High-Level Scientific Communication as Teaching Material:
An Exercise in Discourse Adjustment.

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Abstract

The present study deals with the pragmatic adjustment of high-level scientific or technical discourse to (semi) laypersons by the same experts who produced a written version in the first place. The experts comment on their previously published conference proceedings to other colleagues and students. In the process they try to bridge the knowledge gap between state-of-the-art communication aimed at specialists and eventual teaching applications aimed at scientific students. This is done via dialogues between experts and non-experts to obtain mutually acceptable simplified language and conceptual forms. To provide a comparative basis between written and oral reformulation schemes (RS) a preliminary analysis of strategies found in written papers aimed at non-experts and at experts is performed. Oral RS are then studied as they were produced during post-conference oral explanatory sessions. The process of simplification is shown to be heavily dependent on interactive co-operation and not only on textual clarification. Lastly humour is studied as a macro-strategy used by experts and lay participants to facilitate asymmetrical interactions

Key-words: Specialized discourse adjustment, scientific discourse, written, oral, simplification, reformulation strategies, interactive co-operation, expert/non-expert, research, teaching.

I. Introduction.

The reprocessing of speech is an inherent component of oral communication, it reflects the efforts of a speaker wishing to be clearly understood and the often impossible, or ill-advised, task of conveying a given message through a single utterance.
In everyday conversation, this reprocessing of speech is done, among other techniques, through requalification or redefinition of specific terms, reformulation of whole sentences or individual words, self-addressed so-called 'rhetoric' questions which speakers answer to pre-empt expectable queries from listeners, etc. In everyday ordinary talk, all these techniques are usually aimed at clarifying relatively accessible information, mundane issues, depending on easily obtainable and shared knowledge.

In conversations bearing on specialized topics, e.g. those between experts and any lay (or semi) lay person (Gülich, 1999, Ciapuscio, 2003), where different degrees of asymmetry in specific knowledge prevail among participants, the communication techniques may vary considerably. The main cause is the relative difficulty for participants to agree on the nature and amount of minimum shared knowledge for a normal conversation to unfold without running the risk of switching genres and becoming a sort of lecture or a basic introductory course. This difficulty in assessing the reader's amount of minimum shared knowledge is one of the problems facing popularized science discourse and has produced an impressive amount of research by scientific communication specialists and linguists specializing in the sociology of science (Authier, 1982; Authier-Revuz, 1984,1985; Calsamiglia, 2000; Calsamiglia & Lopez Ferrero, 200l; Gülich, 1999, 2003; Mortureux, 1983, 1985; Jacobi, 1984; Jacobi & Schiele, 1990; Myers, 1991, 1994, 2003, among others)
The problem is even more compounded when conversation between experts and laypersons revolves about written scientific texts originally aimed at specialists - a pedagogical, but not infrequent, situation when, for example, teachers of Languages for Specific Purposes (henceforth ESP) decide to exploit research articles with students.
The present article continues a line of research started by Ciapuscio, 2003; Gülich, 2003; Carter-Thomas & Rowley-Jolivet, 2004; among others, and hopefully supplements the work of these researchers.

Ciapuscio's analysis bears on

> ….formulation procedures in a particular type of text the oral interaction between scientists and specialized journalists that *precedes* the writing of science popularization texts targeted for the lay reader. (2003: 207) (my italics)

Gülich's research (2003) rests on

> … recordings of medical seminars and training sessions with patients in rehabilitation centres, of doctor-patient interactions in hospitals and of interviews with patients in other settings (2003 235)

and Carter- Thomas/Rowley-Jolivet (2004) make a comparative study of nine oral conference presentations and their corresponding written proceedings in the form of research articles

II. Purpose

Our present study deals with the pragmatic adjustment of scientific or technical discourse to (semi) laypersons by the same experts who produced a written version in the first place.
These authors answer oral questions based on their previously published conference proceedings. Oral explanations then *follow* written text information and if the expert-layperson relationship is not so emotionally laden and of so much personal concern as Gülich's doctor-patient exchanges, it is very much pedagogically oriented towards the way other future laypersons are likely to understand technical and scientific concepts.

In actual fact, the original purpose of the procedure was not to study conversational techniques or other verbal procedures between experts and lay persons, but to identify problem areas or inter-generic translation difficulties (Sionis, 2001) between state-of-the-art scientific communication aimed at specialists and possible teaching applications, either in the form of manuals or face-to-face "live" courses. In other words, the issue was to know how high-level peer-addressed research could he adapted to lower-level student-addressed teaching material. A sometimes daunting task but one which all researcher-teachers must carry out if they want their teaching to reflect current advances in their fields.

Whereas Carter-Thomas and Rowley-Jolivet compare the oral and written versions of the same scientific message in two different genres, we look at the explanation and clarification techniques adopted by authors when they decide to simplify their own original written message orally for pedagogical purposes. When Carter-Thomas and Jolivet consider the same target audience of peer researchers, we look at the way non-specialists of varying competence are offered a possible way of accessing information via dialogues with competent specialists.
In the process, some light is shed on the way authors identify problem areas in their own work, and the possible discrepancies existing between this type of introspection and the way others perceive problematic aspects

The recordings of the sessions and their transcribed corpus which were originally intended for the designing of teaching materials soon turned out to be useful sources for possible conversation analyses in general and the study of specific discourse types within scientific communication.
Because all exchanges occur in a conversational framework and because the original purpose of the procedure was to transfer research-type to teaching-type knowledge with a view of the latter being discussed, questioned, and ultimately individually processed by each student, the interactive component of the exchanges was deemed essential in the teaching of scientific concepts. The hearers' role is crucial in the efforts by speakers to simplify their message. Without this constant feedback, explanations often run the risk of being even denser and more opaque than the original statements they were to clarify. The following quotation from hopper and Traugott (2003 71-72) encapsulates this aspect very well:

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> *(…) there are a number of competing motivations which can all in some sense be said to be examples of maximization* of *economy or "simplicity ": basically they, can be summarized as maximization of efficiency via minimal differentiation on the one hand, and maximization of informativeness on the other. On this view, hearers play a major role in enabling change because they process input in ways that may not match the speakers intentions. But speakers also play a major role in enabling change, because in producing speech they have communication as their goal, and therefore are always in search* of *ways to guide the hearer in interpretation. In an ideal communicative situation, speakers take responsibility for success in communication and seek to meet hearers' attempts "to integrate new information with information that is already accessible"* (Blakemore 1990, quoted by Hopper and Traugott)

