INTERNATIONAL AVIATION ENGLISH ASSOCIATION

EDITORIAL

The present issue of our Newsletter appears under the sign of Lexcography and Teaching Aviation Terminology, subject of the 4th seminar held in Warsaw on 22nd and 23rd September 1994. So, it is only appropriate that this editorial should open with a quotation from the Shorter Oxford English Dictionary. «Apology... 2. Justification, explanation or excuse 1588. 3. A frank acknowledgement by way of reparation, of offence given, or an explanation that offence was not intended, with expression of regret for any given or taken 1594. « Unfortunately, if we read on, two centuries later we find « 4. A poor substitute 1754 «. Apologise we must for the disgraceful delay in producing the 5th and 6th issues of the Newsletter. By way of explanation, a phenomenon known to many of you : IN trays that seem to grow faster than OUT trays and the voracious demands of professional duties that leave little room for more more humane activities. By way of reparation, a little more flesh on the current and forthcoming issues. But, when all is said and done, indeed a poor substitute for punctuality.

The 4th Aviation English Seminar took place in Warsaw under the auspices of the Polish Airports State Enterprise and the Polish Air Traffic Agency. Ms Bozena Slawinska assisted by Ms Dorota Kozobowska, undertook all the organisation in Warsaw and made us all feel very welcome. We were so well received in the very well equipped and comfortable conference rooms at Warsaw airport, with finer touches such as the beautiful flowers on the table, and perfect pastries at the coffee breaks bearing witness to the amount of care that went into the preparations for the seminar. We were spoiled indeed, with an attractive and interesting buffet lunch at the Polish Air Traffic Agency Training Centre, where

PRINCIPALS OF TERMINOLOGY AND TEACHING SPECIAL LANGUAGES

Krista Varantola, *Professor of English, Department of Translation Studies, University of Tampere, Finland.*

Dr Varantola is an expert in lexicography and terminology and has long been interested in special languages - her doctoral thesis dealt with the knotty problem of noun phrases. She teaches non-specialists how to translate specialist languages.

What is lexicography?

The aim of lexicography is to make observations on the vocabulary or vocabularies of one or more languages by collecting information and materials about lexical items. A selection of these lexical items is then made by a lexicographer, or team of lexicographers and then they try to describe the use of the chosen lexical items. The product of this description is a dictionary. No dictionary, not even the biggest, is complete. Some may well be very comprehensive, but lots of words must be left out ; specialised vocabulary and new words are added to a language daily.

Until recently, the typical format had been a paper dictionary. Now more and more dictionaries exist in electronic format, but they are still basi-

PRINCIPALS OF TERMINOLOGY AND TEACHING SPECIAL LANGUAGES... *(contd.)*

we had the chance to sample some typical local cold dishes, and then a delicious dinner, offered by Mr Zbigniew Salek, Managing Director of Polish Airports State Enterprise and Mr Jerzy Lisowski, Director of the Polish Air Traffic Agency, in a traditional Polish restaurant in the wonderful old quarter of Warsaw. In addition to gastronomic delights, we were treated to a guided visit of the city, and for those who were able to extend their stay past Friday afternoon, there was a Chopin concert, and a visit to his birthplace.

With the inner (wo)man so well catered for, our minds were kept alert by the quality of the speakers and the lively discussions which followed and we hope that the reports in this Newsletter can bring the benefits of the ideas exchanged at this time to a wider public.

In addition to our programme on lexicography and teaching aviation terminology, we were able to profit from the expertise of our hosts and we were given a short introduction to some of the characteristics of the Polish language and the special difficulties technical English may present for Polish learners. Mr Pawel Kobryn was also kind enough at short notice to provide us with an interesting resume of the background to the Polish aviation industry.

We wish to thank all those who contributed to the success of this seminar, particularly the two sponsoring organisations. Bozena Slawinska's hard work and continuous enthusiasm for the association is very much appreciated, and last but by no means least, we must thank Mr Tadeusz Grocholski, Chief of the ATC Training Centre, whose help and support behind the scenes was invaluable.

In the current issue of the Newsletter we have tried to give an account of at least the essence of the ideas and material presented by the various speakers at the seminar namely Krista Varantola, Tim Johns and Jonathan Main. You will also find an illustration of a particular type of aviation terminology in Kitka T. Toncheva's article on acronyms. Finally we are publishing the first part of an article by Dennis Philip's on Linguistic Security and Syntactic Structure. Starting from a sadly classic case of poor communication, it contributes to a better understanding of what is involved in linguistic terms when communication goes wrong.

cally conceived like paper dictionaries despite the technical know-how that exists to produce electronic data-bases. The electronic dictionary provides the same type of information as the paper dictionary, however it takes less space, uses no paper, and the *search* command is a much quicker than flicking through pages.

What is terminology?

The aim of terminology is similar to that of lexicography except it aims to describe one special field. The product of this description can vary from a special field dictionary, which must be relatively comprehensive within its field to be commercially viable, to a small strictly delimited glossary. The typical aim of a glossary project is to describe 200 concepts and place them in concept systems.

What is the difference between a dictionary and an encyclopaedia?

A dictionary tries to tell you what x means and how it is used in the language whereas an encyclopaedia tries to explain what x is in the outside world.

However, limits are not cut and dried, and there are on-going discussions about the limits of dictionaries. Purists say dictionaries should only include necessary information about the outside, real world. Monolingual dictionaries in particular have a lot of encyclopaedic information such as conversion tables, proper names, historical events. In the Longman Dictionary of English Language and Culture, a lot of cultural items are included e.g. historical figures, names of TV programmes, film stars. It is interesting to reflect on how the cultural choices have been made. At the moment the purists are losing the argument and dictionaries contain an increasing amount of cultural information. Clearly to be a good sales proposition dictionaries must be as useful as possible for the largest possible number of people.

Dictionary dilemma

Compilers of dictionaries want to give clear information which is as context free, i.e. as free from the outside world, as possible. On the other hand, the user wants to know the meaning/use of a word for a context sensitive purpose. They are looking for the meaning of a word in a particular context, or they want to know what word to use in a specific context.

Dictionaries try to overcome the problem of the system of language. They try to explain what words mean at the system level. Communication is possible because there is some sort of agreement between speakers of one language as to what words mean. We all have our own individual ideas about what words mean, but there is the generally agreed core meaning which the dictionary tries to define. There are also associative meanings, which come through personal experience.

Text data bases

Text data bases contrast with dictionaries which are lexical data bases. Text data bases in electronic form can quickly and easily give context. So in future dictionaries could become more context free,

PRINCIPALS OF TERMINOLOGY AND TEACHING SPECIAL LANGUAGES... *(contd.)*

because text bases provide more context-sensitive information.

Dictionary entries

Typical kind of information found about a head-word in a dictionary entry includes:

Form: pronunciation, spelling, inflexion, derivatives, compound forms etc.

Meaning: paraphrases, or in bilingual dictionaries equivalents, usage example

Syntagmatic properties (i.e. how the item behaves in a clause): grammatical behaviour, lexical collocations, idiomatic usages

Extra-linguistic information: pictures, cultural information, subject field information, degree of acceptability (slang, vulgarity)

Choices for users of dictionaries

Dictionaries may be normative or descriptive. Nowadays dictionaries try to be descriptive, but users think of them as normative as is witnessed by expressions such as.... «it's not in the dictionary» «the dictionary says....». Some glossaries are intended to be normative e.g. definitions of standards.

Dictionaries may be synchronic/diachronic, i.e. reflects present day language or historic development and stages. Bilingual or multilingual dictionaries can be conceived actively or passively. A passive dictionary is one used for comprehension, for understanding from L2 (foreign language) into L1 (native language). An active dictionary would be one which tells the user how to use words of a foreign language for production purposes. No-one has yet managed to produce a really good active bilingual dictionary. You cannot write in a foreign language with the help of a bilingual dictionary alone. The user needs the assistance of another source, probably a monolingual dictionary.

The native speaker's competence comes into play when using a passive dictionary. The user can choose between synonyms offered, or even reject what the dictionary offers and by using associations find the correct word in the native language.

General language or special language ?

Market forces enter the choice. Previously the overriding tendency was towards more general, but specialised publications are on the rise.

Krista Varantola

Learners' dictionaries

The Advanced Learners Dictionary by Hornby came on the market in late 40s or early 50s . The material was collected in the 30s. Longmans introduced a simplified defining language- and claim that a basic vocabulary of 2,000 words is used in their explanations.

These dictionaries are perhaps the most innovative because of the large adult and child market.

When compiling a dictionary, compilers are faced with choices such as :

- -number of entries
- -number of pages
- -illustrations
- -typical user profile
- -format
- -front matter (introductions)
- -back matter
- -headword list
- -length of entries.

