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Suzanne de Cheveigné, Eliseo Veron

► To cite this version:

Suzanne de Cheveigné, Eliseo Veron. The Nobel on First Page: The Nobel Physics Prizes in French Newspapers. Public Understanding of Science, 1994, 3, pp.135. halshs-00171760

HAL Id: halshs-00171760

<https://shs.hal.science/halshs-00171760>

Submitted on 13 Sep 2007

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This research on the way French newspapers treated the two Nobel Prizes for physics awarded to Pierre Gilles de Gennes in 1991 then to Georges Charpak in 1992. It allowed us to demonstrate the specificity (and the stability over time) of the relation to science of the different papers, as well as their relation to their readers.

The non-published research report in French is available at <http://halshs.ccsd.cnrs.fr/>

A short article was published in French as:

S de Cheveigné et E. Véron, "La science sous la plume des journalistes", *La Recherche* 263 (1994) 322.

The research was published in English as:

S de Cheveigné and E. Véron, "The Nobel on First Page : The Nobel Physics Prizes in French Newspapers", *Public Understanding of Science* 3 (1994) 135 (manuscript reproduced here with written permission)

A version with a more complete presentation of the theoretical framework was published as:

S de Cheveigné, "The Nobel on First Page : The Nobel Physics Prizes in French Newspapers" in *Rhetoric and Epistemology*, (Jostein Gripsrud, Ed.) University of Bergen Working Papers, 1997.

(S.C., September 2007)

THE NOBEL ON FIRST PAGE

The Nobel Physics Prizes in French Newspapers

Suzanne de Cheveigné* and Eliséo Veron[#],

* Shadyc (EHESS - CNRS), Marseille, France

[#] Universidad San Andres, Buenos Aires, Argentina

Abstract :

We have examined the manner in which the main French daily newspapers reported the announcement of the Nobel Physics Prizes given to P. G. de Gennes in 1991 then to G. Charpak in 1992. We found that their enunciative strategies could be distinguished according to two independent criteria : whether the enunciator presents himself as familiar or not with scientific matters, and whether or not he attempts to explain the scientific content of the discovery. The different combinations of these strategies correspond to different relationships proposed by the newspapers to their readers. Different theories of scientific discovery also appear : the work of a team and an institution, or the invention of an unmatched individual.

Résumé :

Nous avons examiné la manière dont les principaux quotidiens français ont traité l'attribution du prix Nobel de physique à P. G. de Gennes en 1991 puis à G. Charpak en 1992. Nous avons observé des stratégies énonciatives qui se distinguaient selon deux critères indépendants : l'énonciateur se présente-t-il ou non comme familier des questions scientifiques ; tente-t-il ou non d'expliquer le contenu scientifique des découvertes ? Les différentes combinaisons de ces stratégies correspondent à des relations différentes proposées par les journaux à leurs lecteurs. Nous voyons aussi

apparaître des théories différentes de la découverte scientifique : œuvre d'une équipe et d'une institution ou invention d'un être hors-pair.

The relation between the media and the scientific community in France is a sort of love-hate one : scientists often feel they owe an explanation to a public that is supposed to make informed choices concerning technical matters - and to go on funding them. Yet the media that carry this explanation are frequently accused of misunderstanding, deforming, oversimplifying their message. The present article is an attempt to understand part of the complex relation between media and science : how different newspapers treat scientific news, and what implicit models of science are behind these ways.¹

In 1991 and 1992, French physicists Pierre-Gilles de Gennes and Georges Charpak successively won the Nobel Prize in physics. This was of course an important event for the French press and, each time, all the nation-wide newspapers immediately covered the subject². We examined articles published in their first issues after the announcement. Our original study³ covered 8 daily papers and 3 news weekly magazines. We have restricted the present article to the main 5 daily nation-wide newspapers : Le Monde, Libération and Le Figaro, that in Britain would be called "quality papers" and France Soir and Le Parisien which are more "popular"⁴.

To understand the way the media treat science it is important not only to consider *what* they write (or say or show), but *how* they do so, in other words, not only content but enunciation. We are going to examine newspaper articles that, in terms of content, all say roughly the same thing : "The Nobel prize in physics has just been awarded to ...". And yet we shall see that they say it in very different ways.

I. The enunciative device⁵

All the texts under study were written by "real" newspapermen to be read by "real" readers. The average reader knows nothing about either (even if the odd one may happen to know that such and such a journalist is a geologist or a physicist by formation). Regular writers are not presented in the newspapers under study, and no newspaper explicitly defines its target in its articles.

On the other hand, the texts bear marks that sketch two "virtual" beings, the **enunciator** or image the writer construct of himself in the text and the **addressee** or image the writer gives, again in the text, of the reader he supposes he has. These are the only creatures that the "real" reader will meet and, in the present context, we as observers shall study only them⁶. Any "outside information" that we, as members of the scientific community, may have (concerning for example the journalist's speciality or the readers' socio-professional categories) is not pertinent to our analysis, (a) because the "real" reader is not provided with it, and (b) because it does not determine the way in which the enunciator and the addressee are constructed. A given journalist, at different times, can perfectly well build different enunciators and addressees.

Let us propose a somewhat caricatural example. Suppose the enunciator appears in the text as a teacher, recognisable by the fact that he uses phrases such as "now, we all know that ...", "you will remember that ...", etc. That creates an addressee in the

position of a pupil, apparently ready and willing to learn. G. Bateson⁷ has analysed the types of exchange which can take place in such situations. No *exchange* of course takes place when reading newspapers, but the text in fact *proposes a relationship* between the enunciator and the addressee, in this example a teacher-pupil one, complementary in Bateson's terms. The receiver, the "real " reader, may accept it. On the other hand he may refuse it, preferring to read another newspaper offering him a more flattering position.

