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Abstract

Bibliometric mapping of scientific articles based on keywords and technical terms in abstracts is now frequently used to chart scientific fields. In contrast, no significant mapping has been applied to the full texts of non-specialist documents. Editorials in *Nature* and *Science* are such non-specialist documents; they reflect the views of the global scientific community on science, technology and policy issues. We use the VOSviewer mapping software to chart the topics of these editorials. A term map and a document map are constructed and clusters are distinguished in both of them. The validity of the document clustering is verified by a manual analysis of a sample of the editorials. This analysis confirms the homogeneity of the clusters obtained by mapping and augments the latter with further detail. As a result, the analysis provides reliable information on the distribution of the editorials over topics, and on differences between the journals. The most striking difference is that *Nature* devotes more attention to internal science policy issues and Science more to the political influence of scientists.

Introduction

In bibliometrics, mapping is an increasingly important tool in the classification of documents into groups and subgroups and in the analysis of other types of patterns (e.g., Börner et al. 2003). So far, mapping techniques have mostly been applied to data extracted from scientific documents. The raw materials for bibliometric maps have been citations, keywords and technical terms in titles and abstracts. Mapping has provided information on issues such as relations between scientific fields (e.g., Noyons & Van Raan 1998, Van Eck & Waltman 2007), relations between scholars or journals (e.g., McCain 1991, White & McCain 1998) and scientific collaboration between scholars, institutions or countries (e.g., Luukkonen et al. 1993, Peters & Van Raan 1991).

So far, little or no mapping has been attempted in the analysis of bodies of non-scientific or non-specialist documents. It is not clear whether mapping is a useful tool in this case where citations, keywords and abstracts with technical terms are not available. The raw material for mapping would have to be the words in the full texts of the documents, but it has yet to be seen whether in non-specialist documents the relation between the content and the words used is strong enough to generate meaningful patterns through mapping. However, it would be very important if mapping turns out to be effective, since in that case mapping might to some degree replace the traditional manual analysis of bodies of documents. Here manual refers to determining the content of the documents by actually reading them (perhaps partially or superficially) and classifying them into groups and subgroups on the basis of their content.

In this paper we apply mapping to a body of general, non-specialist documents. The body of documents concerned is the editorials of *Nature* and *Science* from 2000 on (Waaijer et al. 2010). These documents are important and interesting in their own right, because they can be considered to reflect the mainstream view of the international scientific community on what topics are important in the conduct and application of scientific research. Arguably, if high profile journals such as *Nature* and *Science* editorialize too much about topics deemed irrelevant, this would rapidly lead to so many adverse reactions that the editors would be induced to change their

policy. Moreover, differences between *Nature* and *Science* might be interesting, as they could reflect differences between European and US views or differences in perspective between the editors of an independent commercial publisher (*Nature*) and the editors of a learned society journal (*Science*).

In view of the novelty of the application of mapping to non-specialist documents, we combined the mapping with a manual classification procedure for a large sample of editorials. We used this method to validate the mapping, notably the interpretation and homogeneity of clusters. In addition, manual classification made it possible to augment our results with supplementary information that is useful in the analysis of differences between *Nature* and *Science*.

The remainder of this paper is organized as follows. The methods that were used to map and classify the editorials will first be expanded upon. Subject areas and their relations in the editorials will then be shown by constructing two maps, a term map and a document map. Subsequently, the combination of bibliometric mapping and manual classification will be shown in the validation of the document map. Finally, the validated document map will be used to point out differences between *Nature* and *Science* and between an early and a late period.

Data and methods

Data collection

In the first step of the data collection process, all *Nature* and *Science* editorials published between 1 January 2000 and 2 July 2009 were retrieved in HTML format. In total, 1565 editorials were retrieved, 1097 from *Nature* and 468 from *Science*. After retrieving the editorials, the full text of the editorials was extracted from the HTML files.

Term identification

Two maps were constructed, a term map and a document map. To construct these maps, terms needed to be identified in the editorials. Since manual term identification is subjective and labour intensive, we took an automatic term identification approach. We first used computer programme NPtool (Voutilainen 1993) to identify noun phrases in the editorials. Most noun phrases were identified correctly using this programme. However, noun phrases containing a conjunction or preposition, such as ‘Food and Drug Administration’ and ‘National Academy of Sciences’, were not identified correctly. To solve this problem, we created a lexicon of noun phrases containing a conjunction or preposition. Using this lexicon, these noun phrases could be identified correctly. The criterion for a noun phrase to be included in the lexicon was that a fragment of the noun phrase (e.g., ‘Drug Administration’) occurs at least five times in the editorials and that the complete noun phrase (e.g., ‘Food and Drug Administration’) appears on the first page of the Google search engine when searching for the fragment. The lexicon can be found in the Supplementary Material (p. 66). After identifying the noun phrases, we calculated for each noun phrase its so-called termhood. This is a measure that indicates to what degree a noun phrase is systematically associated with specific underlying topics (Van Eck et al. in press b). Of all noun phrases occurring at least 15 times in the editorials, the 600 noun phrases with the highest termhood were selected to be used in the construction of the term and document maps. In the rest of this paper, we refer to these noun phrases as terms.