Limits of dictionaries - users' problems with dictionaries

• Word groups

A user may have problems with word groups e.g. *draw a gun, run a bath, spread butter, drive a car, play by ear, draw the line.*

PRINCIPALS OF TERMINOLOGY AND TEACHING SPECIAL LANGUAGES... *(contd.)*

What word would you look under? For dictionary makers, if you can list them in one place only, it saves space. Dictionaries are inconsistent with these types of examples. They are listed under verb, noun or both.

• Missing words

Examples of words/phrases missing from pre-1990 bilingual dictionaries:

- *industrial relations*
- *cellular phone*
- *camcorder.*

When presented with such problems, the only thing the user can do is to look for the types of publications where s/he can expect to find these words in various collocations, e.g. *for camcorder, <u>Which</u>,* the consumer's magazine.

Interdisciplinary entered dictionaries in the late 70s.

Inertial reel seat-belt was in a monolingual dictionary, but what non-native speaker could have found it listed under «inertia»?

Reefer in the context where it was found was clearly not as the general dictionary suggested *a cannabis cigarette.* After much searching it was found in the Canadian Government Data Base *Termium* to be *a ship designed to carry refrigerated cargo.*

It takes about 5-10 years for a new technical word which appears in more general contexts to appear in general dictionaries. This could be expected to change with electronic dictionary up-dates.

Termium and Term Banks

Termium is a bilingual English/French data base created by the Canadian Government with one million entries. This term bank is used, among other things, for official translations. All major fields are represented. A CD-ROM version may be ordered and updates obtained by subscription. It can be used as monolingual glossary as it has definitions and contexts.

The European Community Term Bank can in theory be accessed through E-mail or Internet or from a library. It was designed for European Union translators.

Difficult definitions

Some dictionaries use corpora (texts from the «real» world) to give collocations of words e.g. *Collins Cobuild.* Nowadays a test corpus is a must for all respectable British publishers, and all 1995 editions of learners' dictionaries are based on a text corpus. This can sometimes lead to rather inaccessible information.

Definitions must not be circular e.g. *bobcat - lynx; lynx - bobcat.*

Defining words should not be more difficult than the word being. For example :

DOG

Longman's dictionary

« A common 4-legged flesh-eating animal, esp. Any of the many varieties used by man as a companion or for hunting, working, guarding, etc. It is often called ' man's best friend. »

Cobuild

« A very common four-legged animal that is often kept by people as a pet or used to guard or hunt things. »

Collins English Dictionary

« A domesticated canine mammal. »

Dictionaries' problems with users

Most people criticize their dictionaries saying they are poor and inadequate, and there is certainly room for improvement, but users could help themselves by at least reading the introductions. This is the plague of dictionary-makers who know that their introductions go largely unread.

What is concept analysis?

Concept analysis is an attempt to analyse the properties of different concepts and establish what distinguishes one concept from the another. This process almost always uses comparison. *Monitor, terminal, screen* all belong to same concept system, so they must be compared and separated. This helps to describe relationships within the concepts, and place them within systems. A choice has to be made about which properties are distinguishing. Concept systems can be represented as tree diagrams with a hierarchy of superordinate concepts and subordinate concepts.
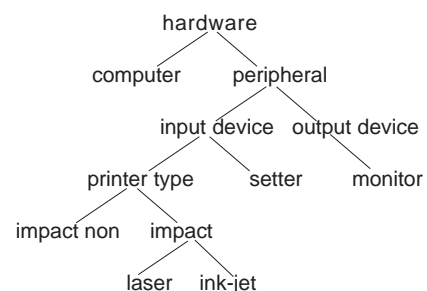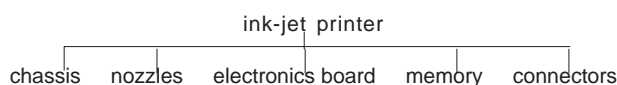

There are also part-whole relationships between concepts.

PRINCIPALS OF TERMINOLOGY AND TEACHING SPECIAL LANGUAGES... *(contd.)*

```
                        ink-jet printer
        ┌──────┬────────────┼────────────┬──────────┐
     chassis  nozzles  electronics board  memory  connectors
```

Associative concept systems using functions, causal relations and temporal relations can also be used to differentiate between concepts.

As concepts become more specific, they acquire more properties.

A Typical Concept Analysis Process

A decision is made to study and compile vocabulary for a problem area where there is some confusion about terms. The confusion may be caused by new concepts being created, perhaps because new things are coming onto the market. In a language other than English, anglicisms may be being used in parallel with L1 synonyms which are ill-defined. A work group with subject specialists and terminologists is formed, and they produce a glossary. For the field of telecommunication the chapter headings are as follows:

> Conceptual Fields
> General concepts
> Services
> Networks
> Connections
> Equipment
> Concepts related to payments
> Numbers

What is a Terminological Glossary?

It is the product of concept analysis and has a limited number of central concepts. The user should therefore read the foreword to understand what the glossary is trying to cover.
It is systematic and conceptually arranged.
It always has an alphabetic index which refers the user to the word within its concept system.
It has definitions.

Definitions used in authoritative texts are studied and sometimes discrepancies are found between the sources. In the same way, synonyms are often found. Ideally, there should be one term for one concept - this is the normative aim, but it is utopian. Apparent synonyms can be tricky. Their exact use has to be studied to establish their place in the concept systems. The concept systems may differ in different languages even in technical fields.

Gaps are allowed because sometimes the terms just do not exist in each language. Missing terms may subsequently be found and inserted in updated editions. Terms are taken from authentic sources, never invented by the terminology group. The sources are given in the foreword. In multilingual glossaries, if a language has more than 25% gaps it is usually not included.

Glossaries cannot be exhaustive. They can be evaluated according to terminological stringency - is the glossary for specialists or is it semi-specialist and closer to general language. (e.g. whales are fish or mammals, strawberries are berries for cooks, not for botanists).

Limits of glossaries

Glossaries are, by definition, limited but there is the problem of the large subtechnical vocabulary. which does not really belong to any particular field but is still too 'specialised' to appear in the special senses in a general dictionary. It is a pity it is not really to be found anywhere except in big specialised dictionaries. This vocabulary is common to many fields. These words get their meanings from other vocabulary e.g. verbs like *fix, fit, connect, set, install.*

What is a terminologist?

A professional who knows how to

- compile vocabularies
- do concept analysis
- get the most out of subject-field experts
- highlight and focus on the problems which the experts should solve
- be in charge of terminology project management
- record and present the vocabulary material.

To untangle some of the terms, the terminologists can make tentative concept systems and ask for comment from the subject specialists. It is interesting to see how individual experts may conceptualise their world differently. The terminologist has to sort out the mess. We are all familiar with the conceptualisation process when we are searching for something a little out of the ordinary in the supermarket. «Where are the breadcrumbs?» Is it bread or flour? We are unsure what classifier to look under.

Aviation English teachers could see themselves in the role of terminologists, collecting materials and making term inventories, with their pupils being subject specialists. Teachers can provide context examples, rather than making definitions.

Problem of synonyms in aviation terminology

Contexts of synonyms or near synonyms can be collected as they crop up and this can help to define them more closely. Usually when misunderstandings due to synonyms can be dangerous, there is an attempt to sort them out. If official bodies then want to become normative, there is an attempt to get rid of the synonyms

GETTING CLOSE TO REALITY

The Use of Machine Readable Corpus Data in Teaching English for Special Purposes

Tim Johns, *English for Overseas Students Unit, University of Birmingham*

« Learn to do without dictionaries! » « Make your own! Be a Sherlock Holmes! » « Throw away your crutches and focus on your own skills of puzzling out. »

Examination of some of the 'alternative' terminology gleaned from a quick glance at an aviation journal, and eavesdropping on a couple of aviation experts talking shop would tend to prove that dictionaries would be little help for deciphering this type of communication:

« NEW ZEALAND WAS IN THE HANGER »
« VIRGIN WAS IN THE SHOP »
« JULIET CHARLIE WAS ON THE APRON »
« 2 JUMBOS WENT MISSING ON THAT TRIP »
« GULF HOTEL HAS GONE TECHNICAL »
« THE LOT 73 IS KNACKERED »
« HOTEL INDIA WENT AOG »
« GULF ALPHA WILL ROTATE WITH CHARLIE IN DHAHRAN ».

Without a considerable amount of inside knowledge, these phrases are very difficult to interpret correctly.

On this evidence it would seem that informal communications in aviation makes extensive use of renamed items, makes use of much slang and jargon and is used among peers. This type of alternative, informal terminology is much more common than we realise, but it is rarely, if ever, studied. Above all, it is based on reality, on what people have to talk about to accomplish their jobs.

During two hands-on sessions Mr Johns introduced his techniques of discovery of terminology and the language surrounding it, using his concordancing computer programmes. A concordancing programme can search a huge amount of data very quickly and throw up on your screen the statistical information about the occurrences of the item requested and show all the contexts in which it occurs. In concordancing, text becomes the vehicle for information about the language.

Teaching Terminology : Requirements

Classroom teaching of terminology should be based on reality with evidence of usage, including statistical evidence.