The **enunciative device** is the way in which enunciator, addressee and the relation between them are constructed within the text. Each newspaper has its own, more or less successfully adapted to the expectations of its readership. The fact that we are working with articles that have roughly the same content gives us access, by comparison, to the enunciative devices of the different newspapers, to the relation they build with their readers, what we call the *reading contract*⁸. This goes beyond the particular style of a given journalist - and our observations hold even when the signatures change in a given newspaper. The "reading contract" is related to what one could call the global "tone" or "style" of the newspaper⁹.

The different enunciative devices do not of course appear randomly. They are part of the discursive strategy of each newspaper, concern all areas and not only science, and are dictated by what the editors, newspapermen, etc. believe to be the expectations of their public. This strategy is relatively stable in time - a paper cannot change its "tone" or "style" from one day to the next without disconcerting its readers.

The relation between enunciator and addressee built in the reading contract is particularly complex in the case of the press. On one level, it is created between the newspaper itself and its readers (in a manner similar to the one between a commercial brand and its consumers) : "The Washington Post says ...". The signature, the personal identity of a particularly famous journalist could of course affect the relation. This is not the case in our study, mainly because science is not usually first page news, and science writers are not as well known as some political commentators. So news articles on science will be strongly marked by the global enunciative strategy of each newspaper, which has to be grasped to understand how science is presented.

II. Methodology

The Nobel prizes have provided us with an exceptional occasion to isolate what is of the order of enunciation in the articles under study, for two reasons related to methodology :

-*comparison* : Each year's sample is homogenous in the sense that all the articles composing it were produced under similar conditions (the same subject of course, but also the same urgency, the same competition with other simultaneous events, etc.) The sample is complete since all the French nation-wide daily newspapers covered the event. The only way to discover what is characteristic of a newspaper is to compare it to others, to establish the field of strategies supporting the choices that have been made. Only differences or comparisons can provide information : as young physicists are taught, to say that something is big doesn't mean anything if you don't say on what scale !

- *regularity* : The double sample (1991 and 1992) allowed us to check our findings. A year is a fairly short period on the time scale of the evolution of the reading contract of a newspaper, so discursive strategy was unlikely to have changed.

The text of the articles under study were scanned and stored on computer as text files. For each article the following elements were extracted :

- all the quotations made, sorted according to their source as presented to the reader : the prize winner, colleagues and authorities (such as the director of the Centre National de la Recherche Scientifique, the Minister of Research, etc.) ;
- explanations of technical or scientific terms ;
- elements related to the position of the enunciator (see below), such as judgements made by the enunciator, judgements attributed to others, phrases marking distance to scientific knowledge, quotation marks, etc. ;
- elements related to how scientific work is carried out, what qualities brought the physicists their prize, etc. ;
- the practical use of the prize winners' discoveries ;
- the elements of a physical or moral portrait of the prize winners.

The smallest unit was the sentence. We calculated the percentage of the text, in characters, devoted to any of these subjects, but we only retained variations of order of magnitude as significant.

This type of semi-quantitative method was very useful for determining the origin of the differences in "tone" between the different articles perceptible by simply reading them. Of course, other elements can be extracted, but we looked for those related to explanations of the discoveries, the reasons why the prize was given, and the relation of the enunciator to science.

III. Strategic choices

In examining the texts, we found that two main choices of strategy had been made, one concerning the construction, by the enunciator, of its own legitimacy, the other concerning the hypotheses of the enunciator about the addressee's expectations in terms of scientific explanations. The two choices were independent, so four combinations were possible.

A. The world of Science : inside or outside ?

A first choice to be made is how the enunciator justifies the fact that he is telling us about the Nobel prize in Physics. How does he define himself with respect to the world of science ? Is he a permanent correspondent who has been on the spot for years, familiar with the language and customs, or is he a special correspondent, sent in to describe an exceptional event taking place in a strange world ? These are two classical figures in the news media. They express the hypotheses the medium makes concerning the importance of the area - geographical or intellectual - under consideration, in terms of the abundance or rarity of pertinent news. Permanent correspondents are set up in countries where regular and pertinent events are expected ; special correspondents are sent to countries that only exceptionally appear in the floodlights. The word "pertinent" is of course defined in the framework of the hypotheses the medium makes concerning the relation between its readers and, in

our case, the world of science, and consequently concerning the centrality or marginality of this world within our society.

We can recognise an enunciator constructed as familiar with the world of science by the fact that he personally assumes scientific judgements, rather than leaving them to experts that he quotes. A non-familiar one will not make such judgements and will on the contrary mark his distance. This can be done explicitly, or by using quotation marks on technical terms or expressions such as "known as", "called" which underline the fact that the words are those of a community to which the enunciator is exterior. Schematically, the familiar enunciator will say "what X has done is fundamental ..." whereas the non familiar one will say "What X has done sounds terribly complicated, but his colleague Y says it is fundamental".

Le Monde builds a familiar enunciator :

Specialist in solid state physics, this agrégé [a high level French diploma] in physics has made important theoretical contributions in areas as varied as magnetism, superconductivity, polymers, liquid crystals or hydrodynamics. [M, PGG]¹⁰

Spécialiste de la physique des milieux condensés, cet agrégé de physique a apporté des contributions théoriques marquantes dans des domaines aussi variés que le magnétisme, la supraconductivité, les polymères, les cristaux liquides ou l'hydrodynamique.

He can recognise "important theoretical contributions" and marks no distance to the terms magnetism, etc. France-Soir builds a non-familiar one (in:

The motivations of the Academy certainly could leave those who are profane in physics somewhat reserved. [FS, PGG]

Les motivations de l'académie ont certes de quoi laisser quelque peu circonspects les profanes en matière de physique.

Once again, it is the position of the enunciator that we take into account - marks in the text not the diplomas of its author.

B. Popularisation or News ?

The second choice is whether or not to try to explain the scientific content of the work of the two prize winners. We have chosen to study articles¹¹ that tell us about an event that has just taken place - news, in other words. An article can be completely written in what we shall call the "news mode", naming the discoveries, of course, but without explaining them, concentrating on the congratulations of the President of the Republic, or the culinary tastes of the prize winner. In that case, nothing distinguishes it from the article that announces that X just won an Oscar for his performance in the film Y. On the other hand, part of the article may contain an explanation of the scientific or technical content of the discovery - we shall say that this part is written in the "popularisation mode".