Essential to the guiding of hearers in interpretation are *oral reformulations* and *illustrations.* These have been studied by Gülich and Ciapuscio as not particularly associated with written information, but our corpus allowed them to be systematically studied in parallel with the researchers' written proceedings As far as the oral responses were simplifications or elaborations of the original written version (and this was nearly always the ease) it was also possible to make a comparison of the different written/oral information structuring procedures (Lambrecht, 1994) in which semantics, syntax, prosody and pragmatics combine to differentiate the two channels

Another aspect this study considers is the expert researchers' reactions to queries resulting in answers of varying length, form and scope which fall roughly into two main categories simple or elaborated, much like the preferred/unmarked or dispreferred/marked categories of replies identified by Levinson *(1983)*

For Levinson, 'dispreferreds' signal difficult responses mostly in terms of respect of participants' roles and self-images, as such they usually require longer verbalizations. Contrary to what can be noticed in everyday usage, "preferreds" or "dispreferreds" in our specialized corpus do not signal difficulty in managing one's own and other speakers' images, not even the acceptation or rejection of a proposition included in the first parts of oral exchanges, but more often the acknowledgment by our expert scientists that the questions put to them warrant no, little, or lengthy explanations Our producers of second parts or replies are then more preoccupied with how to cope best with requests for information in terms of clarity, exhaustiveness, gradation of concepts, etc. than in, say, repair work and conversation management in general.

In doing so they resort to techniques and strategies used by non-native users of English to tackle concept-oriented and/or language-oriented difficulties (Beebe, 1980, Tarone, 1980: Raupach, 1981, Faerch & Kasper, 1983: Sionis, 1995)

To sum up our purpose, we will he looking at the variations in oral/written language and discourse organization when complex concepts conveyed in writing are reprocessed orally to make them more accessible to students. A survey of the various techniques used in written expert-expert communication will be conducted prior to looking at the techniques and strategies used in oral expert- non-expert communication.

Special attention will he given in the latter situation to the conversational format of the exchanges as it allows discourse to be co-constructed. These exchanges will be studied as they reflect difficult issues both in terms of concept and language. As the experts' oral answers are all based on the written version of their peer-addressed message, this latter form will be considered as an "optimal meaning form" (Varàdi, 1980) for them, i.e. the kind of verbalised form they would produce spontaneously when free from all explanatory or teaching constraints, and all efforts to elaborate on this original form will he treated as pedagogical or popularizing strategies and techniques. A taxonomy of these strategies and techniques will he proposed.

A last important aspect we will study in detail is humour as a macro-strategy transcending several micro-strategies and cutting across a number of psycho-social factors in the teaching of research materials.

III. Description of corpus and analyzing procedure.

The written corpus consists of 139 transcribed oral presentations made at the 5th International Conference on Integrated Design and Manufacturing in Mechanical Engineering held at the University of Bath in April 2004. Although the only language of the conference was English, 45 presentations originated from teams of 2 to 4 francophone researchers, and out of these, 11 presentations, involving 20 researchers and totalling 39, 200 words, were selected on the basis of the researchers' availability and their direct or indirect affiliation with the same institution where the pedagogical applications of the presentations were to be tested and ultimately adopted. Another condition was the participants' willingness to explore the potential of the conference proceedings for possible pedagogical applications.

Most of these written conference proceedings reflected very faithfully the original oral presentations. But the reverse is also true: because of the high number of papers to he delivered within a short period (3 days), the conference organizers requested all presenters to stick very closely to pre-conference descriptions made available in shortened or complete form. The result was that in some cases the written proceedings did not depart significantly from these prior descriptions and little, if any, improvised and conversation-like exchanges occurred during certain presentations.
Unfortunately, we did not personally attend the conference, but according to those who did, the organizers' instructions were obeyed diversely. We can hardly conceive of oral presentations as some text being read aloud verbatim, and chances are that**,** as Carter-Thomas and Rowley-Jolivet put it

> *(…) with a physically present audience, too impersonal a monologue would he badly adapted to the context (…) we then have an oral type of communication which, although prepared, is conveyed in rather spontaneous manner* (2004 142) (our translation)

We must add that 5 to 6 minutes of "question time" was allowed after the presentations, but unfortunately, these very useful and interesting exchanges between peers were no more available to us than a tape-recording of the main part of the presentations as they were originally made.
The questioners and interviewers of our scientists during the post-conference sessions held a few months later were a group of colleagues from other but connected specializations, some of them teachers of ESP who were to assist their specialist colleagues in the teaching of the original research-type materials. Other participants were students of varying scientific levels who were to help in the process, both as representative target-students and witnesses of a kind of *naïveté* different from that of the science teachers and the language specialists.
The post-conference sessions spanned a period of about 6 months and involved about a dozen researchers, teachers and students in addition to the original 20 authors. Typically, the 17 sessions, which were all taped, involved at any given time one or two authors and three to four 'witnesses', among whom the present writer. The transcribed oral corpus consisted of 311 questions/answers sets including nearly as many associated digressive passages totalling 15,400 words overall.
On the evidence of the first two sessions, the potential for a conversation analysis treatment became obvious and the remaining sessions were transcribed using now established conventions for this practice.

In what follows we will call Reformulating Schemes (RS) all communication techniques or strategies used metalinguistically by a writer or speaker to develop, explain or clarify linguistic or conceptual items to make them more accessible to non-experts.

IV. Criteria for identifying Reformulation Schemes in written papers

Identifying Reformulation Schemes or explanatory techniques is not always easy, not all such structures take the form of explicit speech acts in which authors signal their intentions by resorting to introductory forms like "*I will explain this to you ..*" or even less obvious signalling. Along with other researchers, we have chosen to look at the presence of some key words, or operators, as indication of RS being used [1].

These key-words are *call, define, refer* (used as lemmas, but also under their non lemmatized firms *called*, *defined*, etc. as well as constructed with other words *referred to, as*, etc.), *known* (*known as*, etc.), or, *mean, in terms of*, *i.e.* but also wider coverage words like "*be*", which when used with indefinite articles, hedging phrases or other modalizing terms like adverbs or modal verbs, may also act as RS

The validity of proceeding via such key-words was first assessed by running the whole written corpus through a concordancing program and then performing a "manual" check of about 20% of the 39,200 words to make sure no other significant RS form had been overlooked, The approach proved to he more than 90% reliable. The remaining 10% include appositive sentences, an occasional "signifies" or "*deemed*"-type RS, or the use of other devices like a colon or a dash preceding an RS

Once the detecting key-word approach adopted, we looked at a first classifying method applicable to the RS detected. Candel's categories (1995) seemed interesting as they were applied to a deliberately explanatory written corpus. Her RS came from a corpus of technical and scientific articles written by experts for non-experts. The 700 passages she studied yielded 72 specific contexts including some form of RS. Our own expert-expert written corpus produced 802 passages of which 93 could be considered as RS.