Relationships are central to the concept of terminology, hence the need for strategies for puzzling out. Data from the computer can be used to find out about linguistic patterning. Sense relationships between terms are shown in hyponyms, synonyms and antonyms and 'probes' can

Tim Johns

be used to reveal examples of these sense relationships: *or* and *rather than* can be used to seek antonyms, while *such as* will point to hyponyms.

By examining terminology in this way one is also dealing with the relationship between other levels of language - the lexis, syntax and discourse distinction tends to collapse when language is viewed with the aid of a concordancer. One is examining the dancing of words, discovering what friends they keep and what corners they hide in.

A third type of relationship is that between the terms and the context in which they appear. We are in the domain here of collocations, idioms, pragmatics and usage.

Access to language data of this type gives the language instructor the tools to be able to say « I don't know; let's find out together ». The teacher becomes a research leader for the students. Furthermore, studies have shown that memory is enhanced by puzzling out words in context. In addition the skills developed in the classroom for specific exercises are carried over into the real world outside.

Software

Microconcord published by Oxford University Press, £125.

Corpus data can also be purchased. One corpus of a million words taken from the press and another of a million words of academic texts with a wide range of subject areas, from theology to engineering. £55 each corpus.

The programme can scan 2.5 million words in 2 minutes. The concordance of an item is first shown with the pattern of words occurring to the right, for example the term *crash* gave *crash course, crash into, crash on,* etc. while sorting to the left gave *the crash, to crash*. The text from which any of the citations for the target word has been taken can be examined in a more extended form. A gapping exercise

can be generated by simply pressing a key. The computer can find the main collocates of any item.

In the future one could envisage adding a concordancer to the utilities available to people writing with a word processor. This would complement the spellcheck and dictionaries already available. The data generated when using the programme can be selected and printed or saved in a text file.

Important feature - there is no restriction as to the size of text that can be examined. One could envisage examining the whole of an Aircraft Maintenance Manual in minutes, for example.

Corpus

The teacher should consider what sort of texts are desirable and why. Texts for reading, for listening or texts of the sort students should be aiming to produce in spoken or written form. The spoken word is, of course, more difficult. Only recently has there been an attempt to collect and sample authentic English speech. This has been done by the British National Corpus of Spoken English published by Longman. A selected number of volunteers carried a tape recorder with them over a certain period. The selection was based on region, social class, occupation etc. One of the results shown has been the amount of foul language in everyday use!

How to input text

You can type it in yourself but this is slow. You could always try to get your students to do it. A scanner is a more practical means. Free material can be obtained by networking on E-mail and texts on CD-ROM may be downloaded.

Suggestion

The Association could centralize materials and form an aeronautical corpus for concordancing work. Aviation specialists should beg, borrow or buy (stealing was not actually mentioned) material to build an aviation corpus. The concordancer reads text entered on diskette in ASCII form.

Mr Johns' demonstration of the possibilities of concordancing opened new vistas both for the ESP classroom and for the writer of ESP teaching materials. With such a tool and access to aviation texts in the appropriate form, aviation English teachers would easily be able to base their teaching on reality, and the students would be able to discover the workings of professional English for themselves. •

The Lost Boys

On a recent BBC Radio 4 spot on map-reading and sense of direction, it was drawn to our attention that no-one in the armed forces officially gets lost; they are « navigationally embarrassed ».

While euphemisms may be useful as a cover-up, they can never have the same impact as the real thing, and there is little chance of anyone other than the native English speaker remembering such a mouthful. Besides, the French pilot who called ATC in Germany during NATO exercises some years ago with the following heavily accented words «I am French. I am lost. I want to go home.» would never have made his point so clearly in any other way. •

(by courtsey of Jim Walters)

PORTRAIT

The Association is about meeting people. We felt that you could get to know fellow members better by a series of short « Portraits ». No one better to launch this new feature than Bozena Slawinska who has contributed so generously our activities and especially to the success of the Warsaw seminar.

I was born in Warsaw 19th March 1954.

I lived in England for two years (1976-1978) where I learned most of my English and acquired all of my Yorkshire accent.

Two years later I entered University of Poznan where I later got a masters degree in English language and literature.

For the past 15 years I have been working as a language teacher in what is now Polish Airports « State Enterprise division Air Traffic Agency».

I met Fiona Robertson at an annual meeting of British Guild of Air Traffic Controllers in 1985 or 1986 and thanks to her I have become involved in the activities of the International Aviation English Association.

Teaching is not my only professional activity. I also work, on a freelance basis, as an interpreter and translator. I translated 3 plays, on of which has been on in one of Warsaw repertoire theatres for the past years and was also staged in two other Polish cities. (Murray Shisgall « Twice around the Park»).

In my free time I like to travel, listen to classical music, read, go to the theatre and cinema.

Britain is very close to my heart, but from a traveller's point of view my favourite city is Paris and country Italy.

PRINCIPALS OF TERMINOLOGY AND TEACHING SPECIAL LANGUAGES... *(contd.)*

and try to harmonize the concept. Once agreement has been reached, then the terms that should be used are called *preferred* terms, and those that should be rejected are *deprecated* terms.

Professor Varantola is working in a privileged controlled environment with Finnish. It is a minority language and official bodies are prepared to put money into compilation of good glossaries. By comparison English is vast and anarchic with many people creating their own terms with little apparent reference to anything anyone else has done (e.g. linguistic theory). This is more frequent in soft sciences than in hard sciences. All new developments have terminology problems e.g. PC terminology versus Mackintosh terminology. Aviation also displays these symptoms, as a cursory comparison of Boeing/Airbus, American/British, Flight/Maintenance documentation will demonstrate.

This brief glimpse of the inner workings of the dictionary and the world as observed by the terminologist brings us a better understanding of the purpose and function of dictionaries and glossaries and hopefully helps us to be better users of these tools both in the classroom and the workplace.

For reference :
Termium : See « REFERENCES»
Sidney Landau: *The Art and Craft of Lexicography,* Cambridge, CUP, 1989.
Meyer Nigrad: *Computer Assisted Concept Analysis for Terminology Work* in Terminologiläran och dess Relationer tell andra Områden, Nordterm 4, Stockholm, 1992. •

ACRONYMS - AN ACTIVE FORM OF WORD FORMATION IN AVIATION LITERATURE AND TERMINOLOGY

Kitka T. TONCHEVA - *Lecturer of English in the Air Force Academy, Bulgaria*

CAS-LOC-NASA-VORTAC-STOL-TCAS-APU-NTSB-JAR-ICAO-FIM-IFR-RAT-EICAS-AMM-PFD-VOR-SST-IATA-GPWS-CIDS-ACESS-EEE-AOA-MEK-LORAN-WX-IRAN-FOD-EPR-QAD-LOX-SAE-ATLAS-CRT-NACA-ATA-RNAV-AMS-SB-PNF-CRM-FIR

The definition of the word «acronym» in the Oxford Advanced Learner's Dictionary of Current English is a « Word formed from the initial letters of a name » and in the Oxford Encyclopedic English Dictionary, the definition says « a word, usually pronounced as such, formed from the initial letters of other words ». In Achmatova's Dictionary of linguistic terms an acronym is considered as a synonym of the term « initial type of complex abbreviated words ».

In this paper by the term « acronym » we mean abbreviated words, formed by the initial letters or the initial parts of the words and also which are similar to, or completely coincide, with ordinary words. In some cases it is possible for the acronyms to contain some letters which are not initial, and also elements of telescopy, which evidently are of little importance and in fact help the formation of the acronym.

The difference between initial abbreviations and acronyms can be seen at first glance. This is their phonetic structure. Indeed, the difference in the phonetic structure is the most important formal difference between these lexical units, but some other differences should be taken into consideration, too.

1. The structure of the initial type of abbreviations depend to a great extent on the structure of the correlate (the full form of the abbreviation), and with the acronyms the correlative abbreviation is especially important, i.e., the correlates are created simultaneously with them. That is why for the acronym, a specific problem is solved, namely, the typical structure of the word that should be chosen.

2. The phonetic structure of the initial abbreviations is very specific and not easily incorporated in the phonetic system of a language. This is the reason why the initial abbreviations are striving to get an ordinary phonetic structure, i.e., the initial abbreviations are trying hard to become acronyms. This is the place to point out that the future structure of acronyms is taken into account at the very moment of their formation. Recently, abbreviating as a linguistic phenomenon has become a mass phenomenon and represents the efforts of a language to break some language norms and at the same time it stimulates the

development of that very language. However, the system of the language strongly influences the newly created lexical units. That's why in a certain sense, we can say that acronymy as a phenomenon appears as a result of acceptance of the abbreviation in a given language system.

Language as a system develops continuously, and the changing of certain elements influences the development of other elements. Models for creating new words are also subject to development and among the clearly-defined models, some transitional forms might be present. There can be only a relative stability of certain models at a given period of language development.