The linguistic structure of popularisation discourse has been characterised by number of authors¹² as a sort of movement back and forth between a specialist's discourse and discourse that the unspecialised reader can understand. Technical terms are accompanied by an explanation, such as :

a definition :

« ...then I became interested in the extraordinary world of superconductors », these exceptional materials that allow current to pass, at low temperatures, without any resistance. [M, PGG]

«.... puis je me suis intéressé au monde tout à fait extraordinaire des supraconducteurs», ces matériaux exceptionnels qui, à basse température, laissent passer le courant sans résistance.

an example :

To do so, particles (parts of atoms such as electrons) are accelerated and thrown against each other, or against inert « targets ». [M, GCh]

Dans ce but, des particules (parties d'atomes telles les électrons) sont accélérées pour être projetées les unes contre les autres, ou contre des «cibles» inertes.

an analogy :

A particle going through the gas ionises it by to a process analogous to that of lightning going through the atmosphere. [M, GCh]

Une particule chargée traversant le gaz l'ionise, selon un processus analogue à celui de l'éclair traversant l'atmosphère.

applications :

Associated with positron emission tomography (one of the most sophisticated techniques of brain imaging that presently exist), they increase sensitivity for the detection of the radioactivity of marked molecules. [M, GCh]

Associées à la tomographie par émissions de positrons (l'une des techniques d'imagerie cérébrale les plus sophistiquées existant à ce jour), elles augmentent la sensibilité de détection des rayonnements émis par des molécules marquées.

The "news mode" (which is not necessarily exclusive of the popularisation mode) is characterised by temporal marks of urgency, spatial marks of location and by the narrative mode :

Charpak himself says he was « surprised ». When the telephone call from Stockholm rang yesterday morning in his house in the Gex area, close to Geneva, Carlson, one of his colleagues, had to cross his heart, swearing it wasn't a joke. [L, GCh]

Charpak lui-même affirme être «surpris ». Quand le téléphone depuis Stockholm a retenti hier matin dans sa maison du pays de Gex, près de Genève, il a fallu que Carlson, un de ses collègues lui jure croix de bois, croix de fer que ce n'était pas un canular.

These sentences do not explain anything scientific - they create the illusion that the reporter was on the spot, just when the phone rang The choice whether or not to explain, once again, depends on what the reader's expectations are thought to be.

These two alternatives, the building of a familiar/non-familiar enunciator and the use or not of the popularising mode, allow four different combinations. Schematically the enunciator can say :

- i) "I know what this is all about, and I know you want me to explain it"
- ii) "I know what this is all about, but I know you don't want it explained to you"
- iii) "This is all new to me, but I know you wanted me to get it explained"
- iv) "This is all new to me, and I know you don't want any explanation"

We shall see, by looking at real quotations, that we can classify the newspapers in the following manner :

	Familiar	Non Familiar
Populariser	Le Monde	France Soir
Non Populariser	Libération	Le Figaro Le Parisien

Let us begin with the cases where the enunciator constructs himself as familiar with the world of science.

IV. Enunciators Familiar with the World of Science

Two enunciators are familiar with the world of science, those of Le Monde and Libération Yet their visions of this world are completely different.

Le Monde : A populariser

The enunciator built in the articles from Le Monde is familiar with the world of science. He is competent to express judgements in his own name :

The praise is merited and recognition of Pierre-Gilles de Gennes' work had long been awaited. [M, PGG]

L'éloge est méritée et l'on attendait depuis longtemps la reconnaissance des travaux de Pierre-Gilles de Gennes par les « Nobel ».

His distinction of course represents another acknowledgement of this great laboratory, the best in the world in particle physics. [M, GCh]

Sa distinction constitue évidemment une nouvelle reconnaissance de ce grand laboratoire, le meilleur au monde en physique des particules.

He takes charge of the explanations, marking no distance to scientific terms. Quotations serve other purposes. No colleagues (except for a biologist who works with Charpak - perhaps the enunciator is admitting his unfamiliarity with that field ?)

The prize-winners tell us about History or the Future :

« All of a sudden, in 1957, we began to understand. Those were years of great happiness » [M, PGG]

«Tout à coup, en 1957 on a commencé à comprendre. Ce furent les années de grand bonheur»

« That should lead to great breakthroughs between now and the year 2000 » he estimates. [M, GCh]

«Cela devrait aboutir à des percées importantes d'ici à l'an 2000», estime-t-il.

An enormous number of authorities are quoted - this is the legendary institutionality of Le Monde : the Research Minister, various Directors of the Centre National de la Recherche Scientifique (CNRS) and of CERN, the President of the Republic, etc ...

Institutional vs individual

The presence or absence of the authorities belonging to the scientific institution is symptomatic of the conception of scientific discovery held by the media and of the position it attributes to the prize-winner with respect to this institution. We find two extremes : an *extractive model*, where the prize-winner is described as unmatched ("hors-pair", literally, beyond the group of his peers), a genius qualitatively different from his colleagues and a *hierarchic model* in which the prize-winner is presented no doubt as an excellent physicist, but not qualitatively different from the others. In the latter case, institutions and colleagues are present and play a role in the prize-winning work. But then the attribution of the prize creates a problem : how can it go to an individual if science is a collective achievement ? (The question of the earlier Nobel prizes given to scientists who worked with detectors invented by Charpak is related to this one.)

Le Monde has a hierarchic point of view, colleagues and scientific institutions are part of the story :

Each time, in these fields, he found the way to stimulate research both in the groups he created and in the ones he worked with. [M, PGG]

A chaque fois dans ces domaines, il a su stimuler la recherche tant au sein des équipes qu'il a créées que de celles avec lesquelles il travaillait.

This Nobel Prize awarded for the second year in a row is above all a sign of the value of French Physics.

