The use of Alert Signals: What does the Pharmaceutical Sales Force information noise on the internet signal?

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Summary

Internet provides an interesting contribution to the ever growing business information explosion, especially through PR releases. Correspondingly, with increasing economic acceleration there is growing information need. All this creates the risks of overwhelming the researcher using electronic search engines. A good screening procedure allows to get "useable" information by the search criteria definition; however the search results are not always "useful". What's true for business is true for the research on business. The paper presents an example showing the use of an automatic alert through a publicly available search engine (Google) and the validation of the results over a subsequent period and the comparison of the results with those from a commercial data base of news available to the academic institute (LexisNexis). The paper reviews the search results, notably the preponderance of the pharmaceutical sector and the higher results for a paid-for search engine compared to a free engine, and explains these findings in terms of theories of information, signaling and signal detection and their application to the internet market place, and provides some basic recommendations on the use of search engines.

Keywords

Adverse selection, moral hazard, noise, imperfect information, signaling, signal detection theory, alert, internet

Introduction

There is an old Venetian story about the princes of Serendip, who went on voyages to look for something. They did not find what they were looking for, but discovered many other things which were interesting. For us, this paper has been a serendipitous voyage. It started from a simple alert on Google by one of the co-authors to keep abreast of his field of "sales force". But the results, the enquiry on the results, the validation, the discussion and suggestions by anonymous referees, led to many other exciting discoveries.

There are two puzzles which we observed, and to which this paper is addressed. First, for some reasons the pharmaceutical sector appears in about a third of the alerts on "salesforce". This seems disproportionately high since this sector does not account for a third of the economy. The second is that free alert agents like Google are not reporting as much information as paid-for professional databases like Lexis-Nexis. In fact, Lexis-Nexis reports ninety times as much news as Googles on any given day, (although there is some amount of redundancy in LexisNexis information because different journals in the database report the same event)! This is a puzzle because one would expect that more internauts are plugged into Google for free than those who are paying Lexis-Nexis. Therefore, more media should be targeting free search engines.

Our explanations of the two phenomena draw from a number of fields and concepts. We first review, very briefly, some of these fields and concepts in part I. We then look at the results which we found puzzling in part II. Finally, in the rest of the parts, we discuss the possible reasons for these results using the concepts which we developed in the first part. Broadly speaking, Parts III and IV deal with the transmission of signals, while parts V and VI deal with the perception of signals. More specifically, in part III, we take up the question of why the pharmaceutical sector predominates in the dissemination of sales force information. This is perhaps a bit of a digression from the rest of the paper, but it is where our journey started. In part IV, we apply our introductory concepts to why consultants to pharmaceuticals provide information on the internet. In part V, we take up the question of why users may prefer a professional agent to a free agent in order to receive information. In part VI, we make a few general comments on the use of Alert Agents, once again to tie up with our initial journey.

I. Review of related concepts

The concepts which we introduce in the first part include information theory, contract theory, efficiency of markets, signaling and signal detection theory, internet and alerts. While we understand that economic theory is disparate concepts and that the ones we have chosen are not neatly related, we are focusing on these for the brief purpose of this paper.

Traditional economic theory assumes perfect competition for the most part, utility maximizing rationality, including perfect information and free competition. While the free competition assumption has been dropped frequently to study second best solutions such as monopoly and other domains such as oligopoly and monopolistic competition, the perfect information assumption and the rationality assumption has been challenged more recently. As a result of these challenges, inefficient markets often operate bringing in attendant challenges to traditional economics. A whole new field of behavioral economics has sprung up to answer many of the situations considered as puzzles by classical economists.

Within the imperfect information assumption, there is a special case of asymmetry of information producing special problems such as adverse selection (Akerlof) and moral hazard (Stiglitz & Weiss)[*]. To counter these problems, solutions proposed have been the development of guarantees and cautions as well as the development of intermediaries with private information[†]. A special case of the moral hazard problem is the principal agency problem reported in management literature[‡].

A special case of the principal agent problem dealt in financial literature is the shareholder-manager relationship. The Free Cash Flow theory (Jensen, 1986) deals with the

[*] The distinction between the two is that adverse selection is the problem faced by an agent before the event while moral hazard is the problem faced after an event (Mishkin 2004).

[†] For example, securities intermediaries like stock exchanges create rules for doing business that add to information flow and to ethical norms for participating and their own credibility and reputation are a function of fixed and human capital invested in the exchanges (Mahoney, 2002). Value would be added to the society (in the Pareto optimality sense) if the adverse selection problem could be resolved by the provision of information. However, if people with information provide this publicly, it creates a free rider problem. So some intermediaries (like banks) prefer to keep the information privately.

[‡] The principal agent view of relationships stems from a contract theory view to economics. According to this, in a contract one party is a principal and the other party is an agent. However, the agent may have his own personal agenda and may therefore not try to maximize the results for his principal. The contract therefore has to contain special clauses of controls and incentives.

specific problem that managers often spend available cash flow on non-productive or non-efficient uses from a shareholder viewpoint. One way of controlling this moral hazard has been to use share-market values to reward managers.

This approach requires ensuring that markets value the shares efficiently. This is so, according to the Efficient Market Hypothesis. This Hypothesis is based on the market having perfect information, even inside information. A major critique to this Hypothesis is its circularity: that is, if the Hypothesis is true, the market is already efficient and arbitragers are redundant. However, if no one intervenes to arbitrage, how will the market be efficient? Secondly, continuing with the asymmetric information problem, it will be in the interest of a manager to provide positive information to the market but withhold negative information. This negative information would have to be found by the market from other sources.

However, whether one follows the Capital Asset Pricing approach or the Arbitrage Pricing approach, markets are indeed brought into equilibrium by either a large number of small investors or one large investor by the procedure of arbitrage. Arbitrageurs are those who recognize the true value of information. By default, many others do not recognize the true value of information. This is clear because if at any one time there are people buying and selling shares, everybody does not interpret market information in the same way. The same signal about a firm is detected differently by different people. To separate the value creating information from the rest, the latter is termed as noise (Black, 1986). Some people react to noise and are termed noise traders. Arbitragers essentially move in to correct this noise.

