Collocability in Languages for Special Purposes (LSPs): Some Preliminaries

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Abstract: This paper is concerned with the language professional discourse communities use for their internal communication. The characteristics of these languages for special purposes (LSPs) are many and varied, as well as being underresearched. The focus adopted here is to examine the phenomenon of multiword units, many of which are orthographic pluralities designating conceptual singularities. It is important to recognise at the outset that collocation is not the same as collocation. Analysis and systematisation of these textual “clusterings” is intended to separate them into two radically different types of entity: multiword segments possessing terminological status; and collocative material. The methods used to achieve the above objective are both qualitative, i.e. micro-environmental analysis, and quantitative, i.e. statistical patterning exhibiting a certain level of frequency and constancy. Collocational material quoted here also shows by its configuration that discourse communities use collocations to which the general public are not inured and with which they may not necessarily be familiar at all.

Keywords: CHUNKING, CO-OCCURRENCE, COGNITIVE ENTITY, COLLOCABILITY, CONCEPT, CORPORA, DISCOURSE COMMUNITY, DISTRIBUTION, DYAD, ENCYCLOPAEDIC COMPETENCE, LANGUAGE FOR SPECIAL PURPOSES, LEXICOGRAPHY, MENTAL LEXICON, MULTIWORD UNIT, OCCURRENCE, SOCIOLECT, STATISTICS, TERMINOLOGY, TERM, TRIAD

Opsomming: Kollokeerbaarheid in tale vir spesiale doeleindes (TSD's): 'n Aantal inleidende aspekte. Hierdie artikel handel oor die taal wat professionele gespreksgemeenskappe gebruik vir interne kommunikasie. Die kenmerke van hierdie tale vir spesiale doeleindes (TSD's) is baie en veelsoortig, en word ook onvoldoende nagevors. Die fokus wat hier gekies is, is om die verskynsel van meerwoordige eenhede te ondersoek, baie waarvan ortografiese meervoudighede is wat konseptuele enkelvoudighede benoem. Dit is belangrik om van die begin af te besef dat kolokasie nie dieselfde as kolokasie is nie. Analise en sistematisering van hierdie tekstuele “klusterings” is bedoel om hulle in twee algemeen verskillende tipes entiteite te verdeel: meerwoordige segmente wat terminologiese status besit; en kolokatiewe materiaal. Die metodes gebruik om bogenoemde doel te bereik is sowel kwalitatief, d.w.s. analyse van mikro-omgewings, en kwantitatief, d.w.s. statistiese patroonvorming wat 'n sekere vlak van frekwensie en konstantheid vertoon. Kollokasionele materiaal wat hier aangehaal is, wys ook deur die configurusie daarvan dat gespreksgemeenskappe kolokasies gebruik waaraan die groot publiek nie gewoond is nie en waarmee hulle glad nie noodwendig bekend mag wees nie.

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D’autre part, les collocations ne sont pas des unités de lexique: tout ce qui est de l’ordre du mot — les mots composés, par exemple — devrait être écarté. Ceci est hélas plus facile à dire qu’à faire, particulièrement dans les langues de spécialité. Les associations nom + nom et nom + adjectif, par exemple, qui y sont nombreuses, sont souvent considérées, à cause de leur caractère de fixité et du fait qu’elles font référence à une notion qui occupe une place précise dans une taxinomie, comme des unités lexicales. Mais les critères de différenciation entre mot et “non-mot” (ou plutôt terme et “non-terme”) ne sont pas toujours limpides. Dans un dictionnaire de collocations d’anglais général, il n’est pas trop difficile d’exclure des suites comme “generation gap” ou “battering ram”, mais en langue de spécialité, les problèmes sont un peu plus complexes.

Henri Béjoint et Philippe Thoiron

Preamble

The above quotation — which, interestingly, chooses English examples to support its thesis — sets the scene admirably for what is to follow in due course on what is acknowledged to be a very significant aim, within text linguistics, discourse analysis and, of course, lexicography and terminology studies: firstly, the location within running text and the subsequent analysis — either by hand or by computer — of units of meaning which comprise more than one (orthographic) word; and secondly and much more importantly, the overarching phenomenon of "chunking". However, before we can sensibly discuss these matters, the major focus of this paper, we must tread a path to the promontory from which we will best be able to view the scene.

Point de départ

Chunking is a primarily mental phenomenon, the symptoms of which are to be found in linguistic formulations. Put in other terms, chunking is a psychological cause, associativity, which has linguistic effects, juxtaposition or blending. It follows that any macro-investigation of chunking as a phenomenon is best pursued by the micro-investigation of "chunks", stretches of agglutinating linguistic material which are felt to represent segments of thought rather than just fragments. Chunks are also entities about which and about the use of which
there is some sort of social consensus. However, chunks hardly ever seem to be static in developmental terms; rather, they appear to be on a trajectory towards "explicitness" and involved in a systemic combat driven by language users and aimed at a prevaricating homeostatic trade-off between lexis and syntax. Once they have reached it, whatever that means in orthographic terms, they are no longer inchoate and they are no longer ambivalent: they have, in fact, merely become "normal", if somewhat lengthier, units of language — in common perspective, at the very least.

It is a well-known but regrettable fact that very, very few language communities possess satisfactory collocations dictionaries, the global mission of which — in addition to their strictly utilitarian function — is to demonstrate, reactively and proactively, that colocation is not collocation. The former, that is, mere juxtaposition, is either volatile or an example of a "fixed" multiword unit, whereas collocation manifests associative regularities — sometimes based on assonance, sometimes on prosodic effect, sometimes on less easily definable criteria — that can be shown to be statistically significant rather than "binary" in the sense of present versus absent. The normal unavailability of collocations dictionaries is a great pity because that is exactly what advanced learners need and, indeed, what many native speakers hanker after too. In fact, it is not stretching things too far to say that first-class collocational control is the hallmark of the true L2 expert; collocational control is, of course, normally the last linguistic subsystem to be mastered by L2 learners who proceed to an advanced level. Correct deployment of collocations is particularly important for anyone striving for authenticity of performance within a particular professional sociolect, such as the language of medicine or economics.