Ce deuxième Nobel attribué en deux ans consécutifs est, surtout, un témoignage de la valeur de la physique française.

although it insists strongly on the personal qualities of the prize-winners :

Pierre-Gilles de Gennes and Georges Charpak have in common a great creativity, served by a deep and very "open" knowledge of their discipline and of neighbouring disciplines. [M, GCh]

Pierre-Gilles de Gennes et Georges Charpak ont en commun une grande créativité, servie par une connaissance profonde et très «ouverte» de leur discipline et des disciplines voisines. Ils partagent un souci égal pour l'application et le devenir de leurs recherches.

Le Monde provides us with a typical example of popularising discourse - indeed, all the examples given above came from that paper. The explanations, given directly by the enunciator, are more often of the order of the definition than of the analogy or the application. The mediation of the writer is never underlined. All technical terms are either explained if they are unfamiliar or put in quotation marks if they come from everyday language (for example "target", "collision" or "event" - their meaning can be guessed).

In summary, this enunciator is familiar with the world he is describing and explains it to his addressee, hence the position we have given Le Monde on our diagram.

Libération or Passionate Science

Libération also builds an enunciator familiar with the world of science, but it is not quite the same world. Libération equates science with passion - it is the only paper that conveys the idea that science might be fun !

... today, the scientist has conceived a passion for biology. [L, in a header, GCh]

... le chercheur aujourd'hui se passionne pour la biologie.

Even if it looks complicated and not easy to generalise, Professor de Gennes sticks to it with delectation. He is in love with "everyday physics" in the words of the Institute, which, so it is said, brings him a loving admiration from his students. [L, PGG]

Même si ça a l'air compliqué et pas facile à généraliser, le professeur De Gennes s'y colle avec délectation. C'est un amoureux de la « physique de tous les jours » selon les termes de l'Institut, ce qui lui vaut, d'après ce qu'on en sait, une admiration amoureuse de la part de ses étudiants.

Nevertheless Libération's enunciator is familiar with the world of science and bears scientific judgements :

His simple formulas on liquid crystals, superconductors or glues ...[L, in a header, PGG]

Ses formules simples sur les cristaux liquides, les supraconducteurs ou les colles ...

To produce particles with ever more powerful machines so as to pierce the mysteries of matter is fine. To know how to detect them precisely and rapidly is capital. [L, GCh]

Produire des particules avec des machines de plus en plus puissantes pour percer les mystères de la matière c'est bien. Savoir les détecter avec précision et rapidité, c'est capital.

The difficulty of the scientific vocabulary is never underlined, as we shall see unfamiliar enunciators do. An impersonal "one", less clumsy in French than in English, saves using "they" that would put the enunciator outside the world of science or "we" that would claim that he was a member of it. He is a just familiar visitor :

Today one knows how to detect identify and store in memories millions of events per second, each corresponding to hundreds of particles emitted. One knows how to choose between the bad ones and the good ones, the ones that will allow the reconstitution of the complex history hidden in the heart of all the atomic nuclei, from hydrogen to uranium, from the depths of our planet to the heart of stars and galaxies. And understand how particles and antiparticles, the hordes of neutrinos, bosons and quarks were born and lived at the very beginning of the universe [L, PGG]

Aujourd'hui on sait détecter, identifier et mettre en mémoire des millions d'événements par seconde, chacun correspondant à des centaines de particules émises. On sait faire le tri entre les mauvais et les bons, ceux qui permettront de reconstituer l'histoire complexe se cachant au cœur de tous les noyaux atomiques de l'univers, de l'hydrogène à l'uranium, des tréfonds de notre planète au cœur des étoiles et des galaxies. Et comprendre aussi comment particules et antiparticules, la cohorte des neutrinos, bosons, quarks sont nés et ont vécu aux tout débuts de l'univers...

But none of the terms used are explained. The enunciator does not say that he is incompetent, nor does he have others (colleagues for example) explain them. Libération builds an addressee who is interested in the life scientists lead but who does not want their work explained to him. It could be that he already knows the vocabulary, but then the article would be aimed at only a very small number of

specialists. More likely, Libération constructs a relation of complicity with a sophisticated reader who is not daunted by words he does not know, who is not interested in the content of scientific knowledge but rather in the sociology of research. He is curious to know about scientists, not science.

So Libération tells a story. The narrative form is very present :

At the traditional family Sunday lunches that used to bring the whole tribe together in their large house in Orsay a few years ago, he would only briefly appear. He would emerge from his office, his forelock dishevelled, unfolding his immense silhouette from behind his desk. After coffee, he had already disappeared, running for a plane or rushing off to « l'Ecole » ...[L, PGG]

Aux traditionnels déjeuners familiaux du dimanche, qui réunissaient il y a quelques années toute la tribu dans la grande maison d'Orsay, il ne faisait qu'une brève apparition. Il émergeait de son bureau la mèche en bataille, dépliant son immense silhouette de derrière sa table de travail. Après le café, il avait déjà disparu, courant après un avion ou filant vers « l'Ecole » ...

The moral and physical description of the prize winners fills about 40 % of the article on de Gennes and 25 % of the one on Charpak, whereas Le Monde just says a word or two about their modesty.

Sixty eight years old, deep blue eyes, tall, elegant and charming, Georges Charpak is a physicist that no colleague can reasonably ignore. [L, GCh]

Soixante-huit ans, yeux bleu intense, haute stature, élégant et charmeur, Georges Charpak est un physicien qu'aucun collègue ne peut raisonnablement méconnaître.

The corollary of this importance given to the individual is the fact that the institutions are barely present - little history and no colleagues quoted. The scientists won their prize because they are exceptional individuals.

A Nobel for his talent as an unmatched clarifier. [L, PGG]

Un Nobel pour ses talents de clarificateur hors pair.

...before Charpak, was the prehistory of detectors, so to speak. It was he who began to write History. And if one absolutely must put a date on it, one could say that the revolution really began in 1968. [L, GCh]

... avant Charpak, c'était un peu la préhistoire des détecteurs. L'histoire, c'est lui qui a commencé à l'écrire. Et si on veut à tout prix y apposer une date, on pourrait dire que la révolution a véritablement commencé en 1968.