If information comes in, before an arbitrager corrects the share market, the share market will have to be in disequilibrium ex ante. Let's say the price has increased because of some noise. This means that even if "noise" has to be corrected, "noise" must have made some impact before. If noise makes an impact, we should be able to make money on noise, i.e., noise should be useable. This is what smart money does (Schleifer, 2000). It adds euphoria to noise, pushing prices in a direction and then it pulls out before the others, causing the bubble to burst. Thus arbitragers may add to inefficiency of markets. Noise can also be used by the fund manager who wants to show that he has private information, even if he doesn't (Trueman, 1988). These examples show that even if noise does not have useful information, noise can be useable to create profits for some. Of course, nobody may really know what is noise and what is information, except with hindsight, adding a risk element (Black, 1986).

Transposing this to marketing, or more specifically within the field of hard selling, it would be important for innovative sellers to create a perceived need for their products. For this, they would create noise. For their noise to be credible, they may need to look for signals on which they could piggy-back their noise. The business community, or some part of it, is therefore on continuous alert for usable noise signals. This paper is going to argue for such a phenomenon.

Having reviewed the concepts of information and noise, we now introduce signal and signal detection theory, because if some agents are transmitting noise-signals, they are evidently interested that their signals be detected.

Signaling is the communication of information. This communication could be done by what the manager is doing by his actions. There are some major problems of signaling. One is that managers may send wrong or false signals. For example, producers of low-quality products could claim high-quality (Spence, 2002). This kind of behavior is limited if one wants to play repeated games. Another problem is that one may not want to signal to everybody, but rather to restrict information. This could be the case if there were value adding customers and value destroying customers. The solution would be to create difficulties to access information for the latter or charge a fee. Spence (2002) gives the example of taking time spent as a signal of interest because time is in short supply. The other problem is that a manager's signal may be open to diverse interpretations. For example, if the dividends are raised, the manager is signaling that he has adequate cash flow. He may also be signaling that he does not have alternative investment projects. Therefore signal detection may vary according to the respondent.

According to signal detection theory (see Heeger, 2003 for an introduction, Logan, 2004 for evolution of the theory), which is individual based, a person is perpetually exposed to inside and outside noise. As a result he does not detect all signals he is exposed to because some of them get lost in the noise (termed as a "miss"). When he is looking out for signals, he can make mistakes and think that there has been a signal when there has been none (termed as "false alarm"). The theory is able to separate notions of "sensitivity" of individuals to signals and also their conservative or liberal "bias" towards a signal. Sensitivity is the signal-to-noise ratio or the standardized mean difference between the signal and noise distributions (Ye &

Van Raaij 2004), as shown in the figure below. In terms of figure 1 below, if the curves overlap a great deal, sensitivity is considered low. If the response criterion is shifted to the right, there is a conservative bias, if it moves to the left, there is liberal bias. The theory has been used in sales and marketing. For example Hutchinson and Zenor (1986) apply it for brand-attribute associations, Tashchian et al (1998) discuss the problems of using it to advertisement recognition, Knowles et al (1994) used if for Sales Effectiveness, Ye & Van Raaij (2004) uses it to study sensitivity and bias in brand awareness as well as in brand likeability.

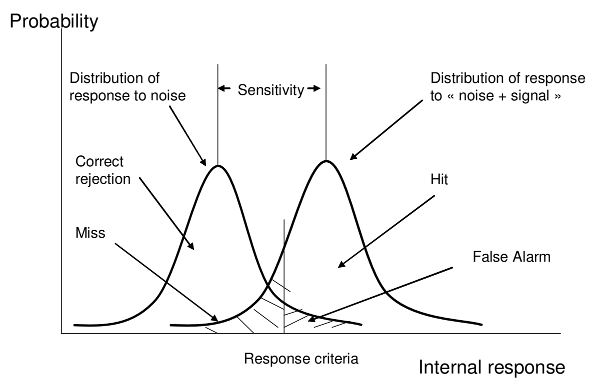

Figure 1: Normal distribution of probability of Internal response to noise and « noise + signal », Source: regrouping based on combination of different authors cited in text

It would be tempting to associate the false alarms of signal detection theory to the concept of noise explained in the financial trading context. To some extent this would be true but we would place a few limitations. First noise traders not only detect false alarms, they also take the trouble to act on the signal detected. This means that the false alarm is strong enough to overcome inertia as well as transaction costs. Second, smart money must know which false alarms are strong enough to cause noise traders to react. This requires total transparency of reaction probabilities and/or homogenous perception curves to noise and signals and also homogenous transaction costs. With these disclaimers, we could say that part of the "false alarms" region constitutes usable noise. However, the area of usable noise exists elsewhere too, as explained below.

Heeger (2003) points out that as noise increases, the dispersion of probability distribution of noise and noise+signals widens, as illustrated in figure 2. This increases the overlap between the two distributions. This therefore increases the number of misses and false alarms. So, even information currently rejected outright or misses could theoretically enter the range of false alarms, once new noise is created. To make the example concrete, if smart money adds to the noise, even if a person would not have taken it as a false alarm, with the greater noise, he may take it as a false alarm. In a more marketing set-up, if the media talks a lot about a non-essential attribute of a company's product (noise), the fact of media attention could be mistaken as a signal directly or indirectly (for example, through the creation of familiarity bias). So based on the foregoing discussion, we can say that there is an overlap between "false alarms and usable noise". All kind of noise which leads to false alarms may not be useable. At the same time, noise which is normally rejected may be considered as alarms if the level of noise is increased. Partly, this could be due to the fact that people take time to adjust their response criteria to the higher level of noise. In a dynamic setting, repeated false alarms and frustration with the results would finally make them adjust the response criteria.

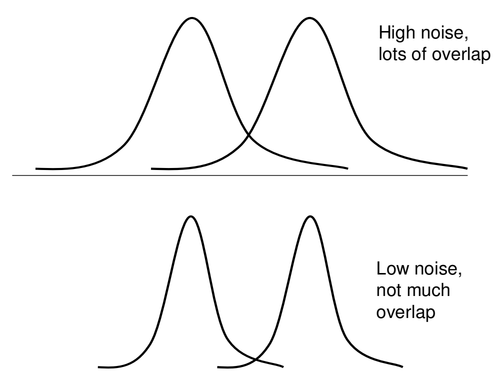

Figure 2: When noise is greater, the spread is greater and the curves overlap more (Source Heeger 2003)

Having noted some key concepts which we will apply later to the case in hand, we now introduce very briefly the changes brought about by the internet to the information market.