Lexicographic tools are urgently needed to help those who have not had the advantage, from their early years, of "statistical exposure" to lexical patterning which, although often analytically idiosyncratic, is habitual. It follows that investigation of the phenomenon of collocability relates to the hidden, subliminal patterns and rhythms of language which need to acquire a description having its basis rather in the statistics of occurrence and co-occurrence. Such lexicographical tools need to be primed — in the sense of acquiring the data they treat — by computational tools, the purpose of which is to identify, excerpt and prioritise relevant lexical material in a form suitable for subsequent lexicographical treatment. However constant this general aim may be, the actual means of fulfilling it will differ from one language to another. In all cases, of course, it is a question of locating stable and authentic multiword material — this is probably the only initial common denominator.

The "intrusion" of terminology — in a double sense!

In languages for special purposes (LSPs), a particular problem is posed by the terminological usages which proliferate in such modes of discourse. It so happens that technical terms are themselves often composed of more than one
orthographic word. Some criterion is therefore needed to discriminate between terms and collocations. The former are cognitive entities inserted as such into flowing text, the latter are, predominantly, inserted separately into text, yet their associativity helps that text to flow and to cohere. However, the position is given a further twist by the fact that genuine collocability also manifests itself in LSP discourse.

Let us commence by suggesting that Béjoint and Thoiron's formulation “lexical units” can be the cause of some confusion as this piece of nomenclature focuses on the messenger rather than the message, so to speak. Is it not preferable to refer to cognitive units or cognitive entities — which, naturally, require linguistic form, at least for the purposes of interpersonal communication? Quibbles apart, all of these terms attempt to capture the "truth" that it is not only words which retain their referents outside text; word-groups and phrases may also do so. This is entirely in accordance with the customs, habits and social compact established within societies for structuring individual and group experience. These lexical pointers along with whatever they point to constitute the mental lexicon of individuals and, by aggregation, the working consensus of society about how to interact linguistically with the world. Items in mental lexicons are mappings, complex rather than simple, between mental images and the names which point to them. In some ways the names are secondary and subservient: they may alter, leaving their referent unchanged, for instance. Yet they have power: names tame! The "downside" of this, via a different analogy, is that the natural dynamics of mental images are reduced to slow-motion film or even to still photographs. Yet names are also the major instrument of effability and they may acquire or discard referents as a result. Most of all, names, normally named "words", are at the very basis of social intercourse. Of course, much social intercourse takes place on a distinctly professional level, invoking/evoking — and instantiating by words — established concepts (Latin: ideas "taken together", i.e. holistically merged), phenomena or artefacts current within particular discourse communities (DCs) for the simple (!) reason that they have been professionally introduced, negotiated and subsequently validated by them. This process is necessary so that DC members can communicate with each other on the same terms, in a double sense, understanding without either external or internal mediation and not merely comprehending each other's thinking and reasoning. In this way a DC's sophistication increases, first of all encyclopaedically (at least for the pioneers) and then terminologically. The route from term to concept is immediate for DC members; for those outside the DC it is most likely to be mediate. It can, obviously, also be a cul-de-sac. The people of a DC and their purposes always have precedence over their technolect, so to speak.1 Putting this point in the parlance of sociology, the DC — even represented by its neophytes! — is the independent variable, the linguistic resources that they call on to express themselves individually and corporately are the dependent variable(s). A less obvious corollary, even to those directly involved, of this system of socio-professional "information exchange" is the
continual growth — not necessarily linear! — in the given paradigm's cohesion. It should in fact be noted, in the margins, that this "growth" can sometimes lead to the sclerosis of orthodoxy, hopefully then followed by genuine renewal based on new relationships and a new dialectic, plus a new or at least revitalised discourse to go with them. In such extreme circumstances a DC's members may well be prisoners of their thought or "mind-set"; they are not normally prisoners of their terminology because they can realign and resemanticise it by agreement.

How and where to establish a "base" for investigative purposes?

Those who observe and analyse DCs because of an interest, even a utilitarian interest, in their technolects are almost exclusively never members of them. This, of course, puts them in the empirically best possible but still suboptimal position to carry out their work as dispassionate investigators. The position is still less than perfect because little or no regard is given to what is encyclopaedically expressible (i.e. "encyclopaedic competence"?), only to what is actually expressed by linguistic means (i.e. "linguistic performance"?). However, that is an easy statement to make. After all, there are constraints. What is more difficult is making a judicious and also successful choice of methods for the investigation. It seems that linguists are — very sensibly — increasingly resolving the problem of linguistically modelling discourse, not least LSP discourse, by primary recourse to quantitative rather than qualitative methods. Qualitative analysis of LSP discourse by "frontal attack" requires an exceedingly well-stocked arsenal of tools and techniques, many of them still evolving and maturing. The yield tends to be on a micro level, the analogy of intensive "case-study" approaches which always seem to studiously eschew any mention of "comparators" when the real questions are always the following. First and foremost, just how representative of wider practice and habits are the "findings"? Secondly, has the "gulf" between encyclopaedics and linguistics been successfully bridged? Quantitative methods offer a way round this dilemma — at a cost! These methods can summon from an arbitrarily large corpus exhaustive lists of linguistic "segments" along with their frequency of occurrence. Although the frequencies are numbers, this information is of high qualitative value because the individual items in the associated lexis can then be described in terms of their actual functional load in the running source text and also in terms of their putative "market share" in analogous "still-to-be-written" text. Such material is of prime value for pedagogical purposes, principally because it is direct and powerful evidence of authentic usage. This then is the nature and purpose of quantitative modelling in linguistics — specifically lexis in this case — and it is arguably the best route open to investigators, particularly those with strong pedagogical interests.
The crux of the matter

We are now at a point where we can begin to draw together the two main strands of this paper. The first strand is obvious enough: how do we isolate within running text, firstly, DC cognitive units expressed by single orthographic words and how do we isolate those cognitive entities which are by definition conceptual "singularities" even though they are at the same time orthographic "pluralities"? Obviously, such matters of procedure and the variety of contingent cruces will depend on the particular natural language involved in any such investigation. In some languages, of which German may be taken as a suitable representative, the linguistic designation/configuration of many concepts, both within everyday life and within specialist DCs, often occurs via the compounding of separate lexical items into one orthographic unit. The linguistic process involved is one of holisticisation — who can say whether this is a true reflection and model of the Gestalt formed by the fusion of the latent (!) mental constructs? Just as the concept is "taken together" and becomes molecular, so the component [Latin: "putting together"] names are similarly batched and merged:

Farbfernsehempfänger, [Farb{fern}{sch}{empfänger}];
colour television receiver, [colour_ [tele]{vision}_ [receiver]);

Preisfestsetzungsrichtlinien, [Preis{fest}{setzung}{richt}{linien}];
price-fixing guidelines, [price-fixing_ [guidelines]].