Libération has therefore an implicit model of science that is quite different from that of Le Monde : there is a qualitative gap between the prize winner and the others. The attribution of the Nobel prize to a single individual creates no particular problems. The newspaper has built an enunciator familiar with the world of science and an addressee who wants it described but not explained to him - the relation proposed is

one of complicity, more symmetrical, in Bateson's terms, that the one Le Monde proposed to its readers.¹³.

V. Special correspondents in the world of science

After having met enunciators who seemed quite familiar with the world of science, we shall now find ones who discover it, more or less fascinated.

France Soir : outside curiosity

We have already given an example of France Soir's enunciator constructing his ignorance of the word of science and, by complicity, that of his addressee. Here is another one - the "sic" was part of the article :

In giving the 1991 Nobel prize in Physics to Pierre-Gilles de Gennes for « having discovered that the methods worked out for describing order in simple systems could be generalised so as to be applied to more complicated forms of matter, in particular to liquid crystals and polymers » (sic), it is the person it considers simply as the « Newton of our times » that it wished to reward. [FS, PGG]

En décernant à Pierre-Gilles de Gennes, le prix Nobel de physique 1991, pour « avoir découvert que les méthodes élaborées pour décrire l'ordre dans des systèmes simples peuvent être généralisées de manière à être appliquées à des formes plus compliquées de la matière, notamment aux cristaux liquides et polymères » (sic), c'est celui qu'elle considère tout simplement comme « l'Isaac Newton de notre temps », pas moins, qu'elle a voulu distinguer.

This non-familiar enunciator will not give complicated explanations nor make scientific judgements in his own name. And yet there is a wish to explain, modest in the sense that few difficult terms are introduced, but when they are, they are explained, often through their applications.

His work on polymers has allowed the manufacture of polymer threads with innumerable applications. It is sufficient to look at a flat television screen, a pocket calculator or a watch, to behold the result of his work on liquid crystals. [FS, PGG]

Ses travaux sur les polymères ont permis de lancer la fabrication de fils de polymère aux applications innombrables. Il suffit de regarder un écran plat de télévision, une calculette ou une montre pour avoir devant les yeux, l'aboutissement de ses travaux sur les cristaux liquides.

Most of the explanations come from colleagues or authorities :

« These chambers are to the detection of particle trajectories what the video camera is to photography, explains Jacques Lewiner, scientific director of L'Ecole supérieure de physique et de chimie industrielle de Paris. By connecting the detectors to a computer, one gets an electronic picture that

allows the trajectory to be reconstituted and measurements can be made at the instant one wants. » [FS, GCh]

« Ces chambres sont à la détection des trajectoires des particules ce que la caméra vidéo est à la photo, explique Jacques Lewiner, directeur scientifique de l'école supérieure de physique et de chimie industrielle de Paris. En reliant les détecteurs à un ordinateur, on obtient une image électronique permettant de reconstituer la trajectoire et de faire la mesure à l'instant où on veut. »

This concern for explanation makes us classify France Soir among the popularisers. The enunciator discovers the world of science and describes it to his addressee, but without any particular fascination : its inhabitants are ordinary people :

But the one it honours is quite the opposite of the image of the solitary, inaccessible scientist. [FS, PGG]

Mais celui qu'elle honore est à l'opposé de l'image du savant solitaire et inaccessible.

At his press conference, Georges Charpak said that his detector was originally just a "little thing" ("un petit machin"). France Soir took up the expression, repeating it five times, twice in titles. (Le Monde never quoted it, and most of the other papers mentioned it just once or twice.)

The scientific institution is present :

With this choice, it is of course French research in physics that is valorised, but even more so it is the "Ecole supérieure de physique et de chimie industrielle de Paris", directed by Pierre-Gilles de Gennes, where Georges Charpak teaches, that is honoured. [FS, GCh]

Avec ce choix, c'est bien sûr la recherche française en physique qui sort valorisée, mais plus encore l'école supérieure de physique et de chimie industrielle de Paris, dirigée par Pierre-Gilles de Gennes, et où enseigne Georges Charpak, qui est honorée.

and the prize winner is a leader within it :

Apostle of pluri-disciplinarity, Pierre-Gilles de Gennes has always tried to understand order and disorder in nature, so as to extract practical applications. [FS, PGG]

Apôtre de la pluridisciplinarité, Pierre-Gilles de Gennes a toujours cherché à comprendre l'ordre et le désordre dans la nature pour en tirer des applications pratiques.

Pilote [FS, intermediate title, PGG] [Pilote]

This time, we combine an institutional vision of science and a concern for explanation, but coming from an enunciator who does not present himself as familiar with the world of science¹⁴.

Le Parisien : a world just like any other

The enunciator in *Le Parisien* is exterior to the world of science, and not particularly interested in it. He presents scientists, even more so than *France Soir*, as completely ordinary people, celebrating with a glass of champagne or going off home to join their children.

« I shall be able to buy myself new shoes ! » Georges Charpak, sixty-eight, the new French Nobel prize-winner in physics, said with humour. [P, GCh]

« Je vais pouvoir m'offrir des chaussures neuves ! » a dit, avec humour, Georges Charpak, soixante-huit ans, le nouveau Prix Nobel français de physique,...

Le Parisien gives little information about the work of the prize-winners, always via its applications :

We owe a number of quite revolutionary applications to his diverse and various studies. From the flat screen of television sets to the screen of calculators or watches, the list would be long... And it is not finished. Today the man is taking close interest in super-glues. To marry materials that are too different to be glued. His new challenge ? To glue parts of planes or submarines instead of riveting them. [P, PGG]

On doit quelques applications assez révolutionnaires à ses travaux divers et variés. De l'écran plat des téléviseurs à l'écran des calculatrices ou des montres, la liste serait longue... Et ce n'est pas fini. Aujourd'hui l'homme s'intéresse de près aux superglues. Afin de marier des matériaux a priori trop différents pour être collés. Son nouveau défi ? Coller des pièces d'avions ou de sous-marins plutôt que de les river.