On the basis of the percentage of RS in each corpus (10.28% and 11.59%) the ratio of expert to-non-expert RS and expert-to-expert RS seemed comparable quantitatively, but proved somewhat different qualitatively.

Our general organization of RS follows Candel's two main categories:
1) general to specific RS (e.g. *a reproductive cell also called gamete*)
2) specific to general RS (e.g. *conjoint analysis is a technical and highly structured approach which consists in…*)
to which we added a third, observed in our expert-expert corpus only:
3) specific to specific RS (e.g. *the RSM methodology or F.E. approach makes it possible to…)*

Each are subdivided into metalinguistic RS aimed at explaining the language, based on lexical substitution (e.g. *"the fuzzy parameter **is** an unknown element ")* or using some elements introducing a function of equivalence (e.g. "*a reproductive cell **or** gamete")* and metaconceptual RS aimed at explaining the concepts (e.g. *"The attributes for which the multiple regression is significant [according to Fisher-Snedecor table with P-value= 0.05] **are called** the determining semantic attributes ")*

V. Expert-to-non-expert and expert-to-expert written texts

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[1] Needless to say we are not only preoccupied with the use of verbal RS here. Explicit or implicit reference to and use of visual elements in technical and scientific communication is an extremely frequent form of RS. This occurred very often in the written corpus but the few occurrences of strategies incorporating visual elements in oral explanations have also been accounted for (see table 4). When the experts resorted to them during the oral sessions, they did not apply any "oral-specific" RS to the visual elements which they often took unchanged from their written documents, they mostly incorporated the written verbal elements accompanying the visual to their current oral communication. This was probably due to a lack of language flexibility for the non-native users of English, a probable reason also why little if any lexical reformulation of the key concepts was noticeable orally, as will he seen later.

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A first look at the quantitative differences between the expert-to-non-expert and the expert-to-expert written corpus in terms of RS overall orientation to or from a specialized term/phrase can be summed up in the following table. (the percentages have been rounded off to the first decimal)

Type of corpus	GEN to SPE	SPE to GEN	SPE to SPE
Expert to non-expert	29/72 (40.3%)	43/72 (59.7%)	--
Expert to expert	23/93 (24.7%)	52/93 (55.9%)	18/93 (19.4%)

Table 1. Reformulation overall orientation

If we take an RS using the operator "*(is) called*" or any other similar operator performing the same function of attributing a name to an object or process (e .g "*(is) known as*". *"referred to/ as*. etc.), the usual sentence pattern is of the Known-New, or 'Theme-Rheme type, which is the canonical arrangement when a speaker wishes to contribute additional or specialized information to existing insufficient or non-specialized knowledge. The procedure which consists in first using general terms and then using new terms would logically be expected from any teacher addressing a student or expert addressing a non-expert.

The figures for Candel's expert to non-expert corpus would at first sight contradict this general orientation of RS since her Gen to SPE RS far outnumber those in our expert-to-expert corpus (40.3% to 24.7%), but our corpus includes a category of RS aimed specifically at experts the Spe-to-Spe RS which provide helpful indications only to those already in the know. If we take this special category into account, the ratio of RS oriented from known facts to new ones shows a clear preference among experts addressing their peers for RS mentioning initially specialized notions which are then either reformulated in general terms or in other specialized terms (75.3% to 24.7% vs. 59.7% to 40.3% in the case of a more 'pedagogical' or popularizing sort of texts). It must he noted here that the "general" terms used by experts in such RS are in fact "relatively general", or more exactly "general for experts". The use of the traditionally explanatory formula *"i.e."* is widespread in our corpus but only 4 out of 25 occurrences can he considered RS to a certain extent, and even then the wording of these RS can he as SPE to SPE as the following:

> "QFD assists the designer to explicitly list the customer requirements, to establish qualitative mappings between successive levels of parameters, **i.e.** the customer attributes, the functional requirements, the design parameters and finally the process variables, to identify tradeoffs and to compare product alternatives"

Our corpus of written texts aimed at specialists includes several examples of RS like definitions which make use of lexical substitutions and, above all, make a difference between specific and general terms (e g. *"a component is a constituting part of an object"*). Most of the definitions by reformulation we encountered in our specialised texts link a specific term to another, but the syntactic structure of these RS is not always as straightforward as Subject-Verb-Object, nor is the semantic structure the canonical Known-New or Theme-Rheme. General terms may he found in the first part of a sentence and specialised ones in the second but the reverse SPE to GEN may also be encountered, where the starting point for comprehension may well be, for specialists, the exact specific term itself, with the ensuing general reformulation to be used as confirmation of the initial specific information Conversely, non-experts are supposed to need a general introduction to a topic before being provided with the appropriate lexical tag for it.

The RS using *"called"* as an operator between two terms or phrases can he taken to illustrate the somewhat blurred borderline between SPE to GEN or GEN to SPE reformulating schemes. Our corpus includes 12 such RS:

Called (the numbers in initial position are line numbers)	
22 the European Commission has launched new instruments **called** "Integrated Project" (IP) and "Network of Excellence" (NoE).	GEN-SPE
25 new production processes and devices" (NMP), a NoE **called** "Virtual Research Lab for a Knowledge Community in Production" (VRL-KCiP)	GEN-SPE
631 This is a paradox that crucial decisions need to be taken in the beginning with little knowledge of the final product. This is often **called** the *design paradox*.	GEN-SPE
989 This stage, in a process of change, corresponds to what Lewin has **called** *de-crystallization*	SPE-SPE
1353 a concept **called** "cost entity" [9]. It includes several concepts: cost inductors from activity-based accounting methods	SPE-SPE
1359 This is adding a cost semantic level to the CAD model. This model (**called** costgramme) makes the expertise of the manufacturing cost available to the designer.	SPE-GEN
1997 The outputs of this method, **called** PROFIT (for PROperty FITting), are the correlation coefficients and the direction cosines	SPE-GEN-SPE
1999 The attributes for which the multiple regression is significant (according to Fisher-Snedecor table with P-value − 0.05) are **called** the *determining semantic attributes*	GEN-SPE
2010 to synthesize the vector of semantic attributes of the *ideal glass* (**called** IG)	GEN-SPE
2159 These generally attempt to solve the limit state functions, sometimes **called** the performance functions	SPE-SPE
2202 around the "design point", the point on the limit state with the highest probability, also **called** the Most Probable Point (MPP).	SPE-GEN-SPE
2366 the software that includes the wide range of probabilistic techniques **called** NESSUS	GEN-SPE

Table 2. Expert-to-expert RS using the operator *called*

Among the GEN-SPE reformulating schemes, only samples 22, 25 and 631 really use general terms in their first phrase segment, terms which are accessible to non-expert readers. Samples 1999 and 2010 use semi-general terms in their first segments, terms called "general scientific vocabulary" by Candel (1995) or "sub-technical vocabulary": Context-independent words which occur with high frequency across disciplines" (Cowan, 974) to which Trimble adds 'those "common" words that occur with special meanings in specific scientific and technical fields' (Trimble,1985). Sample 2366 is an RS only for specialists who know what Nessus is and use this information as a discriminating factor between other possible such softwares.