English achieves the same objective of terminologically nominating a concept by juxtaposition and/or hyphenation. Phrasal formulation is also often an option in English: "guidelines for price-fixing / guidelines for fixing prices." It should be apparent, even on this slender basis, that delineating technical terms in running text is not an easy business as far as English is concerned. It is, of course, not unimportant which of the three available methods a language uses, and in what "mix", for structuring syntactic meaning: element order, function words, or inflection. The characteristics of English, with its "residual" inflection and consequent reliance on "neighbourhood" are particularly impervious to analysis by traditional methods. The chunking phenomena of interest yield only to subtle environmental analysis, often supported by statistical profiles. An instance of this is the English "phrase term"

stability augmentor pitch axis actuator housing support

which brackets as

[stability augmentor] [pitch axis] actuator housing support].

See also Appendix I for a brief excerpt of text on navigation with terminological usages "coded up" — in an intuitively simple manner — as single ortho-
graphic words. The paragraph shown represents only about one tenth of the entire text but the artificial graphic system used cuts the token count by 70 items, while — because of the batching effect — reducing the number of types by only a mere half dozen!

A fundamental distinction and its implications

It is vitally important to understand that the formation/usage of such multi-word units in English — and in many other languages — has nothing whatsoever to do with collocability, the chronologically second but thematically and substantively first strand in our discussion. It is a fact of life that, alongside everyday collocations of greater or lesser currency, professional collocations also exist. It is to this feature of language that we now turn our attention, encouraged and helped by the following dichotomising principle: If multiword units are terms they are not collocations; if they are collocations they cannot by definition be terms.

Operationally and computationally, this principle reduces to the need to distinguish in English between those spaces between orthographic words which separate and those which glue and bond. Fortunately, this problem normally solves itself in the course of computer-driven analyses by dint of the statistical force of grouping.

Collocation: a macro phenomenon with micro differentials

Collocation is a linguistic phenomenon which manifests itself via the habitual but often seemingly idiosyncratic or inexplicable association by co-occurrence in a microcontext, in parole, of one word with another. The strength of such associations may vary, both within a community and over time. There is some basis for stating that collocation is a phenomenon which can partly be measured in terms of its surface systematicity. Collocation is a linguistic subsystem which individual L1 users acquire, as noted above, not by study but by sheer exposure to the phenomenon from their early years on. Each new stimulus adds incrementally to the speaker’s ability to control his/her own linguistic behaviour and to make certain judgements about other people’s linguistic behaviour. In many ways, collocational control — which also embraces the ability not to produce incorrect collocations! — is not merely a hallmark of linguistic maturity, it is also a kind of shibboleth. That is why it is so important — it is also why collocational control is difficult to master, seriously so if the person attempting to establish control is not a native speaker of the language concerned. Such a person has to adopt or devise a chronologically optimised regimen for acquiring collocational control: the problem is that emulation of native speakers is too slow and simulation is too risky. The simulation has to be con-
nectionist anyway, developing its own neural network, to use two terms in a literal rather than a metaphorical sense.

Given that collocations occur freely and naturally in all those sociolects which are "everyone's property", it would be somewhat strange if they did not also occur in special languages, the LSPs associated with and "owned" and regulated by DCs which group professional persons by gradations of various types. It is a very pertinent — and underresearched — question as to whether exposure to the collocational habits of technolect speakers instils collocational orthodoxy of linguistic behaviour in the same way as in general circumstances. One hypothesis must be that there are differences between the two situations alluded to. People joining obvious professional groupings do so at a time in their lives when their adult native language habits are more or less established. Nonnative speakers have a more obvious problem. Either way, there is a learning and adaptation process which has to be much more purposive and "supraliminal"; this, in its turn, requires deliberate reflection, learning and greater awareness about linguistic, sociolinguistic and metalinguistic matters. The urge to adopt "group-speak" is more keenly felt even if "group-thought" lags behind somewhat! Yet there is an ongoing tension between the demands of the logical and ontological framework of the professional DC and the requirements of illocutionarily successful linguistic formulations and terminological codifications. The "genre" problem within a DC's discourse is an added subtlety, not least in terms of the collocational practice of DC members vis-à-vis other DC members or "layfolk", to name only one such communication axis.

A LSP-based investigation of collocability

The (ongoing) research on which the above remarks are based is an investigation of LSP discourse in the areas of finance/banking and — partly — of medicine. The texts used in the investigation come from two types of source. Firstly, the holdings of the Aston Scientific and Technical English Corpus (ASTEC) provided the medical text. Secondly, and quantitatively more importantly, the finance and banking material was read from a commercially available CD-ROM which contains the entire text of the 1993 editions of the Financial Times, classified into sub corpora designated by theme and genre.

Once a prima facie satisfactory corpus of text has been identified, it can then be processed. For very large corpora (i.e. 2 million tokens) the machine processing is carried out in a UNIX environment, via a suite of programs expressly designed for the purposes described in some detail here. The method of initially selecting and then identifying multiword textual segments is simple enough. The objective is to find, inspect and count batches, no more than arbitrary fragments really, consisting of nine orthographic words. Once found, these fragments can be sorted and arrayed by their "middle", i.e. fifth, word. The scanning window then moves one word to the right, so to speak, and iterates the same basic process. Some further sophistication is available — at addi-
tional computational expense — by the following method which has been shown to be operationally viable with groups of two words (dyads) and three words (triads). The algorithm works as follows: in the case of dyads, the words comprising them must be within a sentence boundary, with no intervening punctuation marks. Neither member of the dyad may be a function word. For triads the strategy is similar, with the "concession" that the middle word in a triad may be the function word of. The yield, unlemmatised, from the algorithm is sorted by frequency and then inspected with a view to identifying segments rather than fragments. Many of the segments are proper names, either institutional or personal, of encyclopaedic significance to the DC concerned. Those that are not are either terms representing cognitive units or they are potential collocations. A list of 553 triads — representing occurrence frequencies descending from 308 to 3 inclusive — was derived, by the above "unintelligent" methods, from a sample of the World Stock Markets corpus. Of the items in this list 62% represented cognitive units (interest rate cut), proper names (UBS Phillips Drew), jargonistic turns of phrase (dealers took profits), or collocational expressions (volume remained flat). Similarly, a list of 1268 dyads — representing occurrence frequencies descending from 431 to 5 inclusive — was then derived from the World Stock Markets corpus. Of the items in this second list 44% represented the same set of lexical categories: cognitive units (corporate earnings), proper names (Bill Clinton), jargonistic turns of phrase (depressed sentiment), or collocational expressions (Paris fell). An analogous analysis of a medical corpus drawn from the British Medical Journal yielded 121 terms from a list of 883 triads (see Appendix II).