The enunciator marks his distance with one of the few technical terms used :

The « thing » for which professor Charpak has just received the Nobel prize in fact dates back to the end of the sixties : a particle detector called a « multi-wire proportional chamber » that today equips all the large nuclear research centres in the world. [P, GCh]

Le « machin » pour lequel le professeur Charpak vient de recevoir le prix Nobel date en réalité de la fin des années soixante : un détecteur de particules appelé « chambre proportionnelle multifils » qui équipe aujourd'hui tous les grands équipements de recherches nucléaires du monde.

The institutions are very present. Research is described as a long, even monotonous activity :

In the test tubes, the solutions are at rest, barely troubled by the news...[P, PGG]

Dans les éprouvettes, les solutions reposent, à peine troublées par la nouvelle...

At first he thought it was a joke : at the European Centre for Nuclear Research, where his silhouette has haunted the labs for nearly thirty years, the name of this « handyman of genius » had been pronounced as « nobelisable » for so many years. [P, GCh]

Il a d'abord cru à une plaisanterie: ça faisait tant d'années que, au Centre européen de recherche nucléaire, où sa silhouette hante les labos depuis près de trente ans, que le nom de ce « bricoleur de génie » des particules avait été prononcé comme « nobelisable » !

Le Parisien joins Libération in its interest for the prize-winners' private life, proposing complicity in ignoring the content of their work. The difference between the two comes from the position of the enunciator with respect to the world of science : familiar with a world of passion or exterior to a world of boredom. Le Parisien draws a portrait of people who are not very different from its addressee, whose life is not more exciting than his...why say more about it ?

Le Figaro : unbridled lyricism

From magnets to superconductors then to liquid crystals, polymers and finally to colloids, glues and other super-glues, from solid-state physics to the physics of « soft matter », it is, among others, with the concepts of organised disorder and chaotic order that he juggled and shone. [F, PGG]

Des aimants aux supraconducteurs, puis aux cristaux liquides, aux polymères et enfin aux colloïdes, les colles et autres superglues, de la physique du solide à celle de la «matière molle», c'est entre autres, avec les concepts de désordre organisé et d'ordre chaotique qu'il a jonglé et brillé.

The Swedish Academy killed two birds with one stone¹⁵ in rewarding France two years in a row. Yet Georges Charpak has shown the same modesty as Pierre-Gilles de Gennes, 1991 Nobel, and both scientists work at l'Ecole supérieure de physique et de chimie de Paris. But the similarity stops there. If the Swedes are effectively monomaniac, their obnubilation exerts itself on this discipline intermediate between fundamental research and its industrial applications, that pushes solitary people to deepen science, all the while helping the humans in their ordinary life. A generation has indeed past between Pierre and Marie Curie (Nobel prize 1903) or Louis-Victor de Broglie (1929) and Georges Charpak. Physics also takes part in daily life. [F, GCh]

L'Académie suédoise a fait coup double en récompensant la France deux années consécutives. Georges Charpak a pourtant manifesté la même modestie que Pierre-Gilles de Gennes, Nobel 1991, et les deux savants travaillent à l'Ecole supérieure de physique et de chimie de Paris. Mais la similitude s'arrête là. Si les Suédois sont effectivement monomaniacques, leur obnubilation s'exerce sur cette discipline intermédiaire entre la recherche fondamentale et son application industrielle, qui pousse des solitaires à approfondir la science, tout en aidant les humains dans leur vie usuelle. Une génération a bel et bien passé entre Pierre et Marie Curie (prix Nobel 1903) ou Louis-Victor de Broglie (1929), et Georges Charpak. La physique participe aussi à la vie quotidienne.

These two fragments set the tone : the enunciator describes with grandiloquence a strange and fascinating world. In the case of de Gennes two different visits are proposed. First a not very technical article, with numerous quotations of the inhabitants :

For Pierre Bergé, just as for Etienne Guyon, the fascination is there, palpable, when you speak of Pierre-Gilles de Gennes. « His lectures in the Collège de France were a source of inspiration to us, the Saclay scientist remembers. He knows how to find images that inspire. He usually knows how to explain simply, without equations, the most abstract theories. » [F, PGG]

Pour Pierre Bergé, tout comme pour Etienne Guyon, la fascination est là, palpable, quand on parle de Pierre-Gilles de Gennes. « Ses cours au Collège de France étaient pour nous une source d'inspiration, se souvient le chercheur de Saclay. Il sait trouver des images qui inspirent. Il sait en général expliquer de manière simple et sans équations les théories les plus abstraites. »

A second article guides its reader through the jungle of de Gennes research, showing off technical terms like colourful exotic birds, without a word of explanation. The text has no pedagogical aims, on the contrary, the addressee is warned that he will not understand.

His theoretical discoveries, decked out with names that are barbarous for the layman, such as the static properties of chains or the concept of reptation in the dynamics of entangled chains, will not remain unheeded. [F, PGG]

Ses découvertes théoriques, affublés de noms barbares pour des profanes, comme les propriétés statiques des chaînes ou le concept de reptation dans la dynamique des chaînes enchevêtrées ne resteront pas lettre morte.

This fragment can be compared to those taken from Le Monde, where the technical terms were less specialised and all explained, to those from Libération where no distance - "names that are barbarous for the layman" - was marked.

The article on Charpak is less exotic and even gives some explanations :

More simply, the physicist has found the way, with this famous 10 by 10 cm apparatus, to show up these fundamental particles that no human sense can detect and that take part in forming matter. In theory, he strung wires across his box with which, just like the ribbons coated with glue that catch flies, the particles collide. They then set off an electrical signal which, once captured, can be computerised. [F, GCh]

Plus simplement, le physicien a trouvé le moyen, dans cette fameuse pièce de 10 cm sur 10 cm, de mettre en évidence ces particules fondamentales qu'aucun des sens humains ne peut détecter et qui participent à former la matière. En théorie, il a tendu des fils dans sa boîte, contre lesquels, tels ces rubans enduits de colle qui attrapent les mouches, se heurtent les particules. Ces dernières déclenchent alors un signal électrique qui, recueilli, peut être informatisé.