Term map construction

A term map is a map that shows the relations between terms in a certain domain. In general, the closer two terms are located to each other in a term map, the stronger the relation between the terms. Term maps are also referred to as co-word maps (e.g., Peters & Van Raan 1993).

A term map of the 600 terms identified in the *Nature* and *Science* editorials was constructed as follows. For each pair of terms, the number of co-occurrences was counted. The number of co-occurrences of two terms is the number of times that they occur jointly in an editorial. If a term occurs more than once in an editorial, this yields more than one co-occurrence with the other terms in that editorial (e.g., if terms X and Y occur, respectively, two and three times in a single editorial, this yields six co-occurrences). Based on the co-occurrence counts, the similarity of terms was calculated using the association strength measure discussed by Van Eck & Waltman (2009). The similarities were used as input for the VOS mapping technique (Van Eck et al. submitted). Based on the similarities, the VOS mapping technique determined a location in a two-dimensional map for each of the 600 terms. The objective of the VOS mapping technique is to locate terms with a high similarity close to each other and terms with a low similarity far away from each other. However, since only two dimensions are available, this objective usually cannot be achieved perfectly. The VOS mapping technique then attempts to approximate the objective as closely as possible. The VOS mapping technique can be seen as an alternative to the well-known technique of multidimensional scaling. An in-depth comparison of the two techniques is provided by Van Eck et al. (submitted). The comparison shows that in general the VOS technique provides more satisfactory representations of data sets than the multidimensional scaling technique. A computer programme called VOSviewer (Van Eck & Waltman in press a) was used to visualize the map produced by the VOS mapping technique.

As a further step in the analysis, the 600 terms identified in the *Nature* and *Science* editorials were assigned to clusters. This was done using a clustering technique that relies on a multinomial mixture model (similar to Zhu et al. 2009, Section 2.3). The assignment of terms to clusters was based on the editorials in which a term occurs. Six clusters were used, since this number seemed to yield the most easily interpretable results. The VOSviewer software was used to visualize the assignment of terms to clusters.

Document map construction

A document map is a map that shows the relations within a set of documents (e.g., Åström 2007, Janssens et al. 2006, Klavans & Boyack 2006). In general, the closer two documents are located to each other in a document map, the stronger the relation between the documents.

A document map of the 1565 *Nature* and *Science* editorials was constructed in a similar way as the term map discussed above. For each pair of editorials, the number of co-occurrences was counted. The number of co-occurrences of two editorials is the number of terms that occur in both editorials. Again, terms that occur more than once in the same editorial can yield more than one co-occurrence. After counting co-occurrences, similarities were calculated using the association strength measure and the VOS mapping technique was applied to the similarities. The VOS mapping technique determined for each of the 1565 editorials a location in a two-dimensional map. The VOSviewer software was used to visualize the map produced by the VOS mapping technique. For each editorial, additional information such as the title, the text

of the first paragraph and a list of important terms was also provided to the VOSviewer software. This information served to simplify the interpretation of the map.

The document map as such is useful to explore what topics the editorials are about and how the topics are related. However, a quantitative analysis of the topics requires that the editorials are grouped into clusters that are associated with topics. The clustering technique that was used is different from the one used to cluster the terms. To cluster the editorials, the well-known K-means algorithm was applied to the coordinates of the editorials in the document map. Because a reasonably fine-grained clustering was needed, it was decided to use 15 clusters. The VOSviewer software was used to visualize the clustering of the editorials. Since the clustering is based on the document map, we will refer to it as a map-based clustering later on in this paper. Note that the clusters have been determined by a statistical technique and not by an a priori delineation of topics. Naturally, it is to be hoped that the clustering technique leads to recognizable topics, but it has to be explicitly investigated whether this is actually the case.

Validation and content-based analysis of document map

To determine whether the document clusters refer to recognizable topics, the content of each cluster needs to be identified and an appropriate label must be assigned to capture the essence of the content. This requires an iterative process of analysis and interpretation.