Computational experience has shown, at this stage, that the main operational requirement is copious output which can then be refined by classification even if the discard rate is high. A surfeit of information is better than a dearth thereof! The steps needed to achieve copious output are easy enough to understand and appreciate. A large corpus will yield a rather long list of types, to which is appended the number of tokens for the relevant type, that is, its occurrence frequency. No attempt is made at all to group the types together into their "lemma set" and hence attempt to look at the behaviour of the canonical form. This can be done separately for English text, but even for inflected languages (such as Polish) it is more profitable in fact to look at the types independently of their lemma "allegiance". The point is that the various forms of the lemma all lead different lifestyles in text, not just in terms of frequency but also in terms of the lexical company they keep. The grouping action of lemmatisation actually obscures important information about type frequency and functional load within text and — above all — about type behaviour in terms of semantic differentiation. Be that as it may, it is probably the type frequency list (plus token counts) which is the main priming material for further investigation. Clearly, the analyst has choices to make, invidious choices, possibly. Attention tends to gravitate either towards types with a fairly high frequency or towards items of almost curiosity value. Having once selected an item for
further scrutiny, the analyst goes back to the corpus and retrieves all the lines containing the item in question. This is the necessary preliminary to the study of the said item's distributional characteristics — that is, seeing how its meaning is "defined" by the constancy of its neighbours, its morphological variants and, if such applies, its — often Janus-like — polysemy (see Appendices III and IV). This is, in fact, the only logistically feasible way of studying words as "chameleons". It can be noted in passing that any search profile can be entered as a string rather than as a fully-fledged word if interest is actually focused on a lemma or hyperlemma (as in the set: STRUCTure, reSTRUCTure, STRUCTural, STRUCTuralism, deSTRUCTion, conSTRUCTive etc.). The result of the actual search is a set of one-line concordance citations which may supply information that is adequate for the analyst's purposes. If this is not the case, the entire sentence from which the keyword has been somewhat artificially extracted can be retrieved for inspection. As a further specific aid to collocational studies, a so-called synoptic chart (see Appendix V) can be produced of the node's left and right neighbours to a depth of four items. The individual items arrayed are "decorated" with their own occurrence frequencies. This is the basic method of attack for the purposes of collocational analysis but it is worth mentioning in this precise context that an overview of the valency pattern of the node words selected often also comes across very forcefully. Valency patterning is, of course, held by some to be an integral pattern of collocation studies. The techniques enumerated here have also worked, incidentally, to good effect on material in languages other than English.

It is clear from the initial stages of the above ongoing programme of research into LSP collocability that, as regards text generation, a marked degree of formulaic writing exists in the World Stock Markets financial press. This is true with respect to sentence structure and to the choice of words used for the purposes of qualification. This is either a tendency to avoid any disorientation in readers' minds that might be caused by novelty of usage or — just possibly — the result of summoning up, by reason of time pressures, certain prefabricated utterance structures of an algebraic kind and leaving the few variables mostly unchanged (see Cowie 1991 and 1992).

The techniques described immediately above achieve their greatest effect in the way they present for inspection the left-hand and right-hand neighbour(s) of the nodes chosen. Scrutiny of these environments leads naturally and fairly rapidly to the identification of any collocations present. Let the professional collocations used to describe the quality of stock market trading in Appendix VI speak for themselves and invite reflection, but let not the merits of the material in Appendices II, III and IV be overshadowed in the process!

Implications and Renvoi

The implications of what precedes are numerous but can nonetheless be classified as either practical or theoretical. Let us deal with the practical implications
first. Computationally, the impediments impinging on both principle and practice are minimal. Largely, the name of the game continues to be the game of the name! In terms of particular investigations a great role is played by pedagogical impetus: in fact, the agenda can safely be driven by this as no gulf is likely to open up between those who seek and find material and those who place it in the lexicographer's/terminographer's crucible.

On the level of theoretical considerations, there is much more to speculate about. Let us ask some questions which are not merely rhetorical. What is the precise nature of the mismatch between orthographies and the cognitive units they must find designations for? What is chunking — with respect to term formation and collocability — and how can synchronically- and diachronically-focused studies be pursued with both descriptive and analytical purposes? How does the primeval soup of language congeal in different ways and in what contrasting and competing ways within particular languages? What is the logical, semasiological, ontological and analogical nature of, say, the sets (or classes?) of adjectives collocating with certain nouns or groups of nouns? Is this all sui generis or is it describable in generic terms?

Acknowledgement

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Notes

1. For further discussion of the linguistic and sociological basis of DCs, see Knowles 1997.
2. Let us, for the purposes of this discussion, set aside the cross-cultural differentials and the occasional mismatches between the encyclopaedic networks of "national" DCs. Such mismatches cause communication problems by cropping up in LSP discourse potentially addressed to all members of a supposedly international and "shared" specialist/intellectual culture.
3. It may be that German's/Germans' tendency to generate complex/compound neologisms in the form of large numbers of one-word lexicalisations (their words are Komposita or Zusammensetzungen!) is explained not just by the linguistic resources available but also by holisticising perceptions.
4. Languages such as Arabic possess a mechanism known as iDaafa (annexion) in which two (occasionally more) words, while remaining orthographically separate, unite to form a separate cognitive unit. An instance of this is Arabic ra's maal, literally head of money, i.e. capital. These units are fully lexicalised and are atomic in the sense that no other linguistic material may be interposed between the two orthographic words involved. Hebrew, Farsi and Turkish also have very similar structures. Note that these compounds are exactly that, they are not collocations, although collocation might well have been their origin.
5. See Varantola 1984: 42.
7. Why do English speakers always enter a caveat? Enter, here, is a truly transitive verb, a usage very different from "entering" a building.
8. I express a great debt of gratitude to Patricia Thomas and to my close colleague Dr. Peter Roe for insights gained from the many continuing conversations we regularly have on the matters discussed here. A particular vote of thanks is also due to Peter for the specification and implementation of the ATA (Aston Text Analyser) software package which is now under commercial development.