The basic features of the internet is the sharp reduction in transaction costs, the quadratic increase in networking effect and the reduction in noise to signal ratio by the use of fiber-optics (This aspect of technical signal detection we will ignore in this paper). All of this has led to an information explosion. This information explosion has made information availability more perfect and resolved some of the problems of imperfect information discussed earlier. In fact information availability and transaction costs to obtain the information have plummeted thanks to the internet. The result has been an improved ability of buyers to find low cost sellers, improved liquidity for sellers, the ability to outsource because of the improved reaction time obviating the need to have fixed contracts to tie in human resources, and the ability to create some new markets which would not have been possible without this technology. Different authors are pessimistic (Porter, 2001) or optimistic (Spence, 2002) about the continuing further advantages depending on whether they consider price based competition to be destructive or productive. There will be a natural weeding out at some stage and prices will stabilize and, perhaps, quality aspects will again be emphasized. If quality cannot be measured ex ante, as is the case for services, this will then bring us back to the adverse selection problem. Some of this can be resolved by the share-ware kind of voluntary contribution solutions (see Regner 2004 for an application of this to the music industry).

At the same time as conferring advantages, however, the information overflow has exacerbated the searching and processing capabilities of individuals (bounded rationality problems) because the search for lower prices and more customized services takes time and is costly (Elkin-Koren & Salzber, 2004[§]). This searching problem is partially resolved by putting out alerts.

Managers have placed constant alerts for new information linked to all its domains: scientific, commercial, societal, strategy. The "Scientific Alert" is linked to scientific techniques, technology, processes and methods. The 'Market Alert or Competition alert" is linked to commercial aspects like markets, customers, sales techniques and competitive aspects such as existing competitors and new entrants, existing and new substitutes, supplier and customer relations). The "Societal alert" is linked to cultural, political, sociological, historical, institutional, public opinion, employees, law and new legislation and the environment. The "Strategic Alert" takes place upstream in indicating which critical factors to be alerted to and downstream to get the benefits of those alerts and in the coordination of the different alerts (CIGREF 1998). It is evident also that the management academic (teacher,

[§] See Chapter 6 of their book.

researcher) also needs to be aware of the latest developments in his field and therefore needs to participate in putting out alerts. The internet industry has come out with a solution permitting alerts on pre-specified research criteria. One such mechanism is the Google Alert which will be the focus of our attention. Such mechanisms reduce the time required to search for pertinent information (for example, sales force related) among the mass of information (tourism, archaeology, etc.) not relevant to the researcher.

Along with the explosion of quantity of information available owing to the specific nature of internet technologies where everybody is free to voice and publish his information, there has been a strong variability of the quality of information, some of which may be categorized as noise. The question is how to distinguish between information and noise on the internet and how to distinguish between useable noise and other noise? The researcher has to be careful to structure his "alerts" to make sure that all pertinent information reaches him, maximizing useful information and perhaps usable noise and minimizing useless noise. The following example explains the complexity and difficulty of separating the pertinent and useful.

Take the example of a manufacturer who wants to reformulate his marketing strategy, especially product and price. By traveling through the websites of competitors, he can gather information on their offerings along all relevant dimensions. This information is certainly pertinent and usable, but is it useful? After noting the characteristics of the products, the engineers will get many new ideas; but these will not necessarily be the most interesting for the enterprise because the entire data collection ignores the customer. The customer, it may be reminded, is the source of more than 50% of all ideas of successful new product introductions (von Hippel, 1982). It is from the above, therefore, that the mission of salesmen to bring back useful information (feedback) takes meaning. The salesman can find out from the customer which competitive products are really meeting a perceived need and the degree of satisfaction with different product features. Based on this, the manufacturer could then give more precise instructions to his research engineers, regarding competitive positioning: "Me too" or "Me better".

The information from the internet may not therefore be the most useful, but it could nevertheless be usable. If the information is present, it is at least responding to a need to express, and perhaps exploding because the expression of the need is being given a positive feedback. More simply expressed, people publishing information on the internet must be getting some returns to continue putting out information. If information of some sort is then being put out by a lot of people, it is because they believe that it is resulting in superior returns than the opportunity cost and effort. Porter (2001) suggests that the information noise may be a response to investor over-enthusiasm for high-technology. Since investors had at some point based market potential and growth possibilities on "click-through rates" and other dubious metrics, today some businesses are continuing to make noise, hoping it will attract attention. The "stock market created noise" and "firm created noise" therefore are inter-related and mutually inter-dependent; each feeding on the other to create bubbles.

One can link the internet noise to the imperfect information and adverse selection problem. Fabel and Lehman (2002) study the adverse-selection problem in used cars in the electronic market place. If so many participants are present on the internet, how do respondents choose and avoid adverse selection? According to them, adverse selection exists both in the traditional market place and the virtual market-place. In efficient markets with arbitrage, if prices are lower in the virtual market place, it is evident to them that the risk of adverse selection must by higher because of non-observable quality variables, because the risk-adjusted return must be the same in both market places. They find that more severe adverse selection problem especially affects high-quality providers. However, they also point out that not all the internet generated responses are really useable. For example, internet may allow you to get more offers of used-cars in your price-category segment, but many may be located too far to permit going and inspecting.

So far we have focused on just the noise and information aspects related to the development of internet. However, the internet has also brought in a number of sweeping changes, some of which may be temporary, in the way we do business (Porter 2001) in all departments: investor relation information, increased business outsourcing possible owing to faster contact, especially in Human Resource Management (administration, training, time and expense reporting), technology development and procurement, inbound and outbound logistics, operations, marketing and sales as well as after-sales service. Some of these appeared in our search results, discussed in the next part.

II. The case study: methodology and observations

The two researchers, one interested in behavioral corporate finance and its links to restructuring, and the other specialized in sales force and distribution management, both teach in an institution specializing in pharmaceutical sector, among others.

Last year, one of us put out an alert on Google for "sales force". His interest was to find a practical case encouraging students to think about the limitations of internet and to use simple tools available to students. One to five responses were obtained from the Google Alert on each working day. Mostly these responses were Press Releases indicating an increase in the number of salesmen, the nomination of new team leaders, the presentation of new tools (SFA or Sales Force Automation and CRM or Customer Relationship Management). Sometimes, the information included details of sales-force composition as part of the information for financial markets.

During the period mid-June to end-July, he found a disproportionately high number (10 out of 44 or 23%) of alert results related to the pharmaceutical sector. In August, the responses relating to the pharmaceutical sector were even higher: 36%. Why should the pharmaceutical sector create so much noise?