The non familiarity of the enunciator is confirmed by the way he marks the scientists words :

...known by the name of « Charpak's chamber » [F, GCh]

... connu sous le nom de « chambre de Charpak »

He makes judgements not about the scientific work of the prize-winners but about their moral qualities :

What is the secret of this superior mind ? [F, PGG]

Quel est donc le secret de cet esprit supérieur ?

Although, today, the last part of the operation may seem nearly obvious, it took the scientific nerve that characterises the great to think of the modern electronics of the day (in the mid sixties) and to connect a detector to a computer. [F, GCh]

Si aujourd'hui, la dernière partie de l'opération paraît presque évidente, il fallait ce culot scientifique qui caractérise les grands pour penser à l'électronique moderne de l'époque (au milieu des années 60) et relier un détecteur à un ordinateur.

There are numerous quotations, particularly for de Gennes (they take up more than one third of the "non-technical" article). Many colleagues are quoted, explaining the way he works and judging his results.

« He knows how to approach things, not by abstract calculation, but from a phenomenological point of view, the dimensional, qualitative side, Pierre Bergé explains. Schematically, he works out a small model, that allows one to test the ground. If it turns out to be solid, one dives into heavy calculations. He also has the courage to drop field in which he feels he is stuck. One of the important characteristics of his way of thinking is analogy. A small example. He was able to work out a model for the reticulation of polymers, the formation of gels, by analogy with percolation, the passing of water through a solid.» [F, PGG]

« Il sait aborder les choses non par la voie du calcul abstrait, mais par l'abord phénoménologique, le côté dimensionnel, qualitatif, explique Pierre Bergé. Schématiquement, il élabore un petit modèle, qui permet de tâter le terrain. S'il s'avère solide, on se lance alors dans les grands calculs. Il a aussi le courage de laisser tomber rapidement les domaines où il se sent bloqué. L'une des caractéristiques importantes de son mode de pensée est l'analogie. Un petit exemple. Il a su élaborer un modèle de réticulation des polymères, la formation des gels, par analogie avec la percolation, le passage d'eau dans un solide. »

Charpak on the other hand tells his own story and only one colleague is quoted.

«The multiwire chamber is to the bubble chamber what cinema is to photography. You go from a two-dimensional still image to a dynamic, three-dimensional vision», explains Jacques Lewiner, a collaborator of George

Charpak's and director of the Ecole supérieure de physique et de chimie de Paris. [F, GCh]

« La chambre multifil est aux chambres à bulles ce que le cinéma est à la photographie. On passe d'une image fixe en deux dimensions à une vision dynamique en trois dimensions », explique Jacques Lewiner collaborateur de Georges Charpak et directeur scientifique de l'Ecole supérieure de physique et de chimie de Paris.

(The same person, using the same image, is quoted above, in a more technical manner, by France Soir.)

The differences between the article on de Gennes and the one on Charpak may be purely related to the circumstances, dependent on the availability of the prize-winners, etc. More significant is the complete absence of authorities, except for the Swedish Academy. The scientific institution is not very important : the prizes have gone to exceptional individuals :

Indeed, and it is not the least paradox of the scientist, this unmatched theoretician is equipped with a good experimental sense and is concerned with practical applications. [F, PGG]

En effet, ce n'est pas le moindre des paradoxes du scientifique, ce théoricien hors pair est doté d'un bon sens expérimental et a le souci des applications pratiques.

His itinerary makes him in fact an exceptional scientist but at CERN, his human qualities, his nature are appreciated just as much. [F, GCh]

Son parcours en fait un savant exceptionnel mais on apprécie tout autant au Cern ses qualités humaines, sa manière d'être.

They are even marginal individuals, as in the case of Charpak. The word was introduced by Charpak himself, but Le Figaro picked it up with a particular insistence, since it fitted in well with its emphatic narrative :

Portrait of a scientist who dreams of « emerging from marginality » [F, GCh, as a title]

Portrait d'un savant qui rêve de « sortir de la marginalité ».

And this conclusion :

Because with fame begins true marginality, that more than one artist has already called solitude. [F, GCh]

Car avec la célébrité commence la véritable marginalité, que plus d'un artiste a déjà appelé solitude.

Grandiloquence, refusal of pedagogy, description of the prize-winner as an exceptional individual, both the enunciator and the addressee of *Le Figaro* are profane and intend to remain so.

VI. Conclusions

Coming back to our diagram that distinguishes enunciators familiar or not with the world of science, on the one hand, popularisers and non-popularisers on the other, there are four possible relations between enunciator and addressee :

i) - that of an enunciator familiar with the world of science and who popularises. He takes charge of the explanations himself, and builds an addressee who wants to learn. This is the teaching relationship, complementary in the terms of Gregory Bateson³, adopted by *Le Monde*.

ii) - that of an enunciator familiar with the world of science but who does not popularise. He is not offering his addressee the complementary-down position of the pupil, the relation is more symmetrical, there is complicity in the lack of interest for an explanation. "We can talk about science, even wave technical terms, but we don't feel we have to dig into arid scientific knowledge". *Libération* builds a addressee who refuses the pedagogical situation, but does not claim his ignorance.

These first two types of newspapers, that have "permanent correspondents" in the world of science consider that it is an important area which their readers want to hear about - but in two very different manners. The other two types do not think that science is a part of the main expectations of their readers.

iii) - the position of an non familiar enunciator who popularises. He cannot do so in his own right but he quotes experts. Both enunciator and addressee are ignorant but want to learn. They are in roughly symmetrical positions, facing experts to whom the reporter has asked questions that the reader himself could have asked. This is the position occupied by *France Soir*.

iv) - finally that of an enunciator non familiar with the world of science who does not give explanations. He builds complicity in ignorance with his addressee. This is the case, in two different manners, of *Le Parisien* and *Le Figaro*

The relation of the addressee to his own ignorance plays a pivotal role in this potential meeting between reader, newspaperman and scientist. It will determine the position that a given reader will be willing to accept - and, along with similar "agreements" in the fields of political news, foreign affairs or cookery, it will determine the newspaper he reads.