9. We express our sincere gratitude here to the F for permission to make extensive use of the CD-ROM materials.

10. Terms or collocations — on this occasion we draw no contrast!

References and Bibliography


Appendix I

As the water_depths are marked on nautical_charts, a further navigational_aid is provided by soundings, i.e., systematic measurements of the depth_of_[the]_water in which the ship is sailing. The traditional device for the purpose is the lead-line. Patent sounding_machines are based on the fact that the pressure_of_[the]_water on an immersed body increases with the depth to which it is immersed. A more modern device is the echo_sounder. In the bottom of the vessel's hull a transmitting_oscillator and a receiving_oscillator are so mounted that the latter picks_up the echo reflected_back from the sea_bed A rotating_contact causes a condenser to discharge through the electromagnetic transmitting_oscillator, so that a sound_impulse is transmitted. The time-measuring_equipment comprises a neon_lamp rotating in front of a timing_scale. When the lamp passes the zero_position, the sound_impulse is transmitted. The time it takes for this impulse to reach the sea_bed and return to the receiving_oscillator (which is essentially a microphone for picking_up the sound) is marked, or read, on the scale by a flash emitted by the neon_lamp, which has meanwhile rotated past the zero_position. The current from the receiving_oscillator has to be amplified in order to cause the lamp to light_up. Echo_sounders usually operate with ultrasonic frequencies (20,000 cycles/sec.), but sounders operating with an audible sound_frequency (3600 cycles/sec.) are used for deep-sea soundings. The principle of the transmitting_oscillator is really quite simple. The coil is energised by an alternating_current with a frequency of 3600 cycles/sec., so that the laminated armature, attached to the diaphragm, is alternately attracted and released. The diaphragm emits sound_waves of this same frequency. Other types of transmitter make use of the principle of magnetostriction or the piezo-electric_effect.
Appendix II

%95 confidence intervals
abscence of menstruation
active group odds
additive adverse effects
adverse neurodevelopmental outcome
adverse neurodevelopmental sequelae
alternative metabolic substrates
analysis of subgroups
antepartum breech presentation
antepartum cardiac disease
artificial insemination clinic
asymptomatic-neonatal hypoglycaemia
Bayley mental scale
blood glucose concentration
blood glucose concentrations
breech multiple pregnancy
cardioc antepartum haemorrhage
cardiac breek presentation
central delivery suite
centre d failed
computerised collection system
continuous dependent variables
controlled cord traction
cycles of treatment
days of ventilation
degree of hypoglycaemia
degrees of hypoglycaemia
Department of Health
detailed neurological examination
development of hypoglycaemia
diagnosis of postpartum
diastolic blood pressure
dichotomous dependent variables
distribution of conceptions
distributions of insemination
early breast feeding
early childbearing years
early feeding practices
elective intravenous nutrition
empirical cumulated distribution
enzyme immunosorbent assay
fatness mass index
fetal growth retardation
frequency of inseminations
frequency of intercourse
frequent moderate hypoglycaemia
full term infants
full term neonates
gamete intrafallopian transfer
blood glucose concentration
hypoglycaemia plasma glucose
hypoglycaemia recurrent apnoea
hypoglycaemic neurological impairment
iatrogenically controlled ovulation
immediate postpartum period
incidence of hypoglycaemia
incidence of hypoglycaemia
incidence of vomiting
incidence of postpartum
insemination donor clinic
late maternal refusal
local awareness campaigns
major congenital abnormalities
maternal blood loss
maximum regression coefficient
maximum sperm counts
mean birth weight
mean cell volume
mean gestational age
mean monthly temperatures
measure of non-compliance
mental development scores
mental developmental scores
method of testing
methods of testing
middle postpartum haemorrhage
minimal enteral feeding
minimum safe plasma
mothers' educational level
motor development scores
multiple intrauterine death
neonatal cell volume
neonatal packed cell
non-parametric sample test
number of conceptions
occurrence of hypoglycaemia
onset of hypoglycaemia
packed cell volume
persestence of hypoglycaemia
plasma glucose concentrations
postpartum cell volume
proportion of infants
proportion of susceptible
quality of semen
raised blood pressure
randomised controlled trial
rate of conception
rate of ovulation
rate of postpartum
rate of susceptibility
rate of uptake
rates of conception
rates of uptake
reduced developmental scores
regional health authorities
Registrar General's Classification
release of gonadotrophin
risk of hypertension
risk of postpartum
senior house officers
severe neonatal hypoglycaemia
severe neurological damage
somatosensory evoked potentials
special care nursery
treatment of infertility
waste of eggs
World Health Organisation
Appendix III

16 APR 92 / Observer: A smelly
which has a staff of 8, transact
encounters; there is unfinished
r. And all at the bottom of the
hey will lead to more lucrative
hion houses are reporting brisk
oup's managed pubs and property
of its US-based healthcare
having run the

ot of time casting doubt on the
the DTI's efforts to make
not according to Bill Emmott,
seeking to transfer its 'non-life'
tax' on
for domestic mortgage indemnity
However,
were a family
sex, women, big
Dalgety regarded agri
Giovanni Di Stefano, a former
ailing retail
in

The average rate of
proportion of
the HE traditional split in Genoa's
The sectors of the
and significant support within a
jobs, some members of the local
the city's
The Canada's
and the bulk of Canada's
shifted from politicians to the
DALGETY, the foods and agri-
some
1 contracting marketplace where
which indicated that
improvement in
The closely-watched index of
profitability in spite of weak
the Hoar brothers over their
FT 13 JUN 92 / Japanese
the Bank of Japan reported that
the Bank of Japan reported that
decline in
to the 333 companies surveyed,
FT 13 JUN 92 / Japanese
Lybrand - records an upturn in
r Dean, aged 53, is a freelance
sation of profits, there was no