When neither the first nor the second segment presents any explanatory value for a non-expert, the RS can even he of the SPE-SPE variety (see samples 989, 1353, 2159) in which only a degree of relative specificity to be perceived by experts qualities them as RS. Other such schemes even alternate GEN and SPE segments in strings of three (1997, 2202)

The SPE-SPE schemes really seem to be exclusively reserved for experts as the existing explanatory elements are not explicitly signalled in the surrounding co-text (in the following excerpt we have widened the context of sample 2159 and put the core RS in italics)

> The limit state theory is the foundation for the development of many probabilistic design techniques. These generally attempt to solve *the limit state functions, sometimes called the performance functions*. Limit state theory provides a framework within which the performance of components can he assessed against various limiting conditions, such that the component is no longer capable to fulfil its intended function.

It is to be hoped that experts understand the notion of "*solving a function*" (line 2) but the non-expert will probably find that the surrounding "explanatory" co-text only partially explains the relationship existing between the two types of functions. The two expressions, *limit state functions* and *performance functions,* are in fact partly defined by the fact that one concept is included in the other in a sort of Russian doll relationship: performance functions are only selective aspects of a wider array of other conditions, the biggest doll, if we keep our simile, or the hypernymic term linguistically speaking, being subsumed and described in the limit state theory. This hyper-hyponymic relationship is not ideally illustrated by the use of the operating marker *called* which suggests that the second term proposed is a lexical and semantic equivalent of the first. This second term can hardly he considered to be explanatory.

The examples above underline the relative irrelevance of looking at the level of specialisation of the first or the second term in an RS. Introducing "the right term", whether in first or second position, when explaining a concept belongs both to expert-and non-expert addressed techniques.
The discriminating criterion might well be to determine whether prior knowledge of this right term might he considered a useful key to understanding the semantic dimensions of a concept, and hence the width of its functions and applications, or, conversely, if general terms make it possible to have a grasp of the concept and justify the specific name it goes by in a specialist's world. Obviously, the first approach which, among other devices, relies upon the ability of the receiver to make explanatory links between etymology and characteristics or functions, better fits an expert's needs. The second, which goes from the general to the specific is more pedagogical and should be more appropriate for a non-expert.

 What makes the complexity of a specialist text then is not only the extensive and diversified background knowledge required from the reader, it is certainly also the lack of guiding textual signals, or metalinguistic organizers. surrounding basic as well as elaborated concepts about ideas and objects. These concepts which co-operate in the new phenomena being introduced and studied in a given state-of-the-art presentation are too often discussed as if general agreement existed about their nature, function, or other essential characteristics. Being easily remembered items or necessarily shared knowledge for specialists who handle them everyday, little time and space is devoted to the process by which they came to existence, or their own functioning, as the main focus is placed on the new concept or process made possible and of which the author painstakingly attempts to demonstrate the relevance.

The following passage (table 3) about procedures to evaluate the total life cycle costs of a product at the early stages of its design can be an illustration of the sort of stumbling blocks non-experts may encounter in their reading and which often make them miss the main point of a presentation.

Line numbers	
	DESIGN FOR ASSEMBLY AND MANUFACTURE
1	Serious developments in product analysis procedures for DFMA began in mid
2	1970s. The most widely used systems for DFMA analysis are those developed by
3	Boothroyd and co-workers [1], but other assembly analysis systems have also been
4	applied [12-15]. Development of design for assembly (DFA) analysis procedures
5	rests on earlier work on analysis of feeding and orienting of parts for automatic
6	assembly [16]. The basic aim is to predict assembly costs in the early stages of
7	design, through time standard databases accessed by means of a classification of
8	part features. These procedures have become widely used in industry and
9	numerous case studies of product improvements exist [1].

Table 3. Unexplained difficulties in "specialists" texts

L. 1: The writers have overlooked the syntactic awkwardness and difficulty introduced by the second "for" included in the abbreviated form. Abbreviated forms of long compounds hinder comprehension, especially when such forms concern newly introduced concepts and keep multiplying as the text progresses. The

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culmination can be a sentence like the following which occurred only two pages further on in the same text, and which contributes to a sort of "complexity-by-circularity effect"

> *The product assessment tools for DFA, DFM, DFS and DFE have been developed as separate packages although facilities exist for the linking of DFA and DFM.*

L.2: Does the reader necessarily think of DEMA as a system ?

L. 3: the numbers in square brackets send back the reader to referenced authors at the end of the paper, a practice specific to certain journals and publishers, but also to computer science and some branches of engineering science, but is not very widespread in, say, the human sciences which is often the cultural background of LSP teachers

L.5: DFA mentioned, no longer DFMA: why dissociating 'assembly' and 'manufacture' at this point?

L.6: assembling machines still need to be 'fed' with parts; how 'automatic/automated' is this?

L. 6-8: Probably the least accessible sentence: a good example of two complex notions ('time standard databases' + 'a classification of part features') being associated with a third, hardly easier to understand 'assembly costs'.

In theory, the texts of the proceedings originating from non-native speakers to be included in the final publication [2] were checked for language accuracy by native subject-specialists in cooperation with the original authors who fully endorsed the form and content.
In practice, the final result sometimes seems to be a compromise between form and content (see table 1). Although the possible reasons for some language oddities to have slipped through are beyond the scope of the present article and would certainly be of interest to specialists of LSPs, what is interesting for our purpose is the fact that the original authors considered as "optimal meaning form'" the final versions which their native speaking colleagues had accepted. This is probably one of the reasons why, during the subsequent oral debriefing phase of the procedure, the experts found it so difficult at times to free themselves from the lexical, syntactic, and discursive original written forms.

The text in table 3 is by a non-native user of English, but all our expert researchers, native or non-native, confirmed that these final texts corresponded to "*the right level and language form expected by any fellow researcher in the same domain",* as one of them put it.