Our main finding is how great the differences are between newspapers. This means that it is impossible to make general statements about the press and is contrary, for example, to the description made by D. Nelkin : "Yet a surprising feature of science journalism is its homogeneity. While journalistic reports on science and technology vary in accuracy, depth and detail, most articles on a given subject focus on the same issues, use the same sources of information and interpret the material in similar

terms."¹⁶ There are in fact important differences, but they must be looked for in the right place : in the enunciative device, in the relation between the newspaper and its readers.

By analysing the discourse of the national daily papers in France concerning the same scientific news event, the attribution of the Nobel prize in physics first to Pierre-Gilles de Gennes, then to Georges Charpak, we have found a series of variations in the representations carried by these media concerning science, research, scientific discovery and relations between science and society. These variations are not erratic : they can be organised around two axes, one that expresses the relation of the enunciator to the universe in question (familiarity/non familiarity) the other one concerning the relation between the enunciator and his potential addressee (popularising or not).

These representations are simply the result of the way the general press works. They are the stakes of the play between offer and demand, as expressed in the implicit hypotheses the medium makes about its readers' culture and interests.

Morality : the only hope for those who try to understand the diffusion of scientific knowledge in our modern societies, is to carefully study the complex intersection between the needs for information, exactitude and pedagogy concerning scientific knowledge and the multiple strategies that run through the media market of images and discourse.

¹. A number of books have been written on the relation between science and media. Among those in English : Nelkin, D. 1987, *Selling Science : How the press covers science and technology* (New York : W.H. Freeman) ; Friedman, S. M., Dunwoody, S., and Rogers, C.L. Editors, 1986 *Scientists and Journalists : Reporting Science as News* (New York : Free Press) ; Goldsmith, M., 1986, *The Science Critic : A Critical Analysis of the Popular Presentation of Science*, (London : Routledge and Kegan Paul)

². On October 17, 1991 (postdated October 18 for *Le Monde*) and October 15, 1992 (October 16 for *Le Monde*)

³. Unpublished

⁴. Dated Octobre 17, 1991 (18 for *Le Monde*) for de Gennes and signed Jean-François Augereau and Jean-Paul Dufour (*Le Monde*), Guy Benhamou et Dominique Leglu (*Libération*), Jean-Luc Nothias (*Le Figaro*), Arnaud Lévy (*France Soir*), Maryline Baumard (*Le Parisien*).

Dated Octobre 15, 1992 (16 for *le Monde*) for Charpak and signed Jean-François Augereau (*Le Monde*), Dominique Leglu (*Libération*), Jérôme Strazzulla et Laurent Mossu (*Le Figaro*), Arnaud Lévy (*France Soir*), Jean Darriulat (*Le Parisien*).

In the original study, we also examined the daily *La Croix-l'Evénement*, *L'Humanité* and *le Quotidien*, and the weekly *Le Point*, *le Nouvel Observateur* and *L'Express*. The report, in French, can be provided by the authors on request.

⁵. The study of enunciation mechanisms, which is a central issue in contemporary linguistics, is at the point of convergence of two conceptual traditions : a French one through the work of Benveniste, Ducrot et Culioli, among others, and an Anglosaxon one, represented mainly by the development of the "speech act theory" in the work of Austin, Strawson and Searle, among others.

⁶. In this study, we are analysing the texts "in production". A study "in reception" would be possible and no doubt interesting. In that case we would be examining the discourse of "real" readers in reaction to our texts. For a theoretical discussion of the relation between the production and the reception approaches, see E. Veron, 1987, *La sémiosis sociale. Fragments d'une théorie de la discursivité* (Paris, Presses Universitaires de Vincennes).

⁷. Bateson, G., 1973, *Steps to an Ecology of Mind*, (London : Paladin Granada)

⁸. Veron, E., 1985, *L'analyse du contrat de lecture : une nouvelle méthode pour les études de positionnements de supports presse*, in *Les Médias. Expériences, recherches actuelles, applications*, (Paris : IREP), pp. 203-230 and Véron, E., 1988, *Presse écrite et théorie des discours sociaux : production, réception régulation*, in *La presse. Produit, production, réception*, (Paris, Didier Erudition), pp. 11-25

⁹. Veron, E., 1992, *Reading is doing : Enunciation in the Discourse of the Print Media*, *Marketing Signs*, 14-15

¹⁰. We use the following abbreviations to identify the quotations: Le Monde - M; Libération - L ; Le Figaro - F ; France Soir - FS ; Le Parisien - P. The initials PGG refer to the articles on Pierre-Gilles de Gennes and GCh to those on Georges Charpak. The quotations have been translated as closely as possible to the original text - sometimes at the cost of elegance in English.

¹¹. We have selected articles published on the day of the announcement. The same newspapers may have, for example, a weekly science section with different characteristics.

¹². See in French a special issue of *Langue Française* (1982) 53, or Jacobi, D. and Schiele, B., Editors, 1988, *Vulgariser la science : le procès de l'ignorance*, (Paris : Champ Vallon).

¹³. In the complete study, we found that *Le Quotidien*, *l'Humanité*, *La Croix* and the weekly *Nouvel Observateur* could be classified with *Le Monde* and the weekly science supplement of *Le Monde* with *Libération*. There are of course subtle differences within each category that are discussed in the full report.

¹⁴. In the full study, we found the weekly *Le Point* in the same position.

¹⁵. The expression is no more appropriate in French than in English.

¹⁶. Nelkin, D. 1987, *Selling Science : How the press covers science and technology* (New York : W.H. Freeman) p 9.