To be sure that all this was not random, we followed this over another three month period (October-December 2004) on Google. The pharmaceutical sector was creating 36% of the noise, with a little monthly variation (from 30% to 38%). To ensure that Google was not biased, we looked at LexisNexis data base of periodicals and newspapers, a database generally available in many libraries (similar databases exist with other universities). Although the two databases are not strictly comparable, even for the method of classification, our major purpose was only a broad confirmation of our results. Since the Google alerts were all in English, we limited the Lexis-Nexis research to 11,000 periodicals categorized under "all news in English". Moreover, we regrouped the three LexisNexis sectors: Pharmaceuticals, Biotechnology and Medicine & Health. Over the October-December quarter, we selected six days at random and searched articles on "sales force". The results were similar at 34%. We followed this up with another three months (first quarter 2005) on Google and on LexisNexis. Table 1 gives the different results for Google. The share of results of the pharmaceutical sector went up to 40%, increasing the paradox.

Table 1

Results from Google: Pharmaceutical sector alerts compared to total								
	October to December 2004				January to March 2005			
	Oct 04	Nov 04	Déc 04	**Total**	Janv 05	Févr 05	Mars 05	**Total**
Total Responses	75	58	30	**163**	57	49	68	**174**
Of which, Pharmaceutical sector	28	22	9	**59**	18	24	28	**70**
Pharmaceutical as percentage of total	37%	38%	30%	**36%**	32%	49%	41%	**40%**

Table 2 gives the summary of the different results for LexisNexis. The details of the LexisNexis researches are indicated in tables 3 and 4. Although the figures for the pharmaceutical sector rose a bit for Google (from 36% to 40%) and dropped a bit for LexisNexis (from 34% to 29%), all of this confirms that the pharmaceutical sector is indeed making a lot of noise in this area of sales force management. Is it signaling something, consciously or unconsciously?

Table 2

Summary of Results from LexisNexis: Pharmaceutical sector news reports compared to total		
	October to December 2004	January to March 2005
Total Responses on 6 randomly selected days	975	1074
Of which, Pharmaceutical sector (1)	327	310
% Pharmaceutical	**34%**	**29%**
(1)Pharmaceutical sector also includes Biotechnology and Medicine & Health		

All of the above would be normal if the pharmaceutical sector represented a third or even a fourth of the economy of most English speaking countries. We looked at the US Department of Labor Statistics report for November 2003. The report indicated that 11% of all US jobs are in sales force. However, for manufacturing industries, sales force jobs are only about 3% of total jobs. The report also indicated that Pharmaceutical and Medicine Manufacturing sectors correspond to only 2% of all Manufacturing sector jobs. There may be many classification errors, and it is possible that many sales force jobs are reported by tertiary sector purely marketing organizations. But, all in all, we come to the conclusion: articles on pharmaceutical industries make a disproportionately high noise in the field of "sales force".

A separate puzzle is that Google provided us about 169 responses each quarter ((163+174)/2) while Lexis Nexis provided us an average of 171 responses on any given day ((975+1074)/12). In short, LexisNexis provides ninety times as many results as Google Alert service. However, we recognize that journals in the LexisNexis database repeat the same thing and so there is redundancy in the information. However, even this redundancy and repetition have noise value. Google, information does not suffer from this redundancy because of three reasons. First, the Google "sandbox" filters out recent site additions for a few months to avoid the the spam problem. To some extent, relevant information is not being captured for a few months. However, after the initial period, if we assume that the number of new sites created is constant, the number of new alerts will be the same because sites created a few months ago will now be validated. Secondly, the Google Alert concerns only the sites which make it to the top 10 News items or the top 20 sites according to their 118 search criteria. This means only the "best" sites according to their criteria get signaled. In fact, Google is under-reporting. Third, not all websites would allow Google access to information available there because of their privacy rights (see Elkin-Koren and Salzberger, 2004).

There is also a third field of enquiry which we will leave open to other researchers. It is interesting to note that the co-author who put out the initial alert indicated that what aroused his curiosity was the high level of pharmaceutical sector results because of the importance of the pharmaceutical sector to our institution. In terms of signal detection theory it means that the co-author was cognitively searching for a signal of "pharmaceutical" in whatever he was doing. If the percentage was in a certain range which he expected, he would not react. These expectations are fixed by internal noise (his own mindset, memory of experiences, etc.) and external noise (messages from others, books, internet). However, he didn't have an exact fixed percentage of what should be normal percentage: he had some distribution curve in his mind. In figure 3, the curve on the left reflects this noise by a normal distribution around his expected mean. If the percentage is significantly higher than some decision criteria he may have fixed, he will think that there is some signal or abnormality which needs to be investigated because he will believe that there is some new curve such as the one on the right, which is incorporating not only the noise but also some special signal. Of course, even if the percentage exceeds the decision criteria, this could be part of the normal expectations (noise) distribution on the left. In such a case, it would be a false alarm and no reason would be found for the high percentage of pharmaceutical responses. There is also a possibility that the response percentage were below the decision criteria but there was a signal (this would have been considered a miss). In our case, of course, we have to distinguish whether the stronger than expected signal we received is a "hit" or a "false alarm". If we can find some good reasons, we could consider it a "hit"; otherwise, we may assume that it was a "false alarm".

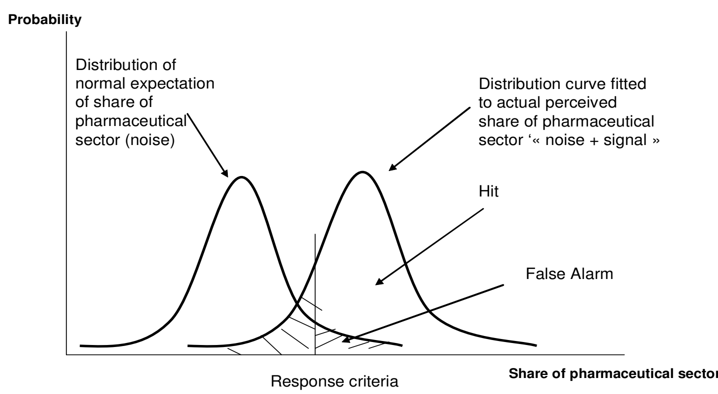

Figure 3: The co-author's detection of disproportionate share of pharmaceutical sector

What can also be noted is that had the abnormally high results been in a non-priority sector, for example automobiles, the co-author may not have taken an interest because he was not looking for this signal.