VI. Oral metalinguistic reformulations.
VI.A. Micro and macro strategies

During the oral phase of the procedure the questioners who included teachers/scientists and students proved to be interested in different sorts of answers. As expected, the students raised basic issues, expected the experts to confirm unstable knowledge, tried to bridge gaps between basic academic notions and innovative concepts, etc The experts from other neighbouring domains looked for the means of establishing links between their own fields of specialization and those being discussed by their answering colleagues, sought possible new interdisciplinary orientations, etc. The LSP teachers were clearly interested in basic explanations of established techno-scientific concepts so that their language teaching could rest against a bedrock of reliable specialized knowledge They also sought comprehensible state-of-the art information so that their teaching of language forms benefited, in terms of student motivation, from the interest generated by the new subject-specific concepts.
However, this diversity of interests from the questioners and the answers obtained from the experts were all dependent on a common written source: the printed conference proceedings which proved to he both a

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[2] Thirty-three of these papers have been published by Bramley et al. 2005 : Advances in Integrated Design and Manufacturing in Mechanical Engineering. Springer. ISBN-10 1-4020-3481-4, also availbale as an e-book, ref. Springer-Verlag 1402034822.
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unifying element and an interesting starting point from which original and differentiating oral constructions could he produced. By contrast, the written forms looked particularly conventional and faithful to a strict understanding of the canonical way of presenting new information, with predominant SPE to GEN or SPE to SPE arrangements typical of expert-expert communication (see table I) , Subject-Verb-Object basic syntactic order, etc. What characterized oral exchanges was the wide spectrum of typically oral language and discourse constructions used by the participants, and above all by the experts who contributed the main part of the oral productions

These constructions cover the whole gamut of the syntactic and semantic sentence arrangements traditionally associated with oral exchanges As such they constitute as many specific micro-strategies to transmit information in lively, communicative and other-participant-conscious ways. Contrary to what might have been expected, these microstrategies are not particularly language- or concept-oriented in a discrete way, or, at least, are not easily attributable to one or the other type, but rather merge the two orientations in a sort of joint effort between form-addressed and concept-addressed strategies

This again is in contrast with the written corpus where the lexical RS were the main language device used and where hard-core specialized concepts were often glossed via the use of other specialized terms in the frequent SPE-SPE direction already mentioned. As will be seen later, oral answers practically never resort to lexical reformulations, practically no simplified word substitutes were offered as RS, and this is the main difference we noticed between written and oral reformulation schemes.

The 311 episodes of questions/answers numbering 15,400 words, actually cover 843 exchanges, i.e. short dialogical units including at least two contributions from different speakers (Roulet, 1991) with the experts speaking about 80% of the time during *interventions* (Roulet, 1991) ranging from about a second (one word, usually "yes" or "no") to 9 minutes uninterruptedly.

The following table sums up the specific micro-strategies employed, usually contained in topically or pragmatically associated exchanges

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Type of micro-strategies	Number of occur. + %	Predominant orientation when applicable	Abbreviated Samples
1. Opposing- contrasting	51 – 7,9%	GEN-SPE	The most widely used systems are ..., but others have been applied ...
2.Definite/indefinite determiners	12 – 1,8%	GEN-SPE	The procedures your are familiar with are ..... but a DFA analysis is can also be considered here.
3.Using specific/unspecific terms of address	71 - 11%		You can ask me about .... One would expect an answer of the type .... We all know that .....
4.Anteposition, cataphoric constructions	4 – 0.6%	SPE-GEN	The DFM cost program, I would say is ....
5. Dislocation Left-hand Right-hand	12 – 1,8% 2 – 0,3%	SPE-GEN GEN-SPE	Computer Aided Manufacturing today, it basically consists of ... You should know it, that theory which says that ....
6. Lexical reformulation	6 - 0.9%	SPE-GEN	The compatibility matrix is a list of all the available processes and the component properties.
7. Cleft-sentences	10- 1,5%		Is it because there's no known application that you hesitate ?
8. Highlighting Orally Syntactically Through a special phrase	66– 10.2% 3 – 0,4% 18 – 2,8%		CAM alone is conventional, not coupled with Activity Based Costing. Shearing results in this, not distortion ... We consider that ... / It happens that ...
9. Other Verbal or semi-verbal Non-verbal	35 – 5,4% 6 – 0,9%		Dis/approbation noises (hmm, hmm) dilatory coughs, etc. Pointing silently at a diagram / facial expressions/ nods, etc.

Table 4. Oral micro-strategies.

Oral micro-strategies fall roughly under the two categories mentioned by Lambrecht (1994: 36-37) as constituents of the universe of discourse the *text-external world* which comprises the speech participants and the speech setting, and the *text-internal world* which comprises linguistic expressions and their meanings. The interdependence existing between these two categories is made evident not only by the special link between *lexical meaning* ("the meaning inherently expressed in lexical items (words and word-like expressions)") and the relational meaning ("which is the meaning that arises by establishing relations between words") (both quotations from Lambrecht, 1994, 36-37) which belong to the "text-internal world", but also by the special staging and targeting of verbal information realized by text-external elements (prosodic and non-verbal micro-strategies)

Above all, the most numerous text-external elements used by our experts and non-experts: using specific terms of address (11%), are text-external elements which take into account the participants and a specific

setting. They are, by far, the most frequently used oral microstrategies, together with prosodically highlighting items (10.2%).

Using special modes of address towards hearers is aimed here at adjusting information to a known, visible and reactive audience. The strategy follows different rules from those aimed at readers in which the use of pronouns like *"I", "we", "one", "us"*, etc. mostly concerns the writing authors themselves who strive to assume different identities as presenters of information. This is also what several authors call 'polyphonic discourse' (Anscombre & Ducrot, 1983, 1986, Bakhtine, 1984) The intention in argumentative scientific written communication is often to have this information accepted as an undisputed evidence when coming from the author(s), or a debatable contribution when coming from others. Using specific terms of address can also signal individual as opposed to a team's viewpoint, etc. In other words, the strategy is predominantly author-addressed (Amossy 1999, Authier-Revuz, 1984, Fløttum. 2003, a, h : Fløttum, 2004, Rabatel, 2002) Not so here where the main reason for selecting specific or unspecific terms of address depends on the speakers' assumption of the hearers' type of knowledge ("you might think that ...") as opposed to specialists' knowledge ("we tend to consider that …"), epistemic and extratextual reference ("you can ask me about..")

VI.B. oral strategies mostly prompted by text-external elements

As an occasional mix of oral (e.g. 'This is because ") and written styles can he noticed in the written text passages, our speaking experts sometimes rely on some of these strategies which they can import directly. and practically unmodified, into their oral answers.

In this respect, the *text-internal world* is here all the more essential as it is relevant so both sorts of RS, written and oral. For example, the opposing/contrasting micro-strategy so frequently used orally (7.9%) is nearly as frequent in the written passages (7 out of our 93 written RS = 7.5%)

Interestingly, no lexical reformulations of the key concepts or objects really happen between written and oral versions. When passages are borrowed from written papers, the general strategy or sentence arrangement is preserved, but the same original lexical items are used in oral strategies (only 6 occurrences of lexical reformulations were found in the oral corpus, the same number as for non-verbal strategies).