A starting point when analysing acronym models is the structural-semantical approach, i.e., not only formal phonetic and letter structures should be taken into consideration but also structural and semantic models, which carry certain meaning.

A classic example of an acronym in linguistic literature is the word RADAR. Having in mind the purpose of this paper, we have to point out that the word RADAR serves as a model for creating a whole series of acronyms which are connected with phenomena of a certain type. But if the choice of one or another of the correlate elements depends on the need to create a certain model, it could be said that the process of acronymy has a definite regularity about it. Looking at a number of acronyms, ending in -AR, we face the following picture ! On the one hand the component - AR is a part of the word root, and on the other hand this component is quite distinctly perceived as a bearer of the systematic meaning for creating a number of acronyms, as in :

LADAR   Laser Detection and Ranging
SONAR   Sound Navigation and Ranging
CONDAR Conflict Detection and Ranging, created following the model
RADAR   Radio Detection and Ranging

Quite substantial is the series of acronyms in the field of Air Navigation :

LORAN   Long Range Air Navigation
TACAN   Tactical Air Navigation
ICAN   International Commission for Air Navigation
SHORAN   short Range Navigation System
TELERAN Television Radar Navigation System
RAN   Regional Air Navigation

or the one connected with the operational characteristics of an airplane :

ETOPS   Extended Twin Engine Operations
EROPS   Extended Range Operations
PANSOPS Procedures for Air Navigation Services Aircraft Operations

ACRONYMS - AN ACTIVE FORM OF WORD FORMATION IN AVIATION LITERATURE AND TERMINOLOGY *(contd.)*

VertOps   Vertical Flight Operations and Certification Programme
SIMOPS   Simultaneous Operations on Intersecting Runways

or when weather forecast is concerned :

HIFOR   Height Forecast
ARFOR   Area Forecast
TAFOR   Terminal Aerodrome Forecast in Full Form
ROFOR   Route Forecast
FIFOR   Flight Forecast

or in connection with security :

SEC   Security
COMSEC   Communication Security
AVSEC   Aviation Security Study Group

More recent abbreviations/acronyms appeared along with satellite technology :

AEROSAT   Aeronautical Satellite Council
EMETSAT   Organization for the Exploitation of MET Satellites ; /Europe/
METEOSAT   Meteorological Satellite
PROSAT   Satellite Programme
SARSAT   Search and Rescue Satellite Aided Tracking
INMARSAT   International Maritime Satellite Organization
COMSAT   Communication Satellite Corporation
RNAV   Area Navigation
SATNAV   Satellite Navigation

It is clear that in the above-mentioned examples we are dealing with several structural models - (X)AR, (X)AN, (X) OPS, (X)FOR, (X)SEC, (X)SAT, (X)NAV, which serve for creating shortened names for navigational systems, operational characteristics, forecasts, security, satellite systems, air navigation, etc. The establishment of these models is interesting from a practical point of view, as their systematic meaning permits the general meaning of the acronym to be guessed with a great degree of accuracy. The components -AR, -AN, -OPS, -FOR, -SEC, -SAT, -NAV, carry some meaning but they can be combined with other elements of the correlate.

Some acronyms are very consistent in following given models, for example : WILDO, WILCO, WILAD, WILFO, WILRE - WILL DO , WILL COMPLY, WILL ADVISE, WILL FOLLOW, WILL REPORT. But other models only allow to be taken from the correlate those elements which an fulfil the model and it is a formal question whether only the first letters of the correlate should be used. For example, if we take the model (X)FOR in ARFOR, HIFOR, ROFOR, two letters are taken from the first word, and for TAFOR only the first letter is used. The same phenomenon can be seen in the model (X)CON, in the acronym RAPCON for Radar Approach Control and in TRACON for Terminal Radar Approach Control, where in the first example the letter « R» is taken from

the first word and the letters « AP» are taken from the second word of the correlate, while in the second case only the initial letters from the three words Terminal, Radar, Approach, are used.

The tendency towards creating acronyms following structural-semantic models exists in many fields of professional terminology. In every separate branch of science a number of acronym microsystems can be observed. Another example from the aviation terminology is the microsystem (X)TOL, where the common element is TOL (Take-off and Landing) as in :

ATOL   Assisted Take-off and Landing
CTOL   Conventional Take-off and Landing
GETOL   Ground Effect Take-off and Landing
RTOL   Reduced Take-off and Landing
VTOL   Vertical Take-off and Landing
STOL   Short Take-off and Landing.

It should be noted that a common element of a model can be an element that had been used on its own before. Such an example is the element MET - Meteorology, Meteorological, which was later included in :

AIRMET   Airman's Meteorological Information
OPMET   Operational Meteorological Information
SIGMET   Significant Meteorological Phenomena Information
VOLMET   Meteorological Information for Aircraft Flight, or in
UNICOM   Universal Integrated Communications
SATCOM   Satellite Data Communications

where the element COM had been for a long time been used on its own.

The examples given above show conclusively that many aviation acronyms follow models and that the acronyms following the same model have a common element, which acts as a clue to the meaning of the acronym.

What can be said about the linguistic nature of these common elements ? First of all, we must point out that they are bearers of a common meaning, -AN, for example, puts the acronym in the group of navigation systems. The function of -AN is similar to that of suffixes, but it is hardly correct to consider it as belonging to the category of affixes. With affixation, the lexical meaning of the word stem is supplemented and made more exact by the meaning of the affix. With acronyms, following the pattern of a model we have a much more complicated process, because in that case we cannot separate the stem in the general sense of this linguistic term. The meaning lies in the whole acronym. So, we can argue that acronyms are inseparable ; they have one morpheme and only tend to acquire morphologic structure. Besides, they have a common component that is not a morpheme but only a phonetic or graphic element that indicates the common meaning. When this element is recognised the acronym is quickly understood and related to a certain group. Of course, that does not mean

ACRONYMS - AN ACTIVE FORM OF WORD FORMATION IN AVIATION LITERATURE AND TERMINOLOGY *(contd.)*

that every abbreviation with an -AN element automatically relates to the acronyms, following the model (X)AN. It is the context that is of primary importance.

Widely spread in current English language are acronyms that completely coincide with ordinary words, in both letters and sounds. This group of acronyms can be called acronym-homonyms.

The creation of acronym-homonyms relates to the cases when an acronym is created following a model, but the model is an existing word. There is no common element ; the very word is the identification element. Acronym-homonyms are in fact an example of creating words ad hoc, i.e. words, created especially for naming, usually within limited groups of professional users. According to their formation, acronym-homonyms can be divided into two groups :

1. Acronym-homonyms, where the coincidence of letters and sounds is quite accidental and is a result of initial abbreviation ;

2. Acronym-homonyms that are created intentionally.

In aviation English examples of the first group are :

STAR	Standard Terminal Arrival Routes (Jeppesen)
CAT	Clear Air Turbulence
CAN	Committee on Aircraft Modelling Environment
JAWS	Joint Airport Weather Studies
PAPA	Parallax Aircraft Parking Aid
RASP	Radar Application Specialist Panel
STEP	Service Test and Evaluation Programme
SWAP	Severe Weather Avoidance Plan
SWAT	Subjective Workload Assessment Technic.

A subgroup of these is a group of acronyms in which one of the letters comes not from a single word but from an abbreviation :

ADAPT	ATM Data Model
PARADISE	Prototype of an Adaptable and Reconfigurable ATM Demonstration and Integration Simulator Environment
PHARE	Programme of Harmonized ATM Research in Eurocontrol
OASIS	Open ATM Systems Integration Strategy.

Accidentally created acronyms as a variety of initial abbreviations antedate the intentionally created ones. Obviously, it was recognized that they were easily remembered and identified among other words. Intentionally created acronym-homonyms are a group of words having some specific features which are the result of the simultaneous creation an acronym and its correlate. Here are some of the specific features characteristic of acronym-homonyms :

1. Possibility for non-participation of one or other component of the correlate in the acronym, because such components stand in the way for creating an acro-

Pawel Kobryn

nym, coinciding in form with a word from general English. For example,

TACT	Tactical System
GATE	Group of Air Traffic Management in the Eastern Part of ICAO Eur Region
ERA	European Regional Airlines Organization
FLOW	Air Traffic Flow Management Meeting of ICAO Europe West
FANS	Future Air Navigation System Committee
SCAR	Supersonic Cruise Aircraft Research Programme.

2. Possibility for appearing in the letter structure of the acronym a letter, which does not correspond to any component of the correlate, but which is necessary for creating a homonymic form. An example of this feature is the acronym « ATLAS» :

ATLAS	European Commission for a single Unified Air Traffic Management System. The letter « L» is introduced to get the homonymic form. Another acronym of that kind is :

HERMES	Harmonized En-route Metering and Sequencing, where the letter « E» is added.