The first step of this process is to inspect a number of elements from each cluster and to give a characterization of these elements. This characterization must both be intuitively comprehensible and 'predictive' of the characteristics of other elements from the same cluster. Next, some of these other elements are studied to verify whether they fit the 'predictions'. If this turns out to be the case, the cluster can be considered homogeneous with respect to the characterization and can be assigned a label.

However, if the predictions are not borne out by the newly inspected elements, the characterization of the cluster needs to be adjusted and the process is repeated. The adjustment may be a modification that corrects for errors in the original characterization, but more often it amounts to a generalization that makes the characterization applicable to more elements. Naturally, this generalization comes at a price. It causes distinctions between clusters to become less sharp and characterizations to overlap. Therefore, it may be necessary to sharpen the characterization again, implying that some of the elements of the cluster do not fit the characterization. Thus, the iterative process essentially searches for characterizations that balance on the one hand the amount of overlap and on the other hand the number of cluster elements that do not fit the characterization. If no reasonable balance can be found for a considerable part of the clusters, the whole clustering needs to be rejected and a new approach (e.g., changing the number of clusters or changing the terms used for the mapping exercise) has to be adopted.

In a term map the characterization problem is somewhat easier to solve than in a document map. As the elements of the clusters are terms, a characterization amounts to providing a general heading for the terms in a cluster and inspecting whether a considerable majority of the terms in a cluster do indeed fall under this heading. However, in the case of a document map, characterization may be quite difficult and at the same time require a high degree of accuracy. Occasionally, the titles of the documents may help, but in the case of editorials these often are intended as a pun,

phrased to capture attention and not very informative on the subject matter. Therefore, the key terms in an editorial are the most important information to work with. This is why it is important that in the VOSviewer software one can zoom in on individual editorials and view not just their title and first paragraph but also the terms that are most specific for the editorial.

Using the mapping and visualization technique, the content of most clusters could be determined fairly well, but the proper characterization of some clusters remained somewhat uncertain or elusive. This is unacceptable if, as in the present case, a high degree of accuracy is required.

For this reason, we employed a powerful validation method for the characterization of the clusters. We read and summarized a sample of editorials from each cluster (Supplementary Material Table 1). At least ten editorials from *Nature* and ten from *Science* were read from each cluster. Using our summaries, the sample editorials from each cluster were classified into subgroups with a homogeneous content. In most clusters, most sample editorials were immediately seen to be part of one or a few homogeneous subgroups. From these subgroups, the main content of the cluster could then be determined quite accurately and a complete content classification of the editorials could be drawn up (Supplementary Material Table 2).

The content of some editorials in some clusters did not fit into the subgroups belonging to the cluster but instead fitted into another cluster. A very small number of editorials actually did not fit into any of the clusters at all. Consequently, each sample editorial now has two classifications:

1. The map-based cluster to which the editorial was assigned by the clustering technique described above.
2. The content-based cluster to which the editorial belongs according to the manual classification.

Thus the sample makes it possible to *confirm* the homogeneity of the clusters, to *interpret* the clusters by providing them with an appropriate label and to *augment* the clustering, both by adding detail and by indicating the level of accuracy.

Results

Term map

The term map is shown in Figure 1. The map can be examined in full detail using the VOSviewer software at www.vosviewer.com/editorials/terms.php. Terms that are located close to each other in the map often occur together in the same editorial, while terms that are located far away from each other do not or almost not occur together. In general, terms in the centre of the map co-occur with many different terms and are therefore related to various topics. In contrast, terms at the edges of the map tend to co-occur only with a small number of other terms. Terms at the edges therefore often belong to relatively isolated fields. The colour of a term indicates the cluster to which the term has been assigned, and the size of a term indicates the frequency with which the term occurs in the editorials. The size of a cluster in the map is influenced by many factors (e.g., the number of terms in the cluster, the frequency of occurrence of the terms and the strength with which the terms are related to each other) and therefore does not have a straightforward interpretation. The density of an area in the map is determined by the number of terms in the area and by the frequency with which the terms occur in the editorials.