The questions which could be raised for further research is whether the human mind responds to any patterns or only patterns it is looking for. Also, if other researchers wish to go into the relevance of these findings in their sectors of interest, the results are reported in tables 3 and 4. The reader may note from Table 3 that we have clubbed biotechnology (5.3%), medicine and health (18.1%) and pharmaceuticals (10.2%) to get a sub-total of 33.5% share of responses of these sectors. However, since there are some regroupings included as separate possible searches such as "Business and Management" and "Manufacturing and Mining", the totals exceed 100%. However the industry-wise criteria of Lexis-Nexis retrieves articles that have been indexed as being very relevant (85%+) to the chosen sector, rather than all mentions. This again results in duplication if a news item pertains to a company operating across more than one industry. However, since Lexis-Nexis was chosen only to confirm our Google findings, we did not worry about such niceties. Overlapping should occur for all industries and not just for pharmaceutical industries.**

Table 3

Details of Lexis Nexis research first period (October to December 2004)
Number of responses to search for sales force on each randomly selected day per sector

	11/10/2004		25/10/2004		16/11/2004		18/11/2004		24/12/2004		29/12/2004		TOTAL OFF 6	
	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	total in RAW in number	the 6 in number in %off total number off all RAWS
All industries	201	100,0%	243	100,0%	223	100,0%	151	100,0%	73	100,0%	84	100,0%	975	100,0%
Biotechnology	4	2,0%	13	5,3%	20	9,0%	5	3,3%	6	8,2%	4	4,8%	52	5,3%
Medicine & health	28	13,9%	45	18,5%	43	19,3%	28	18,5%	17	23,3%	15	17,9%	176	18,1%
Pharmaceuticals	19	9,5%	26	10,7%	24	10,8%	12	7,9%	8	11,0%	10	11,9%	99	10,2%
Sub-total	51	25,4%	84	34,6%	87	39,0%	45	29,8%	31	42,5%	29	34,5%	327	33,5%
Advertising & Marketing	47	23,4%	59	24,3%	43	19,3%	28	18,5%	11	15,1%	19	22,6%	207	21,2%
Automotive	3	1,5%	8	3,3%	1	0,4%	1	0,7%	4	5,5%	7	8,3%	24	2,5%
Banking and Finance	12	6,0%	21	8,6%	16	7,2%	11	7,3%	5	6,8%	6	7,1%	71	7,3%
Business & management	114	56,7%	171	70,4%	139	62,3%	97	64,2%	44	60,3%	52	61,9%	617	63,3%
Chemicals and Plastics	13	6,5%	28	11,5%	19	8,5%	10	6,6%	6	8,2%	11	13,1%	87	8,9%
Computers & Technology	40	19,9%	44	18,1%	26	11,7%	27	17,9%	8	11,0%	8	9,5%	153	15,7%
Consumer Products	0	0,0%	2	0,8%	1	0,4%	3	2,0%	4	5,5%	6	7,1%	16	1,6%
Electronics	2	1,0%	7	2,9%	6	2,7%	5	3,3%	0	0,0%	2	2,4%	22	2,3%
Food & Beverage	6	3,0%	4	1,6%	9	4,0%	1	0,7%	1	1,4%	3	3,6%	24	2,5%
Insurance	5	2,5%	5	2,1%	12	5,4%	5	3,3%	1	1,4%	2	2,4%	30	3,1%
Law & Legislation	7	3,5%	24	9,9%	25	11,2%	11	7,3%	5	6,8%	12	14,3%	84	8,6%
Manufacturing & Mining	31	15,4%	44	18,1%	43	19,3%	23	15,2%	20	27,4%	17	20,2%	178	18,3%
Property	11	5,5%	4	1,6%	8	3,6%	5	3,3%	5	6,8%	4	4,8%	37	3,8%
Retail & Wholesale trade	15	7,5%	14	5,8%	10	4,5%	14	9,3%	6	8,2%	8	9,5%	67	6,9%
Science & Nature	6	3,0%	27	11,1%	31	13,9%	10	6,6%	6	8,2%	18	21,4%	98	10,1%
Services& Professions	19	9,5%	28	11,5%	15	6,7%	10	6,6%	4	5,5%	5	6,0%	81	8,3%
Telecom & Wireless	15	7,5%	28	11,5%	14	6,3%	4	2,6%	5	6,8%	4	4,8%	70	7,2%
Travel & Leisure	8	4,0%	8	3,3%	1	0,4%	5	3,3%	2	2,7%	4	4,8%	28	2,9%

All subjects; all countries; all news in english; in all News publications = 11000
for 6 randomly selected days
in number of occurrence

We looked again at the alerts we obtained from Google and found that a lot of them were from consultants. Some of these consultants specialized in Market Research and in the effective use of sales force for pharmaceuticals. Others were specialized in training the sales force for pharmaceuticals. While Market research on effectiveness and training to improve

** At the limit, one could argue that the Pharmaceutical and Biotechnology are overlapping to a large extent and included in Medicine and Health, thus dropping the percentages from 33.5% to 18.1%. But even this is much higher than the 2% expected share of pharmaceuticals.

effectiveness are commendable subjects, the question is why so much in the pharmaceutical sector.