ACRONYMS - AN ACTIVE FORM OF WORD FORMATION IN AVIATION LITERATURE AND TERMINOLOGY *(contd.)*

3. Possibility for using in the letter structure of the acronym not only the initial letters but also letter combinations from the correlate components ensuring the acronymic form of the word :

RASCAL	Radar Sharing and Calculations
SLAP	Slot Allocation Procedure
STORM	STORMSCALE Operational and Research Meteorology
ASTERIX	All Purpose Structured Eurocontrol Radar Information Exchange
STAR	Stellar Attitude Reference
DIRT	Displaced Runway Threshold.

Some of the acronyms like DIRT, RASCAL, STORM, SLAP have an emotional aspect too.

An interesting group of acronyms which follows all the above-mentioned peculiarities is that in which the letter structure coincides with names. Surely, names are easily remembered !

ATLAS	Air Traffic Land and Air Study
SARAH	Search Rescue and Homing
DORA	Directorate of Operational Research and Analysis
PHAROS	Plan Handling and Radar Operating System
NADIN	National Airspace Data Interchange Network
HERMES	Harmonized En-route Metering & Sequencing
ADAM	ATM Data Model.

Finally, there is one more group of acronyms, namely, acronym-homophones, which coincide in their phonetic form with an ordinary word but their spelling is a little different. Examples for such acronyms can be :

ASIST	Airport Systems International Show Tokyo
COMPAS	Computer Oriented Metering Planning and Advisory System
EASIE	Enhanced Air Traffic Management and Mode « S» Implementation in Europe.

With respect to the international choosing of acronym letters and the correlate, acronym-homophones are like acronym-homonyms. They are similar also in their naming a single object, while acronyms of the type RADAR, RNAV, TACAN, etc., denote technical equipment and systems. In this case acronym-synonyms should not be used because they could give rise to undesirable association between technical terms and homonymic words and phrases.

For reference :
V.V. BORISSOV, *Acronymy and Abbreviation*, Moscow, 1972. •

SOURCES

We call your attention in passing to the publication of Dr. Steven Cushing's book « Fatal Words : Communication Clashes and Aircraft Crashes» published by the University of Chicago Press (1994). Dr. Cushing addressed the 5th Aviation English Forum last year.

We have mentioned in the past how particularly fortunate we are in the aviation profession to be surrounded by a plethora of (usually) high quality, well-documented and well illustrated periodicals. Not only are they attractive ways of keeping up with the latest developments in a constantly changing industry but provide an inexhaustible source of materials for classroom and self-study se. Forsaking ubiquitous titles such as AVIATION WEEK, FLIGHT INTERNATIONAL, FLYING, etc., we have turned our attention to a few of the many excellent more specialized journals often to be founded behind the doors of Documentation centres or on the executive mailing lists.

In the fields of:

Aircraft maintenance

Aircraft Maintenance International
Euromoney Publications PLC
Nestor House
Playhouse Yard
London EC4V UK
Fax : 44 171 779 8868

Overhaul and Maintenance Quarterly

McGraw Hill Aviation Week Group
1200 G St NW Suite 900
Washington DC 200005
Fax 202-383-2440

Aircraft Technology Engineering and Maintenance

Aviation Industry Press Ltd.
31, Palace Street
London SW10 E 5HW UK
Fax : 44 171 828 9154

For news and innovations in air traffic control and related subjects :

Air Traffic Management

Quadrant Subscription Service
Oakfield House
Perrymount Road
Haywards Heath
Sussex RH16 3DH UK
Fax : 44 1444 445599

AMI

Oakfield House
Perrymount Road
Haywards Heath
Sussex RH16 3DH UK
Fax : 44 1444 445599 •

COMING TO TERMS – PRACTISING VOCABULARY

Jonathan Main, *English for Aircraft.*

Jonathan Main worked on ESP in the field of helicopters and missiles before devoting the last five years to Civil aviation. He is particularly interest in the application of computer-based techniques to self-access and classroom teaching. He conducted a workshop during the Warsaw seminar on different ways of acquiring and practising vocabulary.

The topics dealt with in this workshop and discussion were derived from Mr Main's experience of teaching aircraft mechanics to read aircraft maintenance manuals in English. The mechanics have a good technical knowledge of the aircraft, and their level of English is generally intermediate or pre-intermediate.

The prime source is the Aircraft Maintenance Manual which is a really vast series of books. Its style is fairly consistent in content and lay-out. It is also repetitive.

The group were asked to spend a short time studying sample pages of a maintenance manual and try to analyse it, decide on: text types, functions and types of vocabulary. The following comments ensued:

1. Grammar

- One participant was reminded of the work of Richard Duda in CRAPEL, Nancy, France with English for mechanics in the glass industry. These people had to cope with large American manuals and Mr Duda discovered that most of the things language teachers imagine would have to be taught were irrelevant to the students needs. He did not have to teach the micro-relationship between text and diagram, or most of the technical vocabulary, because the students knew it all already. It was grammatical features which were confusing the students, for example the use of *as, ing,* and noun phrase combinations. Difficulties encountered include :

  - passives may be very difficult, particularly as they can be used both for descriptions, and in a 'dynamic' way in instructions.

  - highly complex cross reference, use of this and these, in the discursive text

2. Vocabulary

A lot of action words were observed. The sample pages contained a lot of interesting puzzles :

sealant adhesive : both words can be used as either adjective or noun,

polysulphide sealant dichromate cured : is this something we don't know about called a *cured*, or maybe it's a *sealant* ?

Clearly the language teacher needs the help of an expert, in or out of the classroom, who knows what these things are, and what they do.

- noun phrases: the teacher can demonstrate how they work

- verbs are interesting: *prevent, occur, calibrate, fit, increase, decrease, connect*

- a short list of vocabulary to be pre-taught on the specific subject (in this case fire-extinguishers) could be drawn from the text.

3. Classroom dynamics

How much English do the students know, and how much of the student's native language does the teacher know? Is it not best to conduct the technical reading course in the students native language? Translation is not necessarily the most reliable tool in understanding a document.

Use of classroom expert : usually there is one student who knows the technical side better than the others and can help the teacher by explaining, both to the teacher and other students, some of the trickier bits. This idea leads towards the idea of team teaching, with a language expert and a technical expert together.

4. Text analysis

To aid comprehension, ask class to circle verbs in the text, and underline the headwords of noun phrases. Then score off the pre-modifiers of the noun group and rewrite or/and read aloud the shortened text.

5. Complaints

A complaint was made about American manuals for pilots being written without seemingly taking into account the reader who is a non-native speaker of English e.g. use of very heavy noun phrases.

It was claimed that Airbus manuals are written mainly for non-native speakers/readers of English, using Simplified English rules. This may not be a panacea(for further reading about Simplified English see Newsletter No. 3).

Another complaint was that ICAO documents are difficult to understand. These documents seem to be written for legal purposes and the user who has to understand and apply the rules, regulations and recommendations is forgotten in the writing process.

COMING TO TERMS – PRACTISING
VOCABULARY *(contd.)*

6. Visualisation

Applying some of the techniques developed in «accelerated learning» methods, students can be helped to visualise diagrams when reading texts. Sound can also be used to help the students to integrate the information on the page. The training is aimed at helping people to perform tasks as advised by the manual in a completely different context from the language classroom. Evoking the noise of a fire warning, the explosive discharge of a fire extinguisher or the smell and uncomfortable effects of a leak of gas can help to firmly associate language with reality, as can films, figures and schematics.

7. ESP Textbooks

Frequently the authors of ESP textbooks try to summarise the CONTENT of the subject. For example, English for Electricians tries to give a simple summary of electricity. For aircraft mechanics who know the aircraft and the systems, it is not necessary to present the technical content in a coherent way. For this reason, the English teacher can take samples from the documents without looking for content coherence.

Having studied the documents and talked with the users, the teacher will select the following kinds of item from the sample material :

• vocabulary
• contexts for the vocabulary
• typical sentences (the material is repetitive, so examination of typical sentences pays off)
• chunks of text.

These will then provide a kind of data base for developing classroom work.

Classroom activities

The group generated ideas about classroom activities to suit the following raw material extracted from manuals:

• a list of verbs
• a group of terms
• a list of typical sentences

Suggestions: Verb list

• ask the class to mark the ones they know, exchange the group knowledge and with help of the teacher find the meanings of the remaining items by translation, finding contexts, using dictionaries, etc.

• use a concordancing programme to pull out the contexts of the words which interest the group.

• make a blank fill exercise for the verbs the group need to practice.

Sentences

• mix and match with subjects and complements
• identifying the aircraft system the sentence refers to
• jumbled sentences

Discussion

How do you evaluate whether students really understand the texts?

This is particularly acute with students who memorize chunks of technical text e.g. the student who could quote the ICAO definition of missed approach, but could not draw a diagram of it.

How can one separate language from its content?

The language teacher should not be teaching the technical content.

What does it mean to know something?

The language teacher must vary ways in which student comes across and uses new items, differing contexts, tasks and activities. This enables students to refine meaning.

How to cope with the enormous vocabulary?