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busines
The result is a terribly immature business culture and language. In 1980-88, business culture in which discipline business culture will change to allow other business customers - a question highlighted business customers are business customers directly to business customers would save at least 20 business cycle and fiscal stimuli from a new business deal with business debts do not together make a stabil business development manager with Norwich U business development unit of Manchester Bus business empire business empire except for Seibu business empires in Italy (Agnelli's Juvent business enterprises. Only Pounds business environment has business environment would become increasing business ethics being called into question. business executive and conference market. business failures early this year were runn business failures in the sector) to business frauds of the business from Taiwan. business hotel. business hotels at cut-price weekend rates. business hours to encourage more trading. B business in Northern Ireland. business indicators. 'Unless an business influx business initiatives with the shops if business initiatives, business insolvencies business insolvencies throughout the period business interests in the under-developed r business interests to concentrate on core business interests, writes Terry Hall in business inventories - were in line with business inventories to business inventories to business investment in buildings and the co business is the development, production and business jet business jet aircraft. The order business jet at Farnborough to meet the need business jet is due in late 1995. business jet market held up rather better t business jet. business jets sold, although 10.7 per business leader who agrees business leaders and conservative oppositio business leaders' disquiet as the Nikkei in business legislation and important business levels remained well below normal. business lobby, such as Mr Jacques Calvet, business making costly, top-quality sports business managers business managers will be desperate to bull business managers, unlike their national re business managers. However, it seems the st business market, and constant rumbles of business market, though. Other business market. business of business of David Mallor, the new minister; business of government. He promised more op
months, net profit from normal
for Unilever's agri
profits from normal

industrial wasteland into a
permission for a large
permission for a large
eisure district, most of the 22
promoting
promoting
t company specialising in large
in large
at least seven
Mr Jaffe is an old friend and
One
customer orders with their own
Britain's battered small
s that 'there are many Japanese
they are
active fundraising efforts among
on

company News: R. H. Macy unveils
urgently reviewing its

at the
new
look at the project when the
ould look at the project if the
formation we will finalise our
part of the airline's five-year
unveiled a five-year
reached Pounds 1.65bn. The
very have yet to complete their
As part of JAL's
imoto, general manager of Asian

'put together 15 of the last 16
standing commission on laws and
ftware company who says: 'Their
To counter the
proved itself a useful
their lending margins. So basic
ough trading conditions cut agri
domestic and
very says that uncertainty about
acco and insurance group's good
uniform

The
Councils pay their
ear 95 per cent of the assessed
government grant and the
government grant and the

pointing out that
whatever for
stripped out to avoid
capital-intensive
when customer retail
decisions and would not affect
stable in building constructive
t the well-publicised series of

business operations
business operations recently put up for sal
business operations would be about half the
business opportunity.
business park for smaller industrial and se
business park in partnership with the Churc
business park, industrial areas and housing
business park.
business parks are on the periphery.
business parks in the north-east, are not p
business parks in the north-east, are not p
business parks, business parks, has asked National Westmins
business parks, there are hundreds of acres
business partner of Ms Lansing's.
business partner reporting on the ripeness
business partners.
business people need is panic action to ref
business people who
business people, judges or politicians.
business people, led by its deputy
business performance confirmed the broad we
business pessimism, and the political hiatu
business plan
business plan and may decide to sell core o
business plan for the company, says that th
business plan once it was complete and had
business plan to lenders later this month a
business plan was complete.
business plan were
business plan which
business plan which it updates
business plan which, it claims, will 'retur
business plan written in spring last year h
business plan, in spite of
business plan, the airline plans to open at
business planning at Itochu,
business planning has been based on very co
business plans
business practices
business practices are reminiscent of
business problems, the company has plans to
business product with a finite constituency
business profits for the year
business profits to Pounds 11.9m from
business property costs such as rent levels
business prospects is still holding
business prospects prompted profit
business rate in 1990, brought in an estima
business rate is set by the government, but
business rate revenue into the national non
business rate was collected
business rate. However, the Department of t
business rate. This year, though, The Depar
business rates - and council tax when that
business rates - and council tax when that
business rates could lead to unexpected inc
business rates had been cut by Pounds 1.25b
business rates impose on
business rates non-payment',
business rates were 'the tip of a nasty ice
business rather than one which generates a
business reached Pounds 1.154bn.
business relationships between the two
business relationships'.
business scandals in Ireland pointed
rsity of Strathclyde's graduate
ach, both geographically and in
As for the
the apparent opposition of the

The tankan, reflecting poor
Banking, insurance and
BET, the
PRE-TAX profits at BET, the

FT 16 APR 92 / Boost in
and
The latest review of
dy progress on all parts of our
over
department of
y important role in galvanising
cant upper floors can now grant
lord and Tenant Act which gives
anything in
things are profitable in
general fall in
a decline in
ds to attract more tourists and
In 1989 Dan-Air's charter
The new
e US has formed a new worldwide

'The new
GPT has set up a
many
'strategic

In the life insurance sector, There was also a slight rise in
increase in
d today. However, it warns that
ncial services companies expect

A sizeable amount of the day's
core of the
sales at the Darchem engineering
side of the health
ating profit for that sector of
traditional way of doing
Women hoping to set up in
mphasising that any recovery in
 embargo on
lient has tried to carry on the
time they are chasing us to do
in its extraordinary losses was
rritory might remains 'the most
Wirtschaft in Cologne, a
The proportion of
and exclude
Spencer's niche foods

clear signs of an upturn in
from its mainstream
full, and doing a thriving
involved in lending to a small
group was looking to buy a core

business school.
business schools across the world with a cl
business sector terms, to take
business sector, 'which has earned a massiv
business sector.
business sentiment, out next week, before m
business sentiment, prompted a fall in the
business services

13.4%
business services conglomerate, is likely t
business services group, could have been al
business services have both recovered lost
business spending forecast
business strategy for years to come - is no
business strategy goes further than a simil
business strategy.'
business strategy.
business studies.
business support in recent weeks.
business tenancies to housing
business tenants the right to
business terms, ' he reckons. Meanwhile he i
business terms.'
business travel and tourism.
business travel caused by the Gulf war and
business travel as more choice.
business travellers.
business turned over about twice as much as
business unit consists of three product ope
business unit focused
business unit to sell its new Canadair Regi
business unit's mission is to build, on top
business unit, GPT Cablecom, to tackle the
business units beneath those groups in its
business units' (SBUs) in Vevey for each Ne
business units.
business volume in the insurance industry,
business volumes are still depressed and
business volumes during the quarter, the
business volumes in the next three months.
business volumes remain well below
business volumes to
business was holding up, helped Great Unive
business was reported to have come from the
business was smokers' accessories. Today, p
business were hard hit. They fell from
business will attract competition, but is c
business will be lower. Last year 54 per
business will be threatened by the new law.
business will have access to female busi
business will start from
business with Hanoi, the sensitive issue ma
business with a view to
business with us, not
business write-downs and closure
business-friendly location in
business-orientated research institute, say
business-related bankruptcies to total indi
business-related individual bankruptcies ac
business-related individual bankruptcies, w
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or from the Freemans mail order
nearby to handle the volume of
small
pending is put the way of black
that only gangsters are in the
they are still in
ers were informed, was open for
kely to remain in charge of the
y no comprehension of running a
this week, had we been in
unning a town is like running a
in turning round the UK banking
ince 'they are part of our core
everyone gets burnt in the film
are always soliciting new
go out of
omers) is something rare in our
in this country to sustain the