Table 4

	Details of Lexis Nexis research second period (January to March 2005)													
	Number of responses to search for sales force on each randomly selected day per sector													
	03/01/2005		15/01/2005		25/01/2005		07/03/2005		08/03/2005		16/03/2005		TOTAL OFF 6	
	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	total in RAW in number	the 6 in number in %off total number off all RAWS
All industries	131	100,0%	69	100,0%	252	100,0%	251	100,0%	198	100,0%	173	100,0%	1074	100,0%
Biotechnology	9	6,9%	4	5,8%	6	2,4%	4	1,6%	3	1,5%	8	4,6%	34	3,2%
Medicine & health	23	17,6%	11	15,9%	49	19,4%	47	18,7%	47	23,7%	21	12,1%	198	18,4%
Pharmaceuticals	7	5,3%	6	8,7%	24	9,5%	8	3,2%	13	6,6%	20	11,6%	78	7,3%
Sub-total	39	29,8%	21	30,4%	79	31,3%	59	23,5%	63	31,8%	49	28,3%	310	28,9%
Advertising & Marketing	24	18,3%	14	20,3%	48	19,0%	50	19,9%	48	24,2%	14	8,1%	198	18,4%
Automotive	24	18,3%	1	1,4%	3	1,2%	9	3,6%	6	3,0%	8	4,6%	51	4,7%
Banking and Finance	12	9,2%	7	10,1%	28	11,1%	29	11,6%	16	8,1%	26	15,0%	118	11,0%
Business & management	89	67,9%	48	69,6%	180	71,4%	171	68,1%	134	67,7%	99	57,2%	721	67,1%
Chemicals and Plastics	11	8,4%	6	8,7%	35	13,9%	29	11,6%	19	9,6%	23	13,3%	123	11,5%
Computers & Technology	19	14,5%	1	1,4%	37	14,7%	35	13,9%	38	19,2%	17	9,8%	147	13,7%
Consumer Products	7	5,3%	2	2,9%	3	1,2%	3	1,2%	1	0,5%	2	1,2%	18	1,7%
Electronics	3	2,3%	0	0,0%	6	2,4%	6	2,4%	9	4,5%	4	2,3%	28	2,6%
Food & Beverage	3	2,3%	2	2,9%	8	3,2%	4	1,6%	3	1,5%	4	2,3%	24	2,2%
Insurance	10	7,6%	9	13,0%	14	5,6%	3	1,2%	5	2,5%	6	3,5%	47	4,4%
Law & Legislation	13	9,9%	8	11,6%	23	9,1%	10	4,0%	14	7,1%	13	7,5%	81	7,5%
Manufacturing & Mining	35	26,7%	11	15,9%	51	20,2%	49	19,5%	45	22,7%	32	18,5%	223	20,8%
Property	6	4,6%	5	7,2%	11	4,4%	21	8,4%	8	4,0%	12	6,9%	63	5,9%
Retail & Wholesale trade	16	12,2%	10	14,5%	12	4,8%	18	7,2%	11	5,6%	11	6,4%	78	7,3%
Science & Nature	8	6,1%	4	5,8%	21	8,3%	23	9,2%	13	6,6%	13	7,5%	82	7,6%
Services& Professions	14	10,7%	8	11,6%	26	10,3%	23	9,2%	17	8,6%	14	8,1%	102	9,5%
Telecom & Wireless	11	8,4%	5	7,2%	16	6,3%	15	6,0%	10	5,1%	11	6,4%	68	6,3%
Travel & Leisure	0	0,0%	6	8,7%	6	2,4%	5	2,0%	5	2,5%	1	0,6%	23	2,1%
All subjects; all countries; all news in english; in all News publications = 11000														
for 6 randomly selected days														
in number of occurrence														

In the next four parts, we relate the concepts reviewed in Part I to the results found in Part II. We start in part III to provide explanations to the puzzle of the disproportionate share of the pharmaceutical sector in the transmission of signals.

III. Discussion of predominance of pharmaceutical sector in sales force information

We have noted that both Google and Lexis-Nexis have a high share of pharmaceuticals in the alerts on "sales force". Of course, both these are search engines who are also detecting signals. It is possible that they did not report all the cases existing on the internet and that for technical reasons linked to the state of noise on internet, there is some loss and that both misses occurred and false alarms could be included. A private verification of "misses" is not possible, but false alarms could be checked and verified. However, there is no reason to assume that the pharmaceuticals were included in the alerts although they were "false alarms", but not in the "misses". In short, we would expect misses, false alarms and hits by search engines to be consistent across sectors. We will not, for example, explore the possibility that pharmaceutical industries are paying Google as well as LexisNexis journals to report only pharmaceutical related information.

We have come up with many conjectural explanations. The first few focus on different reasons why the pharmaceutical firms may be particularly sensitive or have a liberal bias towards sales force training, effectiveness and other systems.

One possible explanation is that the pharmaceutical sector is disproportionately rich. As a result, it has a lot of money to spend in discretionary areas such as surveying the effectiveness of its sales force or in training its sales force. Following the Principal Agency problem and the Free Cash Flow theory, managers will spend the money. In terms of signal detection theory, the managers flushed with money have a liberal bias and a low threshold to recognize signals for possible uses of their money. What this means is that pharmaceutical industry managers may then be considered appropriate targets (ability and willingness to pay) for communications on sales force training, effectiveness, etc.

A second possible explanation is that the pharmaceutical sector has been rapid in business process outsourcing. As a result, it may have outsourced its market research function to marketing consultants and part of its human resource function to training consultants, ahead of other industries.

A third possibility is that the pharmaceutical sector is going through a particularly important mutation phase in its industry life-cycle and that this mutation is relatively more important for the pharmaceutical industry than for others. What exactly is this mutation? For this we need to look more deeply at the role of the sales force in the pharmaceutical industry within its marketing mix.

Within the over-all marketing mix, detailing is more important in pharmaceuticals than most other industries. The reasons could be many. One could be that advertisements to the general public are of little utility in the ethical market, they may even be illegal. Narayanan et al (2004) indicate that in the pharmaceutical sector, the sales force effort is less diluted by other elements of the marketing mix. The sales force interaction (manufacturer, doctors) requires a higher knowledge base. This means that the sales force, after training, is more educated and perhaps more productive and effective than other possible elements of the marketing mix, as compared to other sectors. The Return on Investment of using a sales representative is therefore higher in pharmaceutical sectors than elsewhere. All this may well be true because according to one information (Hay group, 2005), the sales force of the pharmaceutical sector expanded 300% over the last decade.

Elementary economics teaches us that Marginal Productivity of a single variable factor goes down as the quantity used of the factor goes up. So, if the sales force in pharmaceutical sector has expanded faster than other factors, its marginal productivity must have fallen. In fact, there are reports that there are too many salesmen contacting doctors. As a result, doctors are saturated with information. If they meet more salesmen, they would meet fewer patients and pharmaceutical sales would suffer. This provides a new twist in the factor of production theory, because the customer's time becomes a scarce resource!

If Marginal Productivity of sales force is falling below marginal cost of recruiting a new salesman as shown in Figure 4 (which assumes availability of unskilled graduates), there would a qualitative change in the marketing mix. One possibility is to attempt to raise the productivity of salesmen and provide them more training. Responding to this, many training firms may be making a lot of noise. Already, companies were training their sales force to better target their doctors (the doctor's base of patients, his prescriptive value, his opinion leader status). The quantitative approach of more contact hours with doctors with the sales representative, even with several teams of sales representatives, worked in the race to get the maximum market-share of doctors and to increase the firm's share in the doctor's prescriptions. But as products became more and more homogenous and the doctor's availability got saturated, a qualitative shift in training needs was required. This shift has been one to a more aggressive approach: better knowledge of doctors, a more aggressive communication strategy, hard selling techniques, better presentations, and the taking of feedback on doctor's intention to prescribe and why or why not.