In manuals the technical vocabulary is vast and the language teacher cannot hope to cover it in any one course. But there is a recurrent core vocabulary (e.g. *remove, set, see,* location words etc.) and the language course gives a good grounding in dealing with this. The mechanics then no longer have to translate these words and can concentrate on the more specific ones. In order to find this core vocabulary you must either do this in a rather painstaking *ad hoc* fashion, or use computer software, if it is available.

There is a need for glossaries for different aircraft systems. Pocket glossaries for the man on the job (dictionaries are too voluminous). There is a project in Saudi Arabia to put the manuals on notebook PC computers which would open the scope for on-line glossaries in the computer system and a translation service.

How to eliminate mistakes with «easy» things?

People make mistakes not with the obviously difficult things - the complex new terms in a text -but with 'easy' things which they 'know' : the use of 'ing', the passive, confusing two similar words.

Practising Vocabulary

Finding synonyms and contraries

This gives discussion around near synonyms and differences in the terms. The aim is to help students process and learn these words by considering them and discussing them.

COMING TO TERMS - PRACTISING VOCABULARY *(contd.)*

Find the odd one out

A group of terms is taken from a specific aircraft system, plus one usurper. This reviews and reactivates terms. This type of exercise is usually done on paper but a more difficult variant is to do it orally, and it is then a rather demanding listening comprehension.

Word associations

A list of words to be matched with descriptive words which regularly collocate. This exercise can first be done in its written form, and subsequently recycled orally. It helps vocabulary acquisition and retention.

Verb blank - fill

A list of verb complements ; students must supply appropriate verbs or match from a given list of verbs.

Multiple choice exercise

Random list of terms from different aircraft systems

• ask students to highlight the words they know.
• sorting exercise ; ask students to make vocabulary families under different categories

A selection of sentences

The same selection of sentences chosen from the documents can be used several times on different days of the course.

First time : identify which system each refers to/ identify the verbs, identify compound expressions, etc.

Second time: a blank fill with one of the nouns missing.

third time: a blank fill for the verbs.

A long list of sentences from the documents to be classified under headings: *instruction, description, position, operation* or *warning*. This helps develop scanning techniques.

Jumbled sentences. Words in jumbled order to be sorted to make correct sentences.

Once students come to longer text they have already worked intensively on a lot of the sentences. Computers can be used to review the text using the Storyboard game. A summary of longer texts can be made for the same purpose.

Diagrams

Diagram and list from parts catalogue. Checking the names of parts and the numbers.

Matching: separate diagrams and legends and ask students to match.

Diagram labelling

Feedback and communication about the nature of the documents

There is no official feedback about problems of understanding the manuals on the job, but through the students, the language teacher gets a very good picture of where the difficulties lie. This accumulated knowledge could be used by those who write manuals. Language teachers should be not just modifying the recipients of the message, in this case the mechanics, by teaching them English, but also helping to modify the message itself by improving the language of the documents. The English Department of Birmingham University are now asked to rewrite accountancy examination questions because previously so many candidates failed to understand the questions. How do we get the language teachers and linguists included in the loop of improving the documents? There is a barrier of suspicion within the professional groups - pilots, controllers, mechanics, writers of industrial manuals etc. It is thought that linguistics experts will intellectualise and since they know nothing about the real world on the shop floor, in the cockpit etc., this will just complicate life, not simplify it. It is one of the central aims of the Association to convince the aviation world that teachers and linguistic experts have a lot to contribute to making written and spoken communication more effective in the industry.

The communication process should be looked at as a whole. In this case the teacher in the classroom is dealing with the maintenance manuals for the mechanics, but the manual is just one part of the communication in the whole maintenance process.

There is a lack of coordination, cooperation and involvement in the problems of language and communication. If the problem was recognized at the source, a great deal of wasted time and money could be saved.

For reference :

J Aitchison: *Words in the Mind*, published Basil Blackwell, Oxford. 1987

Storyboard - computer game by Tim Johns   •

THE ASSOCIATION AND ITS SEMINARS

Those members who have attended our seminars in Prague, Helsinki, Bournemouth, Warsaw and Toulouse are unanimous in finding them stimulating, worthwhile events. As we have already pointed out, if this is so it is due to our members themselves rather than to the Association. Each seminar has sprung to life thanks to individual initiative and enthusiasm. In each case, once the initial apprehension overcome, the result far outweighed the investment in terms of organisation. Although the number of important issues waiting to be addressed far exceeds our present capacity to deal with them, surely we should take up the challenge to raise questions such as :

- The use of computers in technical English learning
- How can we maintain language ability ?
- Computer-assisted translation
- Increased llanguage requirements on Cabin Attendants.
- Evaluating proficiency
- Migrating to English language documentation
- Budgetary rrestrictions and training
- Self-access : how and how far ?
- Multicultural crews and communication
- Learning on the job.
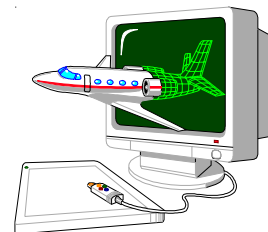
You can easily continue the list.

So, this is an invitation to send us an invitation. All we need is : a subject, dates, a venue, some local organisation in terms of a conference room and accommodation, a courtesy ticket for a guest speaker, if possible. Our address is on the front and back pages ! We look forward to hearing from you. •

DICTIONARY QUIZ

Do you recognize the terms of which these are the definitions taken from a standard American aeronautical dictionary ?

_____ : a heavier-than-air aircraft that is supported in flight by the dynamic reaction of the air against its lifting surface and whose free flight does not depend on an engine.

Some examples hang spectacularly above the concourse in Warsaw airport.

_____ : a mark on a turn and slip indicator which resembles a   (idem)   . It is located one needle width away from the center, and when the pointer aligns with it, a standard rate of turn is being made.

_____ : that part of the useful load of an aircraft from which revenue may be derived.

_____ : the point at which combustion occurs in a turbine engine as indicated by an exhaust temperature on the cockpit indicator.

_____ : the change in frequency of energy waves as their source moves towards or away from the receiver or observer.

_____ : the speed of an aircraft at which the drag has reached such an amount that the airplane will no longer accelerate.

_____ : an irregular line across a meteorological chart indicating areas on the earth's surface having equal barometric pressure.

_____ : hairline cracks in plastic due to age, stress and exposure to sun.

_____ : hairline cracks in plastic due to age, stress and exposure to sun.

_____ : small, low-aspect-ratio airfoils mounted in pairs on the upper surface of high-speed aircraft wings. Their function is to bring high energy to the surface of the wing, delaying shock-induced separation.

_____ : an aneroid (no liquid) barometer calibrated in feet above a reference pressure. It measures the weight of the column of air above it, thus indicating the height at which the aircraft is flying above a given reference.

LINGUISTIC SECURITY IN THE SYNTACTIC STRUCTURES OF AIR TRAFIC CONTROL ENGLISH

Denis Philips is a lecturer in English at the Université des Antilles-Guyane, Martinique, French West Indies and also works at the Université de Toulouse, Le Mirail. He is author of «L'Anglais de la Circulation Aérienne». ENAC 1989.

1. Introduction

On the 27th March 1977 two Boeing 747's belonging to KLM and Pan-Am respectively collided in poor visibility on the runway at Los Rodeos airport, Tenerife (Canary Islands), causing the deaths of 583 passengers and crew.

This accident, the most costly in lives in civil aviation history, was acknowledged in official reports to be due essentially to linguistic factors involving the use of the English language. The following points made in these reports are particularly interesting:

• the pilot of the KLM 747 took off in the belief he had been cleared for take-off ;

• although not entirely regulation, the communications terminology and procedures employed were in daily use in civil aviation,

• the communications terminology and procedures employed resulted in misinterpretation of verbal messages, leading to the collision.

Since the Tenerife disaster, and indeed prior to it, other fatal accidents are known to have been caused by a breakdown in linguistic and communication factors. In this article, we shall present syntactic analysis of the official phraseology used in air traffic control (ATC, i.e. pilot (controller exchanges), in an attempt to highlight its internal mechanisms, and in particular how it deviates from natural (i.e. non-technical) English. However, the thorn question of non-standard communication will not be broached.

Our long-term objective is to construct a typology of the linguistic parameters which have led to recorded incidents or accidents in the various phases of flight (ground, climb, en-route, approach, landing) reputedly due to linguistic and communication factors, in the belief that a better understanding of the latter may contribute to greater safety in controlled airspace. The account presented here is based on research carried out at the Ecole Nationale de l'Aviation Civile, in Toulouse, France (1).

(1) Cf. **D. Philips.** *L'anglais de la circulation aérienne.* Editions de L'ENAC. 1989

2. The Use of ATC English Worldwide

First of all, let us examine why the English language was being used at all at the time of the Tenerife crash, when a Spanish controller was communicating with a Dutch crew in the KLM 747, with an American crew in the Pan-Am 747, and with pilots of many other nationalities also using the Los Rodeos airport at about the same time.