business.
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business. But the success of Mr
business. But there are too few of them lef
business. Foreign investors were
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business. To illuminate my purpose and demo
business. Unless you continue to
business. When he joined Midland in 1987
business.'
business.'
business.'

[270 citations retained out of 984]

Appendix IV

ws: Harland Simon may sell core
istoric buildings with low tech
cretionary portfolio management
for small peripheral
closure of loss-making
on which has sent so many small
Small scale family-run
rticultural and consumer health
formation technology
As one of the two core
nterested in selling non-core
elling some of the private side
health insurance
portfolio of
coup noticed a pick-up in its US
lised approach to running their

businesses
businesses
businesses
businesses and Midland the cheapest.
businesses and adding new ones to our core
businesses in Senegal and the Ivory Coast.
businesses to the (wall)
businesses which constituted the bulk of It
businesses will look elsewhere.'
businesses, Mr Scroggs said. Fisons
businesses, Quality Software Products and S
businesses, William Hill is an essential so
businesses, but
businesses, but promised the hole
businesses, is again meeting claims from po
businesses, some problem areas such as foot
businesses, the relative

[18 citations retained out of 233]
Appendix V

SYNOPTIC CHART FOR 'BUSINESS'

| 51 | the | the | 91 | the | business | 59 | and | 53 | the | 45 | the |
| 42 | of | of | 45 | of | business | 36 | in | 27 | in | 21 | to |
| 32 | to | 30 | a | 27 | a | business | 29 | is | 23 | to | 17 | a |
| 23 | in | 29 | in | 26 | in | business | 25 | of | 21 | and | 16 | of |
| 14 | its | 20 | to | 19 | its | business | 22 | which | 18 | a | 14 | and |
| 13 | a | 19 | and | 17 | and | business | 22 | was | 13 | not | 10 | its |
| 11 | is | 17 | its | 15 | new | business | 18 | has | 13 | has | 10 | be |
| 10 | and | 10 | for | 13 | that | business | 16 | to | 12 | for | 8 | it |
| 8 | for | 8 | on | 13 | The | business | 14 | with | 10 | of | 8 | in |
| 7 | that | 7 | or | 12 | small | business | 13 | plan | 10 | is | 8 | as |
| 6 | with | 6 | is | 11 | for | business | 11 | for | 9 | which | 7 | on |
| 6 | as | 6 | his | 10 | core | business | 11 | community | 9 | be | 7 | by |
| 6 | The | 6 | UK | 7 | their | business | 10 | will | 8 | been | 6 | with |
| 5 | on | 5 | up | 7 | our | business | 8 | would | 8 | are | 6 | is |
| 5 | core | 4 | out | 7 | on | business | 8 | rates | 7 | said | 6 | been |
| 5 | at | 4 | more | 6 | to | business | 8 | conditions | 6 | would | 5 | not |
| 5 | are | 4 | general | 6 | retail | business | 8 | as | 6 | at | 5 | has |
| 4 | who | 4 | at | 6 | hotel | business | 7 | confidence | 5 | he | 5 | Pounds |
| 4 | up | 4 | an | 6 | banking | business | 7 | It | 5 | had | 4 | will |
| 4 | may | 3 | writing | 5 | main | business | 6 | that | 5 | by | 4 | this |
| 4 | had | 3 | very | 5 | investment | business | 6 | rate | 5 | Mr | 4 | one |
| 4 | been | 3 | that | 5 | insurance | business | 6 | parks | 4 | with | 4 | for |
| 3 | will | 3 | specialist | 5 | his | business | 6 | jet | 4 | will | 4 | US |
| 3 | which | 3 | said | 5 | doing | business | 6 | had | 4 | only | 3 | years |
| 3 | we | 3 | political | 5 | clothing | business | 6 | by | 4 | from | 3 | year |
| 3 | was | 3 | own | 5 | agri | business | 5 | volumes | 3 | was | 3 | were |
| 3 | side | 3 | new | 5 | Japanese | business | 5 | the | 3 | up | 3 | up |
| 3 | set | 3 | link | 5 | British | business | 5 | says | 3 | there | 3 | says |
| 3 | part | 3 | growing | 4 | this | business | 5 | district | 3 | still | 3 | new |
| 3 | can | 3 | group's | 4 | some | business | 5 | customers | 3 | should | 3 | leaders |
| 3 | between | 3 | companies | 4 | pro- | business | 5 | The | 3 | on | 3 | into |
| 3 | an | 3 | The | 4 | most | business | 4 | unit | 3 | now | 3 | competition |
| 3 | UK | 3 | / | 4 | large | business | 4 | services | 3 | made | 3 | are |
| 3 | Pounds | 2 | within | 4 | family | business | 4 | sector | 3 | lower | 3 | an |
| 3 | But | 2 | win | 4 | engineering | business | 4 | people | 3 | have | 3 | after |
| 3 | 92 | 2 | which | 4 | derivative | business | 4 | park | 3 | an | 3 | May |
Francis E. Knowles