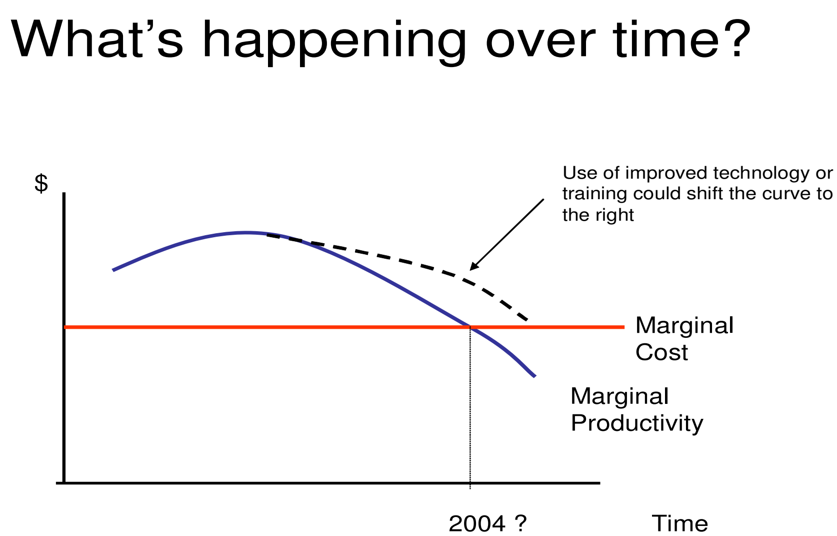

Figure 4: Marginal Productivity of salesmen declines over time but could Respond to additions of technology or human capital (training)

Another possibility is to recruit more qualified salespeople who can understand the competitive strengths of more complex medicines and communicate these to doctors. This would explain a certain number of recruitment advertisements as more qualified people are targeted than the run-of the-mill graduate.

To continue our analogy with the factor of production theory, both measures, training existing sales force and recruiting more qualified people, are in fact changing the ratio of human capital formation to labor. Another possible way is to increase other components of capital. This is probably done by adopting more complex Information Technology (IT).

Of course the pharmaceutical sector was already using a lot of IT. This was partly because the sector is rich, partly because the sales-force doctor contact is a simple one-to-one transaction and consultants could easily come in to computerize the information needs. In fact, the pharmaceutical sector was one of the first to use panels and data based marketing techniques as well as Customer Relationship Management (CRM) and Sales Force Automation (SFA). However, once the consultants have come in, they are trapped inside. The Marginal Productivity of the old IT applications would also fall. To stay in business, consultants need to continue deriving new products, more insightful software. Thus, part of the noise created on "sales force" by the pharmaceutical industry is explained by software consultants trying to stay in the business of providing software support to make salesmen more effective. Examples of such noise include all the activity around the introduction of the latest models of CRM, SFA, etc. Logically, all the sectors should receive this noise proportionately, but it seems that the pharmaceutical sector is receiving it disproportionately because consultants feel upgrades to existing customers are easier to sell than introducing concepts to new customers.

All the above factors indicate that even if the pharmaceutical sector is small in relation to the overall economy, in terms of profitability and surplus cash availability, the pharmaceutical sector is disproportionately richer, attracting a lot of consultants, thus making a lot of noise.

Of course, other possibilities are open to conjecture and could be the basis of future research. For example, perhaps there is a relation of stock price to total noise created. But this relation would have to be specific to the pharmaceutical sector to explain disproportionate noise. One possibility could be that doctors are also rich and are major investors in financial markets. Like most people, doctors would also be subject to familiarity bias and prefer to invest in the pharmaceutical industry in particular and that the sales force is actually serving an investor relation function. This would require a field research of the shareholder composition of pharmaceutical companies and the portfolio composition of doctors.

Another possibility is that with some major reversals owing to side-effects of drugs which have to be withdrawn, the pharmaceutical sector has been forced to make a lot of noise to drown out the negative signals. If consumers and investors judge future performance by past failures of a firm, they have a conservative bias to the use of the products of this firm and to any signals it may give. (The decision criterion moves rightwards). To overcome this, firms need to create more noise so that the spread of the two curves increases, increasing the area to the right of the decision criteria. This would increase the false alarms. But successful trial of new products based on false alarm may result in removal of the conservative bias created by previous signals. Negative information influences bias more if it is repeated. That is to say, there is a possibility that attention weights make a difference to the consumer bias. If this is so, it is important to displace attention of consumers to other matters. So, it may be worthwhile for pharmaceuticals to create more news or noise in other areas than the area of crisis.

IV. Discussion on the use of internet signals for marketing by consultants to pharmaceutical sector

As discussed at the end of part I, it is advisable for firms and new entrants to use the internet and its low costs to signal their ability to provide the same services as large enterprises. This would result from the creation of web pages. As a result, many new entrants would come in. Any orders they get would add to their experience. As a result, we can say that cumulative signaling creates a human-capital effect and adds value. This is also true of consultants and service providers to the pharmaceutical sector.

Consultancy activities for sales force training and effectiveness could not have exceeded limited geographical space without the internet because of the high searching and marketing costs. These costs give inherent advantages to big players and create barriers to entry to smaller players. The fall in transaction costs led to a fall in the barriers to entry and thus allowed individual consultants to signal their presence and thus allowed freer competition. Without the internet, SAP and Oracle for example would provide consultancy for their own software, or franchise it out. However, with the introduction of internet, people already trained by them have been able to offer their services to users in order to take a part of the profit. If these new entrepreneurs have enough customers, they do not need the protection of exclusive salary contracts. Thus, internet has allowed firms to outsource and lower their fixed costs by sharing these with competitors or spreading these over many industries. Similarly, consultants engaged in training of sales force for pharmaceuticals have come in, allowing pharmaceuticals to outsource to them rather than hiring managers within the firm to provide this function. The value added by this shift could lead to a reduction in prices of pharmaceutical end-products making them more competitive with close substitutes in health and beauty.

A related reason is that the sales-force consultants are creating useable noise. By creating a lot of noise, they are attracting attention to their field and indicating to the market as a whole that there are important developments in their field which are to be adopted by savvy clients. If managers believe that shareholders or important investors are influenced by this noise, they will respond to this noise to indicate that they are aware of these developments. Thus, just as a Trueman's (1988) fund manager has to trade to show he has private information on which he is acting, pharmaceutical HR managers may have to show that they are aware that there are special developments in sales force training or effectiveness. Thus noise creates its own demand.