World civil aviation is regulated by the International Civil Aviation Organization (ICAO), set up in 1944 at the Chicago Convention. Linguistic regulations for radiotelephony are to be founded principally in ICAO Annex 10, Vol . 2 (Communication Procedures), and in the PANS-RAC 4444-RAC/501-11 document. In particular, the International Standards and Recommended Practices for Aeronautical Communications (Annex 10, Vol. 2) stipulates that « ... in general, the air ground radiotelephony communications should be conducted in the language normally used by the station on the ground ».

It is however stated elsewhere that « pending the development and adoption of a more suitable form of speech for universal use for aeronautical radiotelephony communication, the English language should be used as such and should be available on request from any aircraft station... ».

In practice, due to the American influence on the growth of civil aviation since its inception, English has become the de facto language of air traffic control worldwide, except in specific situations such as, for example, an exchange between a French-speaking pilot and controller in French airspace.

However, even this type of situation, seemingly anodyne, does have potentially dangerous ramifications, as a non French-speaking pilot monitoring the frequency would probably be unable to understand the dialogue and therefore fail to pick up essential information in an emergency. This is what happened in the fifteen seconds preceding the 1976 mid-air collision over Zagreb between a BEA Trident and an Inex-Adria DC9 in Yugoslav airspace. Hence it was regulation procedure that the Spanish controller at Tenerife should have been conversing in English with all non Spanish-speaking crews.

3. The Tenerife Collision

Before having a look at the two most crucial instances of linguistic confusion surrounding the Tenerife collision, we shall briefly describe the background to the accident. On the 27th March 1977, a bomb exploded

LINGUISTIC SECURITY IN THE SYNTACTIC STRUCTURES OF AIR TRAFIC CONTROL ENGLISH *(contd.)*

in the Las Palmas airport (Canary Islands) terminal building, which had been previously evacuated. As there as a risk of a second explosion, most of the arriving air traffic was diverted to Los Rodeos airport on the island of Tenerife, whose parking area was consequently close to saturation.

The KLM 747 arrived at Los Rodeos at 13 .38 and was ordered to park on the north-west taxiway. The Pan-Am 747 landed at about 14 .15 and was ordered to park on the same taxiway, next to three other planes. Once the news came through that Las Palmas airport had reopened, the Pan-Am requested permission from the tower to start up its engines. The pilot was informed that there was no ATC delay, but that there would be taxiing problems due to a KLM 747 in front, and to general traffic congestion on the ground. Later, when the time came to taxi, the KLM's position did in fact prevent the Pan-Am from passing, which caused the KLM to depart immediately ahead of it.

The KLM was cleared to taxi to the holding point at the end of runway 12, and told to change from ground frequency 118 .7 to approach frequency 119.7. A few minutes later, the Pan-Am again requested start-up clearance, which was then given. It was while the Pan-Am was « backtracking» along the runway on the way to take-off position that the crash occurred, in poor visibility. Backtracking consists in taxiing along the active runway in the opposite direction to the ground roll, and is necessary, for example, when there is no direct taxiway access to the take-off position.

The first instance of linguistic confusion occurred during an exchange between the Control Tower and the Pan-Am crew, as is clear from the following extract from the tape recordings made at the time of the crash:

TIME	SOURCE	CONTENT
17.02 :10	TOWER	Taxi into the runway and leave the runway third, third to your left, third.
17.02:16	Pan-Am	Third to the left, okay.
17.02:18	Pan-AM (Captain)	Third he said.
	Pan-Am	Three.
17.02 :21	Tower	-ird one to your left.
17.02 :21	Pan-Am (Captain)	I think he said first.
17.02 :26	Pan-Am (First Officer)	I'll ask him again.
.../...	(Backtracking along the runway)	
17.03 :12	Pan-Am (First Officer)	Must be the third. I'll ask him again.
.../...	(Backtracking along the runway)	
17.03 :29	Pan-Am	Would you confirm that you want (us) to turn left at the third intersection ? (Third drawn out and emphasised)
17.03 :35	Pan-Am	One, two ...
17.03 :36	Tower	The third one, sir ; one, two, three, third, third one.
17.03 :38	Pan-Am	One, two (four). Good... Very good, thank you. That's what we need right, the third one.

The verbal confusion here is clearly of a phonetic nature (third [ɜθːd] / first [fɜːst]). The noise component is voiceless fricatives, about 1,400Hz-8,000Hz for dentals such as [θ], and 1,500HZ-7,000Hz for labio-dentals such as [f], stretches far outside the frequency range of radiotelephony (RT) communications (typically 300Hz-3,000Hz), and so would be extremely difficult to perceive, particularly in word-initial position.

Furthermore, as A. Gimson remarks, « Our discrimination of [f] and [θ] sounds would appear to depend not only on the frequency and duration of the noise component but also upon a characteristic blending of the formants of the adjacent vowel. » (2). Now long, central [ɜː] does not exist in Spanish, the native language of the Tower controller. This suggests that the 'non-native' blending of his English vowel formants, on which discrimination of [f] and [θ] appears to depend in part, would not have facilitated the Pan-Am crew's task of rapid phonetic differentiation with a view to ascertaining whether to take the first or third exit. Incidentally, the voiceless fricatives [θ] and [f] both exist in word-initial position in Spanish.

The final consonant (or consonant cluster) in third and first provides further scope for phonetic confusion, as word-final voiced plosives are typically devoiced in English ([-d̥]), and therefore scarcely distinguishable from [-t]. Furthermore, the noise component of alveolar fricatives such as [s], approximately 3,600Hz-8,000Hz, again stretches well outside the normal RT frequency range.

Hence, heard on an RT link, with its inherent technical limitations and choppy communications characteristics, and in an unfavourable noise environment, the phonetic confusion induced would be almost total. Unfortunately, the expedient used by the Tower controller to elucidate matters (one, two, three, third), though effective, came nearly one and a half minutes after the controller's initial message (17.03:36 and 17.20:10 respectively).

During this time, the Pan-Am 747 was taxiing along the active runway in poor and changing visibility (approximately 300m). The upshot of this confusion and delay was that the Pan-Am proceeded beyond the third exit, and was still on the runway when the KLM started its ground roll.

---

(2) Cf. **Edward Arnold.** *An Introduction to the Pronunciation of English*. 4th Edition. 1989, p. 24.

LINGUISTIC SECURITY IN THE SYNTACTIC STRUCTURES OF AIR TRAFIC CONTROL ENGLISH *(contd.)*

The second, more critical instance of linguistic confusion, centred round the use of the term « cleared «, but this was not due, as might have been expected, to the polysemic nature of the word (runway clear (=vacated)/ clear (=authorise to take off)). The following extract from the official report is vital to a proper understanding of the sequence of events :

TIME	SOURCE	CONTENT
17.05 :44	KLM	Uh, the KLM... four eight zero five is ready for take-off ; uh, and we're waiting four our ATC clearance.
17.05 :53	TOWER	KLM eight seven zero five you are cleared to the Papa beacon, climb to and maintain flight level niner zero... right turn after take-off ; proceed with heading zero four zero until intercepting the 324 radial from Las Palmas VOR.
17.06 :09	KLM	Ah roger, Sir, we're cleared to the Papa beacon, flight level niner zero, right turn out zero four zero until intercepting the 325 and we're now (at take-off).

The KLM's request for ATC clearance (17.05 :44) prompted a response from the Tower which contained both the expressions « you are cleared to the Papa beacon », and « after take-off proceed... ». Technically speaking, this is an airways clearance, an instruction to the pilot, given prior to take-off, as to which track to follow on once airborne, and not a take-off clearance. However, it was given in response to a request for both clearances, and was interpreted as authorisation for such, which resulted in the KLM starting its round roll. It was only then that the control tower advised « Stand by for take-off, I will call you ». The Pan-Am crew, monitoring the frequency, interjected « And we are still taxiing down the runway ».

After this call, a shrill whistling tone sounded over the radio of the KLM, but the control tower's reply « Papa Alpha 1736 » (i.e. the Pan-Am) « report runway clear » was audible in the KLM cockpit, as was the following transmission « OK, will report when we're clear ». The KLM flight engineer then enquired « Is he not clear, then ?» Captain : « What do you say ?» Flight engineer : « Is he not clear, that Pan-American ?» Captain (emphatically) : « Oh, yes ».

Here, the scenario involves a far more complex interplay of linguistic and extralinguistic factors. There is no phonetic, syntactic or even lexical confusion, no dysfunction in accepted communications procedures : an airways clearance, which by definition is to be implemented directly after take-off, is given immediately prior to a take-off without any reference being explicitly made as to whether take-off clearance is implied or not.

This is not the place to go into other factors involved in the Tenerife accident, but mention could perhaps be made of well-documented psycholinguistic phenomena such as reacting according to expectation (hearing what one expects to hear), attempting to comply with norms or standards (e.g.: stress-induced reactions due to unscheduled delays, heightened awareness of flight-time limitations), and constructing false hypotheses, particularly resistant to correction.