This is all the more surprising as SPE-GEN vocabulary changes would seem a very obvious pedagogical procedure. Even among the six occurrences of lexical reformulation, two are the mere development of abbreviations and another two are not true lexical substitutions but of the type given in table 4 (type N°6: *The compatibility matrix is a list of all the available processes and the component properties)* in which the sequence coming after "is" is rather an explanatory development in which unexpected concepts are added (viz. processes and component properties) than a dictionary-type synonym.

Possible explanations are the extreme dependence of non-native users of English on the 'approved' written texts, at least concerning the adequacy of the technical terms used. Other reasons might be the fact that during the oral sessions, both experts and semi-lay participants could refer to the written texts deemed lexically sufficient; also perhaps the (debatable) feeling the experts possibly had that actions, not names, were worth explaining at that stage.

But the strategies used during those oral sessions primarily reflected the importance of the 'here and now' of the exchange situation. If we look at the micro-strategies listed in table 4, all, except the opposing/contrasting one, not only depend on the text-internal world of the written papers, but also on text-external world elements such as described by Hymes (1972) in his famous SPEAKING model of sociolinguistic oral interaction analysis. The text-external world of the explanatory oral sessions held in familiar surroundings and among mutually supportive people is infinitely better controlled and participant-friendly than that of the original delivery of the papers in a foreign institution and to often unknown competitors.

The physical **S**etting of the oral sessions is no longer a vast lecture hall but a much smaller classroom. The **S**cene, the psychological counterpart to Setting, involves a more informal and relaxed atmosphere. The **P**articipants themselves are in a co-operative and non-competitive mood, the **E**nds are no longer directed at obtaining recognition and support from unknown colleagues but rather towards co-operation in a pedagogical project. The **A**ct Sequences concerning the form and content of the message are considerably

facilitated by the availability of the written papers to all participants. The **K**eys of the oral exchanges are humorous (more of this later) and more oriented towards defusing delicate issues and protecting the speakers' and hearers' faces, than trying to sound self-assured and reproachable: the **I**nstrumentalities involve, among others, a very interactive and lively type of oral communication (see table 4). The **N**orms of interaction allow interruptions and those of interpretation result in a quite accurate understanding of one's close colleagues and students. Lastly the **G**enre is clearly identified as a question-answer type of exchange but can also develop into more improvised types like adapting a concept to the assumed background knowledge of the hearers, or even the silent reading of a passage from the written conference proceedings.

All these specific text-external elements result in explanatory oral sessions which are very different from the original conference where the papers were initially delivered.

The questions and answers of the oral sessions were then both dependent on the text-internal and the text-external worlds. If we refer to the types of micro-strategies listed in table 4, the text-external characteristics of exchanges point towards a very co-operative construction of communication

This co-operation is the joint action of the participants who construct a topic. The notion of 'topic' is understood here as "what the exchange bears about": it is a central element in the mechanics of interlocution and dialogal discourse. In a physiological perspective, the students, researchers and teachers participating in the oral explanatory exchanges alternate T-turns (stimuli) which trigger one or several R-turns (reactions) from the expert which all together constitute a topical network of speeds contributions. This network is locally assembled around an object of discourse, or topic, taken with the sense of "what is being talked about" (Fratila & Sionis, 2006)

As a reminder, the 311 oral episodes included 843 exchanges: most episodes then consisted of more than just a question followed by an answer. If the expert spoke approximately 80% of the time, the other participants ' contributions, although shorter, acted nevertheless as full-fledged dialogal constituents with the main speaker constructing his own discourse in close relation to the stimuli from his counterparts, and incorporating their thoughts, words, and sentence constructions into his own discourse.

These borrowed elements undergo a varying process of reformulation so as to fit the current point being made by the expert, but they may also be incorporated unchanged when the expert's explanatory discourse bears more particularly on the way the T-turn or stimulus was worded. In other words, when a wrong or incomplete understanding of a concept is perceived by the answering expert as stemming from an inadequate formulation. The following exchanges illustrate these two reformulating/explanatory strategies

Incorporation and modification:

Written text.	Oral exchange.
An outcome of DFA (Design For Assembly) analysis will be alternative proposals for product simplification through elimination or integration of parts, including alternative combinations of materials and processes. These alternatives need to be evaluated economically as soon as possible. Thus Design for Manufacture (DFM) analysis is focused on the early assessment of component manufacturing costs and selection of best process/material based on realistic cost estimates. The objective is to influence the early decisions on choice of material and process for a part, before detailed design is undertaken. This is because, once this decision is made, the items must be designed in detail to meet the processing requirements of the chosen process. The overall aim of DFM is to enable design teams to make cost trade-off considerations while these decisions are being made.	<u>Student</u>: "DFA then provides new criteria for the choice of the product components; *the notion of cost seems to be essential*, but does this mean that the other traditional criteria: performance, reliability, physical response, etc. become secondary, or do not need to be *considered* anymore ? <u>Expert</u>: "As a matter of fact, it's an ongoing process, you always go from the finished product to its components and vice versa, this is one of the characteristics of DFA and DFM. So, *the notion of cost, essential as it is, is not the only one considered* at a given time It is true that we've made other suggestions and what came to mind was to possibly think of associating other materials and their specific manufacturing processes.

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  Table 5. Reformulating/explanatory strategies

Interestingly, by reformulating both the written text and the expert's oral explanations in their questions, the other participants often provide the expert with explanatory cues and directions for reformulating strategies. Co-operation in discourse also works in this direction.

Written text.	Oral exchange.
A basic requirement of any effective information support tool is to provide the user with information that is useful without being swamped by a significant volume of irrelevant information. This type of information overload problem is common with Internet searches. If future information support systems are to be valued by their users it is important that a level of knowledge is encapsulated within the system to ensure that only high quality information is offered.	Student : « (…) but the information support tool *ultimately thinks for the user*, it *makes choices for him*, it thinks instead of him » Expert : « Well, in actual fact, the point is not really to have a system which *ultimately thinks for the user*, or *makes choices for him*. The point is to make choices together with another system, to have two systems interacting. The provision of information, which can be communicated at a computer interpretable level, generally requires the definition of common infrastructures which can be shared by the systems which need to interact. However, it is true that on large scale interactions this tends to lead to monolithic data structures which are inflexible and difficult to change, but this is not the problem you mention. »

Table 6. Verbatim incorporation (italics) and adoption with modification (underlined)

Although none of the oral exchanges included any identifiable avoiding strategies (even the occasional and short silent passages were rather to be attributed to the experts feeling the need to ponder over a difficult question or looking at the written text or a possible explanation), the experts always offered some sort of explanation. A number of indirect replies did crop up, but all were of a dilatory nature and could he assimilated to the transitory silent attitudes already mentioned

VII. Humour

One characteristic of oral explanatory exchanges is humour. This feature, which Hymes classifies under a "Key", must not have occurred too often during the live oral presentations if we remember that the speakers had been advised to stick very closely to pre-conference descriptions of their papers.