However, the glut of consultants entering the market has created an adverse selection problem. As indicated earlier, Fabel and Lehman (2002) find this to be especially true for high quality used cars. By analogy, we can add this to the quality of services of ERP and CRM consultants to the pharmaceutical sector. How do you differentiate between the quality of service provided by sales-force consultants who are experienced and good and those who are fly-by-night operators? The latter, like the former, have created a website and are waiting for orders. In fact, the lower the quality of service of a consultant and the less the experience, the more time he has to create beautiful websites. The moral hazard problem is that after a pharmaceutical company places an order and advances money to a training consultant, what if he does not provide the service or disappears half-way through? Thus, after having wasted considerable time and effort in finding a consultant, the pharmaceutical manager does not receive adequate service. For both these worries, the pharmaceutical sector customers require either intermediaries who will vouch for the consultants or tangible evidence that these firms are willing to invest time and money to show their desire to be long-term entrants. One example of intermediary verification is if internet media talks about the supplier. A second would be the creation of new virtual market-places for doing business such as www.ebay.com for B2C or www.freemarkets.com for B2B (Kinney 2000). This idea is similar to the creation of stock exchanges to verify and disseminate financial information (Mahoney 2002), discussed earlier. Similarly dissatisfied customers may post notices on their web-pages. An example of effort made is if the suppliers mail their own communication letters on a periodic basis, indicating their seriousness. Thus for both reasons, the creation of websites is no longer enough, but requires constant news messages. Hence our findings of many Alert signals each day. These would be much more numerous if Google Alert did not filter out most such activity.

We are not suggesting that increased noise or information is the only solution. Another method of overcoming adverse selection would be certification by an independent authority (examples, ISO certification, SAP certified consultant for implementing SAP systems). There could also be word-of-mouth or, in our context, internet links for consultants one knows to other specialists. If we trust the first consultant, we may be able to trust his link to the other specialist is reliable. A method of avoiding the adverse selection problem is to modularize the contracts and link payments to sub-sets of services. But these examples do not require the constant churning out of information which we witnessed.

Although Ye & Van Raaij (2004) use Signal Detection Theory to indicate that attention increases brand recognition memory, brand likeability, and a liberal bias to brand likeability, they also indicate that the recognition bias becomes more conservative. That is to say, the response criteria are pushed to the left for likeability (generating more "hits" and "false alarms") but to the right for recognition memory (generating fewer "hits" and "false alarms"). As a result, the effect on trials is not clear. Empirical Research needs to establish whether there is a positive correlation with causal features between the trial rate of consultants and the frequency of their citations in Internet News letters.

V. Discussion on the preference for of professional databases as opposed to free search engines

Why use LexisNexis instead of Google when Google is free and has more connections?

The providing of links to consultants mentioned above creates a free-rider problem. The free-rider problem in internet is that people have access to information for which they have not paid. To avoid this, providers of information, including newspapers and journals, incur extra trouble to provide their information only to intermediaries (LexisNexis, EBSCO) who will release the information only to those who have paid for a package of information. The content provider would in turn get paid.

The access to a network quadratically multiplies its value according to Metcalf's law. So, providing information in a manner that a free search engine like Google can find it implies that a lot of people see it, but get it free. If the purpose is to create worldwide consumer awareness, this would be a good B2C solution. However, in B2B transactions, as in our example of consultants providing sales force training or measuring sales force effectiveness for the pharmaceutical firms, individual consumers are not important since no orders are expected from them. Our evidence that more information is available on LexisNexis shows that in fact businesses prefer to provide their information to professional press, because the readers interested in paying for the information service may have the ability to pay for the consultancy service also. In terms of signal detection theory, the level of noise has been reduced by focusing on LexisNexis which has the ability to separate corporate news. Although useful respondents may miss the signal because they are not tuned in to LexisNexis, the proportion who would detect the signal on Lexisnexis would increase since they are more sensitive to it (because of reduction in noise).

We have already indicated that within the context of signaling, Spence (2002) indicates occasions where it would be better to restrict demand to those who are interested by making them pay a fee or spend time. As an example, Bhargava and Feng (2005) report that in the 1990's, AOL profitably limited its network to those who would use its special software equipment. This was useful to those who didn't understand the internet but sent a signal of high costs to the savvy internet operators who then stay away. Their exit suited AOL as they take up a disproportionate amount of network capacity and are value-destroying, from AOL's perspective.

Along these lines, we can suggest that Google and the World Wide Web are free. Too many people are wired in. As a result, a signal sent on Google would generate a lot of enquiry. However, as pointed out by Porter (2001), a lot of enquiries mean incremental costs for businesses that have to respond to each and every query. The idea then is to limit the queries to those who are serious. While posting information on the website is one way, another way is to limit the original information signals to those who may be professionally interested.

As a result, it may be better for new businesses to be talked about in limited but professional networks rather than in unlimited but free networks.

VI. Discussion and recommendations on the use of signaling and alert signals

We must come back and review the co-author's initial problem, even if it remained largely unanswered. How do you sift through a large amount of internet noise to get specific information in your field of expertise to let students know what is happening in the market place? If Alerts have to be put out, which kind of search engine should one use? Obviously, one does not have the time to read all the LexisNexis responses on a daily basis. Yet, if the Google Alert provides only a small sample of responses (and hence within rationality "bounds"), would it even be representative of the total noise? These issues still need to be explored, but we make a few observations.

*Using an intelligent agent such as the Google research filter may provide pertinent information that something new or abnormal is happening.

*The LexisNexis research became more interesting once an additional parameter was introduced. "Sales" alone was too large, "sales force" was still too wide and had to be coupled with "Pharmaceutical" to provide more meaningful results. At the other extreme, "Sales Force" AND "Pharmaceutical" AND "Finance OR Stock Exchange" was too narrow to turn up results.

*A signal which is obtained still needs to be verified.

*If possible, there is a possibility of using more specialized research agents such as Copernic (professional version). However, we had a self-imposed constraint of using free tools accessible to students.

*Using professional databases of financial and operational information would undoubtedly provide better information faster, but again, these may not be available to students.

The use of Alerts is not, of course, restricted to students. It is a practical heuristic for managers. If there are too many web pages, to overcome the adverse selection problem and to screen the serious providers, the customers could see which providers are investing in sending information on a regular basis. One way would be to look at Alerts. Thus only new information would be looked at by Purchase managers. This would then force suppliers of services to generate new information on daily basis.

Conclusion

The paper has analysed the search engine results for "salesforce" and discussed diverse issues in terms of information theory and search detection theory: the high response rate of pharmaceutical sectors, the need for pharmaceutical consultants, the advantages of professional databases to free alerts, and some basic recommendations on the use of search engines.

One future area of research comes from the nature of our journey: how does one detect serendipitious signals? This would be interesting both in terms of psychology and its various branches as well as in terms of research and education theories. Within economics, this could be factored in as part of expected rewards, but new models assigning probabilities would need to be developed.

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