2 years 2 weather-proof 4 customer business 4 managers 2 you 2 would
2 when 2 vinyl 3 tile business 4 it 2 writes 2 well
2 way 2 their 3 retailing business 4 he 2 who 2 was
2 Australian 2 take 3 reinsurance business 4 from 2 what 2 total
2 there 2 still 3 property business 4 at 2 were 2 that
2 stopped 2 sport 3 own business 4 a 2 well 2 still
2 some 2 shrink 3 many business 4 He 2 want 2 start
2 project 2 running 3 management 3 until 2 two 2 sell
2 parts 2 run 3 local business 3 though 2 their 2 sales
2 or 2 rise 3 helicopter business 3 support 2 that 2 recent
2 more 2 reported 3 good business 3 strategy 2 six 2 offset
2 margins 2 refrigeration 3 food business 3 should 2 selling 2 much
2 loss-making 2 ratio 3 equipment business 3 remained 2 restrictions 2 more
2 it 2 proportion 3 distribution business 3 population 2 residual 2 manufacturing
2 into 2 paper 3 central business 3 operations 2 reported 2 if
2 have 2 our 3 big business 3 on 2 reorganise 2 housing
2 growth 2 other 3 battery business 3 market 2 renewing 2 high
2 grant 2 not 3 aggregates business 3 like 2 prompted 2 from
2 gradual 2 means 3 US business 3 inventories 2 profits 2 existing
2 go 2 mail 3 UK business 3 interests 2 over 2 end
2 from 2 lose 3 Irish business 3 difficulties 2 outside 2 done
2 expansion 2 last 3 However business 3 development 2 or 2 customers
2 domestic 2 into 2 wine business 3 culture 2 once 2 continuing
2 development 2 international 2 way business 3 could 2 manager 2 companies
2 closely-watched 2 interest 2 various business 3 closures 2 make 2 but
2 build 2 insurance 2 up business 3 climate 2 long 2 badly
2 assessment 2 index 2 transact business 3 are 2 led 2 analysts
2 any 2 increase 2 tourist business 3 activities 2 largely 2 always
2 all 2 help 2 systems business 3 But 2 its 2 The
2 While 2 from 2 steel business 2 year 2 it 2 Ms
2 Mr 2 floor 2 snacks business 2 worth 2 industrial 2 Mr
2 Japan 2 existing 2 small- business 2 world 2 increased 2 Ireland
2 I 2 drift 2 securities business 2 while 2 impose 2 He
2 Halstead's 2 domestic 2 reviving business 2 via 2 help 2 German
2 European 2 decline 2 protection business 2 users 2 growing 2 Dollars
2 BDI 2 core 2 promoting business 2 units 2 government
2 'In 2 commercial 2 profitable business 2 under 2 fell
2 close 2 products 2 travellers business 2 expected
2 cement 2 private 2 travel business 2 consumer
2 car 2 pensions 2 terms' business 2 computer
2 by 2 order 2 survey business 2 closed
Collocability in Languages for Special Purposes (LSPs) 91

<table>
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<th>between</th>
<th>normal</th>
<th>space</th>
<th>business</th>
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Appendix VI

0 1/4, Chrysler in continued active trading. slightly from Thursday's 38.938m s yet another day of extremely active trading. Elsewhere, Peugeot was knocked bac more than Dollars 3 1/2 1/2 in active trading. after the company said it backed Pr less than Dollars 22 1/4 in active trading. Merck also saw heavy turnover. clo dipped 0.29 Dollars 49 3/4 in active trading after Merrill Lynch cut its long-te isregarding down 1/8 at 44 in active trading. Citicorp was up 7/8 at 21 5/8 in ac ior was up 7/8 at 21 5/8 in TAIWAN advanced in active trading. Canada ACTIVITY was limited, with active trading with the weighted index putting on ose 9.7 to TAIWAN advanced in active trading. The NEW ZEALAND saw lacklu.tre markets rallied strongly in active trading after the extremely active trading after Merrill Lynch cut its long-te iing demand for Astra made up for dull trading in other issues. The Affarsvarlden index slipped 1.09 to 279.16 in active trading. Astra was the most in yet another cross-shareholding, issued a gloomy US share prices were flat-to-lower in active trading. The company's gloomy trading trading days it has lost more than PARIS dropped 2.9 per cent in gloomy trading on the last day of the account L6,0 of the per cent lower after a heavy trading session. The TSE-300 fell 15.3 to 272.96 in heavy trading. after a heavy trading session marked by the afternoon trades ended mixed in continued heavy trading. Nikkei average gained marginally a months before the in extremely heavy trading. Although much of that rise was con d Wednesday's gains in further heavy trading as the JOHANNESBURG revived in late ram trading combined 24 3/4 in heavy trading on disappointing fourth-quarter ear iors 3/8 to Dollars 9 5/8 in active trading after the A late selloff sent Toron 5 shares STOCKHOLM advanced in heavy trading as strong demand for Astra made up CKHOLM rallied 4.1 per cent in heavy trading on speculation, confirmed market. F e prices were flat-to-lower in heavy trading yesterday as the market trading. Loss ing FFr13 better at FFr506 in heavy trading of 129,325 shares STOCKHOLM advance -CHP stocks jumped sharply in heavy trading on US stockmarkets Because of the 'ck markets rallied strongly in heavy trading on unexpectedly good trading patter f the last trading day for the Heavy trading in Westpac's new shares and options HANNESBURG ended mixed in lacklustre trading ahead of today's public US SHARE pr days. The NEW ZEALAND saw lacklustre trading as the NZSE-40 index moved up just composite rose 2.79 to 637.16 in late trading. Shares in Tele-Communications led trading day before to L1,500 in late trading. The telecommunications company had
URG saw a flurry of activity in late trading, having moved in a narrow activity of cent. HONG KONG fell back in late trading after the Sino-British Joint Liaison Peugeot was knocked back in late trading to close FFr15 or 2.8 being delayed .25 to AUSTRALIA lost ground in late trading as the local currency weakened again. SINGAPORE closed higher in late trading by overseas institutions in late trading, the JOHANNESBURG revived in late trading, helped by a better performance from the but recovered slightly in late trading to finish down 18.47 at 1,476.01, a

NG ended lower in volatile but light trading. The thin trading in very thin trading, Reuter report the recent MANILA dipped in light trading as the composite index fell 7.35 to 348.75 from its day's highs in thin trading. The trading after a one-day halt, continued as many BOMBAY fell again in thin trading as foreign institutions came into Mending by overseas institutions in late trading yesterday, writes Patrick Harverson

53, while the KUALA LUMPUR saw light trading continuing as the composite index dropped 7.52 to 348.75 in moderate trading PARIS dropped 2.9 per cent in gloom test SEOUL ended firmer in moderate trading on a technical rebound led by Kepco light trading yesterday as losses, and took its d
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X contract MILAN ended lower in slow trading and the Comit index fell 4.17 to 44 Y56 to Y695 on increased speculative trading, after rumours of at 142.9m shares

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