Humour as a text-external element depending mostly on the sort of prevailing interaction is a macro-strategy which transcends several of the sentence-level micro-strategies listed in table 4. It also cuts across a number of psycho-social factors inherent in each expert's personal approach of pedagogy, or, more generally, of human relationships.

As Holmes (2000) points out, humour expresses "positive affect in interaction". This attitude was felt to be particularly necessary by all participants in the explanatory exchanges. These exchanges staged a fairly asymmetrical type of interaction: the experts assumed an undeniable superior position relative to students and even other-domain colleagues, but this position was to he mitigated if positive and co-operative feedback was expected from the hearers. It is worth remembering here that useful clues were to he obtained by the experts from the receivers of technical information with a view to optimizing its eventual teaching.

The experts then strived to create a convivial and relaxed atmosphere by adopting an overall humorous tone. This certainly contributed to the direct and co-operative dialogues. Similarly, the other participants contributed their own form of humour partly to compensate for their often total lack of knowledge about the concepts being dealt with: their ignorance was sometimes so complete that they opted for a self-derisive type of humour (more of it later), and partly in response to the experts' humour. This verified the notion of humour producing more humour and also the fact that people often resort to humour when dialogues cannot be founded on shared knowledge and when co-operation can only happen at the level of form, not content.

In this respect, humour is an implicit or indirect way of signalling incomplete or unbalanced interaction with e.g. one party holding inaccessible information or having unequal and unequalizable status, both as interactional participant and partaker of specific knowledge. In this particular instance, humour acts as a strategy to preserve faces, it indirectly signals that one participant failed to be fully appreciated by others, or that "positive politeness" (cf. Goffman, 1956, 1967) has to be enforced. When the audience felt the expert failed to deliver the needed explanations, the implicit judgment could have been "he's a bad teacher or transmitter of information". Politeness could also he "negatively" oriented (Goffman again) when the same participant's action was questioned in terms of efficiency and adequateness, even if humour was resorted to ("by my humorous reaction I interfere with his wish not to be disturbed in his strategies as an expert")

Even when humour was not detectable through specific lexico-grammatical or discourse constructions, it was perceptible through what Holmes (2000) calls "smile voice" which owed much to associated prosodic or non- or semi-verbal strategies. The overall tone of the exchanges was humorous and would have appeared so to any non-user of the language observing the participants.

The representative instances of humour which will now be reviewed in more detail can hardly be attributable to one strategy in particular. They can be associated simultaneously with a form of politeness aimed at protecting others' faces and also one's own via the use of devices akin to hedging. This is the framework provided by Brown and Levinson's Politeness Theory (1987) which underlines the importance of the "power" participants exercise upon one another in conversation. But in our context humour can also be a component of an elicitation strategy on the part of the experts who tried to defuse complex issues so that the other participants felt less intimidated and dared co-operate.

Although unrepresentative in terms of numbers, a few involuntary humorous episodes failing to preserve the other parties faces even occurred, like this instance of general merriment when all participants, except the producer of a rather clumsy and irrelevant question, rightly interpreted the prolonged silent period from the expert as an indication of something amiss where a response would have been embarrassing to the questioner.

Humour and politeness a multiple-goal strategy.
Humour as a politeness strategy in the asymmetrical interactions of our explanatory exchanges plays both a similar and a different role for the experts and the lay persons. All participants wished to preserve the other parties' faces, but when the experts resorted to humour for that purpose, they mostly cared to spare the students and their colleagues' faces and did not bother to preserve their own faces. Conversely, the lay participants cared both for the experts' faces as communicators of specialist knowledge and their own faces as receivers of a type of information which was not to appear as wasted on a group of individuals ill-prepared or incompetent for such a transmission.
In their attempts the experts, who feared that their tone or rephrasing strategies could he perceived as sententious or omniscient, usually resorted to discourse strategies aimed at presenting actions (often their own) and concepts in an innocuous and sometimes even superficial perspective. As written before, practically no lexical reformulations of specialized concepts ever occurred, it was rather the accompanying paralinguistic, prosodic and discoursal devices used which resulted in an overall derisive or belittling mode of presentation
Just as the hard-core lexical components are practically never modified, the whole concepts relying on these lexical specialised items are hardly touched either by the humorous strategies which seem to occur before or after, never within or mingled with those concepts. Humour then appear to be a sort of peripheral or surrounding mode of presentation. Samples of preceding occurrences of humour are the following:

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Written text	Explanatory exchanges
(1) The automotive supplier system is arranged in a series of layers or "tiers" and the tier level of a given company and a given product depends upon to what type of organization it is sold. Generally, the companies which supply directly to the automakers are known as Tier 1 suppliers while those who supply components to the Tier 1's are referred to as Tier 2's etc. Thus, a tool and die shop would be a Tier 2 supplier to a company that supplies interior mouldings for the cockpit of the vehicle and the plastic resin supply company would be a Tier 2 or 3 supplier to the same moulding company. Tier 1 companies tend to be global in structure while lower tier suppliers are sometime more local in nature. Most automakers are trying to decrease the number of supplier companies in the supply chain for reasons of cost and business complexity as will be detailed below. This trend has resulted in considerable displacement within the supplier community as companies jockey for position as one of the chosen suppliers to the companies in the tier level above.	(1) Participant: "Jockeying for position: it seems however that it is not so easy for suppliers to reach a higher status and become what they are not originally. How does all this function ? Expert: "Well, well, let's look again at those strange animals competing among themselves to climb higher in the tree. What the text basically says is that Tier 3 suppliers do their utmost to become Tier 2 suppliers, and the same goes along the line for all suppliers. The main reason is that automakers try very hard to decrease the number of their suppliers.
(2) The provision of information, which can be communicated at a computer interpretable level, generally requires the definition of common infrastructures which can be shared by the systems which need to interact. However, on large scale interactions this tends to lead to monolithic data structures which are inflexible and difficult to change. While these may work for a specific organisation for a short period of time they are unlikely to be well suited to a variety of businesses which tend to develop their own organisational structures and functionality.	(2) Participant: "This seems to question the whole process as far as information has not been made homogenous from the very beginning what do you think ?" Expert: "A lot of blah actually to mean, in simple terms that the methods for information and knowledge sharing must be accessible to all systems."