A major point is brought to the fore in our above comment on the relationship between the implicit and explicit. In ATC communications, partly reflected in English syntax by the relationship between elliptical and -non-elliptical utterances. It is this aspect that we shall now go on to analyse, along with its implications for increased linguistic security in controlled airspace.

Aircraft accidents or incidents always result from an extremely intricate network of factors. If only one of the factors involved had differed in time or space, a different scenario would theoretically have occurred.

Consequently, our contribution, base on a purely syntactic analysis of the official ATC phraseology, can only be very limited in scope and ambition. However, it may help to shed a little new light on some of the possible causes of poor communications procedures.

4. The Official Phraseology

Having stressed the complex nature of our subject, we shall now look at the official ICAO phraseology, which often has two variants - the original English-language version, sometimes slightly amended to cater for local circumstances, and, in non English-speaking countries, a translated version. Here, we have used the official English-language version used in French airspace, with which we are most familiar.

The main features of the phraseology are as follows :

* the order of priority governing the different types of message
* the spelling code for letters and figures
* callsign details for ground stations and aircraft
* message structure (callsign followed by content), callsign rules, acknowledgements, corrections, repetitions and endings
* distress and emergency measures
* conventional expressions
* the phraseology itself, i.e. : a set of compulsory skeleton messages for use in ATC exchanges.

The codified language of the phraseology differs from natural English on every major linguistic level :

LINGUISTIC SECURITY IN THE SYNTACTIC STRUCTURES OF AIR TRAFIC CONTROL ENGLISH *(contd.)*

a) **phonology :** the pronunciation of certain numbers is different : <u>three</u> : [tri :], <u>five</u> : [faif], <u>nine</u> : [nain∂], etc., in order to avoid phonetic confusion (<u>five/nine</u>), and in recognition of the difficulty many non-English speakers have in pronouncing the voiceless dental fricative [θ] ;

- prosody : flattened intonation curves to minimise emotional content, deceleration elocution : a maximum speech rate to 100 words per minute to enhance comprehension, etc. :

b) **lexis :** the use of a closed set (at least in terms of the corpus) of specific words and expressions chosen for phonetic reasons (e.g. to give syllables their full value) or semantic considerations (to avoid potential ambiguity) ; e.g. :

Phraseology	Natural English
Affirm	Yes / Of course, etc.
Cleared	Authorised / Go ahead, etc.
Negative	No / Of course not, etc.
Request	I'd like to / Could I, etc.
Say again	Repeat / Sorry ? / What ?, etc.
Vacated	Clear / Empty, etc.

c) **discourse :** precise discourse formulations apply to message content, characteristics, order, time of transmission, etc. :

e) **syntax :** the syntactic regularities found in the phraseology differ in such a systematic way from those governing natural English that they can be shown to constitute a <u>subgrammar</u> of English.

Using a standard transformation-generative framework (4) to establish a syntactic differential, we shall now go on to describe and analyse the specific syntax of the phraseology, seeking in particular to highlight the often elliptical structures which differentiate it from natural English, and to examine the linguistic security of these structures.

5. The Phraseology Subgrammar

We begin by positing, for each phraseological utterance, the closest corresponding utterance in natural (i.e. non-technical) English. In cases where more than one utterance is plausible, we have chosen the one which appears to echo the linguistic « philosophy» apparent in the phraseology. For example, the utterance « START UP AT (time)» is taken to derive from the natural English utterance « YOUR START-UP IS AT (time) «, rather than the imperative « START UP AT (time) «, as in all other phraseological utterances comprising the expression « START UP «, the latter is nominalised. As will be seen, nominalisation is a major differential characteristic of the phraseology subgrammer. Finally, in cases where the phraseological utterance already contains deletions typical of natural utterances (e.g. « REPORT PASSING (significant point) », these are not restored in the latter.

The data matrix is a rectangular table IxJ comprising 541 phraseological utterances (I) and 36 structural modifications (J). In view of the limited space available, our corpus data is not fully reproduced here. The following tables will, however, provide the information necessary to a proper understanding of our argumentation :

Table 1 : Aeronautical Sections in the Phraseology (5)

(11.1	Introduction)
11.2	General Phraseology
11.3	Regional (En-route) Control
11.4	Approach Control
11.5	Aerodrome Control
11.6	Flight Information Service
11.7	Special Cases

Table 2 : Transformation Codes

Modifications	Code
No syntactic modification	00
Imperative transformation	01
Passive transformation	02
Negative transformation	03
Interrogative transformation	04
Deletion of determiner in direct object	05
Deletion of determiner in adverbial phrase	06
Deletion of determiner in NP1	07
Deletion of NP1	08
Deletion of direct object	09
Deletion of Aux Phrase (-ING forms)	10
Deletion of Aux Phrase (-EN forms)	11
Deletion of link verb (BE)	12
HAVE (Full verb) deletion	13
Verb phase deletion (verb + + non-adverbial complement)	14
Verb nominalisation	15
Deletion of infinitive phrase	16
Deletion of -ING suffix	17

(3) Cf. **J. Mell.** *Les besoins langagiers en anglais des contrôleurs de la circulation aérienne (OCCA) en France et les problèmes de formation.* Unpublished University of Toulouse-Le Mirail DEA dissertation. 1987

(4) Cf. **N. Chomsky**. *Aspects of the Theory of Synatx.* MIT Press. 1965.

(5) Cf. *Phraseologie à l'usage de la circulation aérienne générale.* Direction de la Navigation Aérienne, Paris, Ministry of Transport, 3rd Edition. 1990.

LINGUISTIC SECURITY IN THE SYNTACTIC STRUCTURES OF AIR TRAFIC CONTROL ENG-LISH *(contd.)*

Deletion of preposition of direction	18
Deletion of preposition of place	19
Deletion of preposition of purpose	20
Deletion of preposition of time	21
OF deletion	22
Adverb deletion	23
Fronting of adverbial phrase	24
WHEN deletion	25
Aspect modification (verb)	26

Table 3 : Calculations

N° of phraseology sections	: 6
N° of phraseology sub-sections	: 79
Total N° of utterances in phraseology	: 541
(Controller-sourced)	: 476
(Pilot-sourced)	: 65

Table 4 : Modifications

Code		Total	% (of all utterances)
00	No syntactic modification	: 27	5.0
01	Imperative transformations	: 230	42.5
02	Passive transformations	: 44	8.1
03	Negative transformations	: 9	1.7
04	Interrogative transformations	: 10	1.8
05	Det. Deletion in direct object	: 142	26.2
06	Det. Deletion in adverbial phrase	: 52	9.6
07	Det. Deletion in NP1	: 101	18.7
08	NP1 deletion	: 138	25.5
09	Direct object deletion	: 4	0.7
10	Aux. Phrase deletion (-ING)	: 24	4.4
11	Aux. Phrase deletion (-EN)	: 53	9.8
12	Link verb deletion	: 112	20.7
13	HAVE (Full verb) deletion	: 28	5.2
14	Verb phrase deletion	: 10	1.8
15	Verb nominalisation	: 2	0.4
16	Deletion of infinitive phrase	: 4	0.7
17	Deletion of -ING suffix	: 5	0.9
18	Del. preposition of direction	: 22	4.1
19	Del. preposition of place	: 38	7.0
20	Del. preposition of purpose	: 11	2.0
21	Del. preposition of time	: 1	0.2
22	OF deletion	: 4	0.7
23	Adverb deletion	: 5	0.9
24	Fronting of adverbial phrase	: 11	2.0
25	WHEN deletion	: 24	4.4
26	Aspect modification (verb)	: 1	0.2 •

REFERENCES

If you wish to follow up the possibilities of using data bases, here are a few addresses :

TERMIUM : originally created as a means for the Canadian Translation Bureau to carry out its mandate of standardizing the terminology used within the federal government, TERMIUM included just over 900,000 records containing 3 million terms in all fields of knowledge.

TERMIUM is available online or on CD-ROM.

Further information may be obtained from :

Promotion and Coordination Division
Terminology and Linguistic Services Directorate
Department of the Secretary of State of Canada
Ottawa, Ontario   K1A OM5
Fax : 819.994.3670

EURIDICAUTOM : a selection from the term bank of the Commission of European Communities.

It contains terms with their definitions, as well as abbreviations and terminological phrases in English, French, German, Spanish, Italian, Portuguese, Dutch and Danish.

Further information may be obtained from :

Conseil de l'Europe
Service de l'Edition et la Documentation
B.P. 431 R6
67006 STRASBOURG Cedex.   France.

AIR CANADA has very interesting publications. We could mention :

Air Canada
Linguistic Services
Centre Air Canada - ZIP 262
P.O. Box 14000
Saint-Laurent, Québec
HAY 1H4.   Canada.

For all correspondence about the Newsletter, please write to:
International Aviation English Association
72, boulevard Vincent Auriol
75013 PARIS – France

For the attention of the Editor