No. 110 of Study Period 1977-1980.

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