Table 7. Humour as prefacing strategy

It is characteristic that both humorous prefaces rely on derision: suppliers being likened to monkeys in (1) and the wording of a published paper being presented as verbose and overcomplicated. But none of the original specialised concepts ever gets modified or rephrased. In (2) the development of "the *provision of information*" into *"information and knowledge-sharing"* is hardly explanatory in nature, *"knowledge-sharing"* is a pleonastic rephrasing of *"information"* and does not shed any extra light on the original notion. On the other hand, an explanation of *"the definition of common infrastructures"* would have been a welcome initiative, especially as the request for clarification from the participant bore on the whole passage, not on the supply of information only.

Following, or concluding, humorous occurrences are usually more explanatory in nature as they somehow summarize the on-going demonstrations, but they too hardly rephrase specialised words and concepts:

Written text	Explanatory exchanges
For each feature, it is necessary to choose the operations, the tools and the cutting condition. For example every hole can be machined with a simple tool or a variable diameter tool, by using a multi-spindle or a single spindle head. In a context of RMS, we should prefer to machine separately each hole, because a variable diameter tool is more expensive.	(3) Participant : «a different tool for each individual task then ? is this right ? isn't this extremely expensive ? Expert : (after overhead-projecting a table showing the dozen or so different tools used, and insisting on this small number) .... Now, as you can see we don't threaten the financial balance of a company, note also that, like for your favorite supermarket, low prices depend on the size of demand, the more the cheaper, so to speak »

Table 8. Humour as concluding strategy.

The lay participants used humour as a self-protective device in a number of cases, all more or less related to a need to save the experts' faces when the specialists' explanations did not come up to their expectations or, more often, when they feared the experts would think the explanations were wasted on an audience in need

of a more basic approach. Typically, several of the student participants asked for explanations on issues bearing on language aspects, although the unravelling of language and inherent conceptual difficulties was not always straightforward (See table 9). When these requests occurred the hedges used were equally aimed at the LSP teachers present in the room.

Expert's oral commentary of diagram	Student's question
A structure for manufacturing information and knowledge The range of manufacturing knowledge is extensive and the types of knowledge is equally wide ranging. While we have focused largely on machining knowledge in our work in this area, we have attempted to utilise an accepted structure of knowledge types, classifying knowledge as explicit, tacit or implicit. This has enabled us to identify the potential routes to the use of manufacturing knowledge. For example, explicit knowledge in the form of tables, procedures and graphs can all be captured in such a way that the knowledge can be computer processed. This is not the case with tacit knowledge, such as that captured in a video clip.	(French) Student : « I am not quite sure about *tacit* here, maybe it's a problem with English ; I am not sure we heard of that in our English courses, but I may be wrong. Why is knowledge tacit in a video clip ? You'll think I shouldn't ask this, I'm sure. I'm sorry I'm not good in English » (laughs) Comment : *Tacit* happens to be a cognate as the French equivalent *tacite* is nearly the same morphologically. The problem may be either that the French meaning and/or the choice of this term here are problematic.

Table 9. Humour and hedging as self-protection strategy.

Several instances of humour used as defusing and elicitation strategy to obtain the other parties' co-operation were also observed. Defusing was systematically obtained by resorting to verbal devices aimed at redefining the framework and/or scope of the concepts or actions mentioned. Here again the specialized terms and notions were not reformulated or simplified but rather their applications or the level of understanding they implied was made more accessible.

> "Well, I have been speaking for half an hour now of a method for evaluating probabilistic design techniques to aid their selection and I have based it on the computational and modelling issues of time, accuracy, cost and robustness. Judging on your lack of reaction I should perhaps reconsider my method" (laughter)
> "The probabilistic design techniques should not frighten you, they can be applied in more simple contexts, so that design optimization can be made to suit the nature of the problem. The techniques giving sensitivity measures are there only to aid further data collection, nothing to be afraid of really"

VIII. Concluding remarks.

By definition the reprocessing of specialised information to make it more accessible to non-specialists is a compulsory task inherent in all popularizing attempts. The difficulty generally lies in the need to identify one's reading or hearing audience accurately. This is in most case the result of assumptions based on introspection and generalizations of what the background knowledge of the average reader/hearer is likely to

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be, and also of the type of surrounding circumstances (language, mood, psychological and physical setting, etc.) ideally suited to the transmission of difficult or simply new information. The writer of popularized science as well as the instructor preparing teaching materials for his students based on specialised written information do not generally enjoy the advantages of preliminary testing benches providing spontaneous reactions from their target audiences before a final version is adopted. However, the flip side of this dynamic practice is also that the expert's work is no longer done in the quietness of an office but in a risk-laden and, for some, destabilizing, public confrontation with end-users.

The experiment described here allowed a re-examination of scientific and technical data carried out jointly by authors and their audience through oral interaction.
The original written texts included reformulation schemes aimed at specialists. These RS were signalled by explicit markers of the type *called, define, refer to, mean,* etc. and less explicit ones like the use of a co-text supposed to provide an explanatory framework by referring to other associated and known notions. Our corpus of specialist writings was characterized by a non-negligible proportion of RS explaining specialized concepts through other specialized concepts (SPE to SPE, 19,4%) whereas the SPE to GEN was used in similar proportions, as often as when experts address non-experts (59,7% in the Candel corpus) as when they address other experts (55,9% in our corpus).

The non-native speaking experts giving oral explanations to non-experts favoured the highlighting of stretches of utterances mostly by stressing them prosodically, syntactically, or by using a special phrase (13% of all occurrences). The second most used strategy consisted in opposing or contrasting notions and concepts (7.9 % of occurrences) and the third and last most noticeable strategy was the use of semi-verbal or non-verbal micro-strategies like e.g. disapprobation noises, silently pointing at diagrams, and facial expressions.

Overall, the use of text-external elements reflecting the here and now of oral interactions with other colleagues and students and relying on the psychosocial dimension of exchanges is ubiquitous and covers the whole range of the constituents of oral interaction described in Hymes's SPEAKING model. This important text-external dimension implied a very cooperative construction of communication with experts and lay persons contributing their share in constructing a topic and negotiating the most adequate RS through questions and answers. These resulted in a gradual approach of concepts and language forms ultimately accepted by both parties.
Text-external and text-internal elements were adroitly mingled but the main source of feedback for the experts were the observable immediate reactions of their audiences. Some text-internal elements were often directly taken off the written papers whenever these contained pre-included oral forms to help non-native or other speakers during the original presentations. An important aspect of the oral reformulating strategies, observed mainly in the non-native experts, is the near absence of lexical reformulations of many hard-core technical notions.
For different reasons, a humorous orientation of most of the exchanges was adopted by all. In addition to being a federating element for the many text-external constituents used by all participants, humour created a special area in which concepts and forms could be viewed with some degree of freedom and relativity. Too strict a conformity to one's own status as expert or student/non-specialist may have resulted in conventional, predictable and ultimately sterile exchanges

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