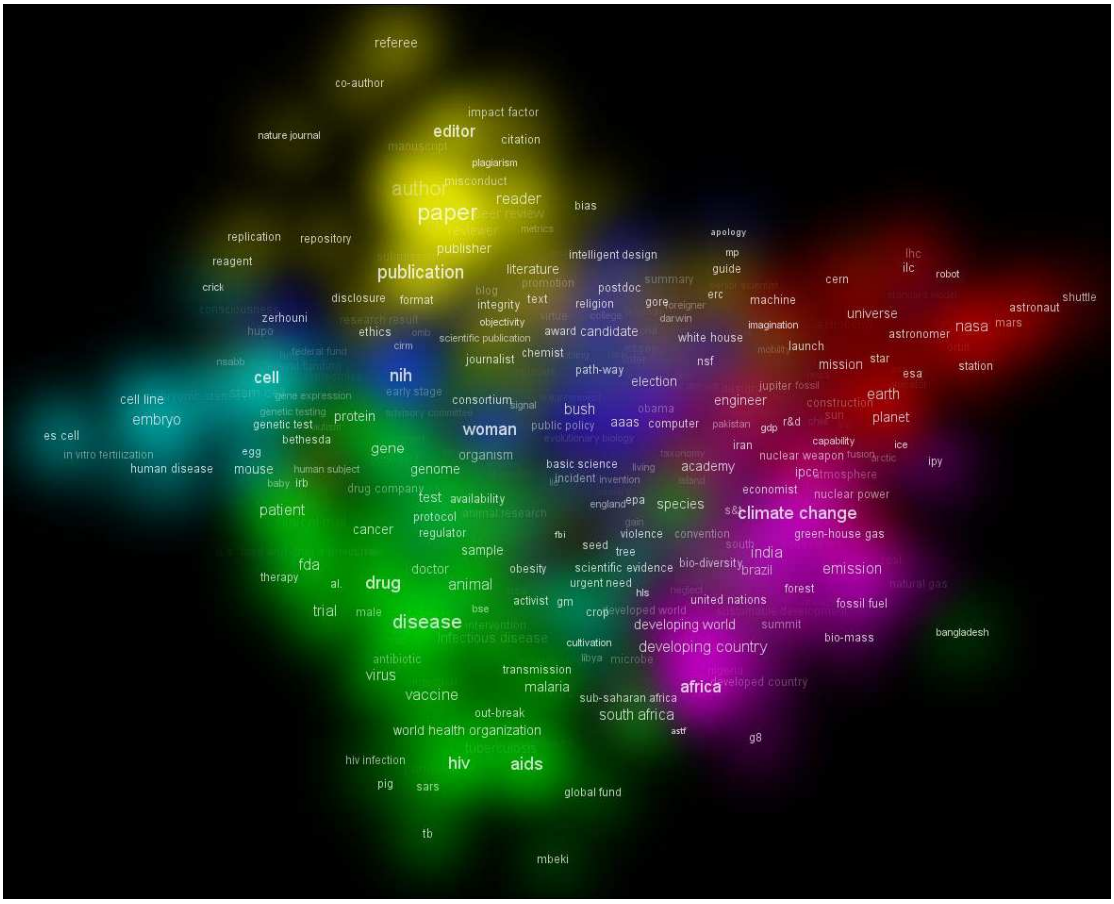

Figure 1. Term map of the 600 terms identified in the *Nature* and *Science* editorials. At www.vosviewer.com/editorials/terms.php the map can be examined in full detail using the VOSviewer software.

Clusters that can be easily interpreted in the term map are space and physics (in red), the scientific publication system (in yellow), stem cell research (in light blue), bioscience (in green) and global problems (in pink). There is a more poorly defined cluster in dark blue, with terms related to politics. This cluster is located more or less in the centre of the map, which shows that politics is related to many different topics. In contrast, the space and physics cluster (in red) and the stem cell cluster (in light blue) are located more towards the edges of the map, which suggests that these topics are somewhat unrelated to other topics.

The size of the terms and the density of the different areas indicate that the scientific publication system receives much attention. The core terms are ‘paper’, ‘author’, ‘publication’ and ‘editor’. Other terms in this cluster suggest that it deals with the way papers are published (‘peer review’, ‘reviewer’, ‘submission’, ‘repository’), with bibliometrics (‘impact factor’, ‘citation’, ‘metrics’) and with scientific integrity (‘plagiarism’, ‘misconduct’, ‘research misconduct’, ‘scientific misconduct’, ‘validity’, ‘replication’, ‘integrity’, ‘ethics’).

Although the clusters on space and physics and on stem cell research are located more towards the edges of the map, they do have locations close to areas one would expect them to be related to. In case of the stem cell cluster, nearby terms are related to the ethical issues of drug trials, such as ‘IRB’, ‘human subject’ and ‘patient’. The same applies to terms related to genetic testing. In case of the space and physics cluster, both the politics cluster and the global problems (especially climate change)

cluster are nearby. This is due to the fact that space and physics research requires a large amount of funding from governmental organizations and, in case of global problems, to the fact that terms such as 'earth' and 'planet' occur both in space and physics and in climate change editorials.

The term map shows a contingency between terms such as HIV/AIDS and other infectious diseases on the one hand and developing countries on the other hand. This indicates that *Nature* and *Science* mainly write about infectious and neglected diseases in relation to developing countries. Similarly, terms concerning developing countries are in the same region of the map and in the same cluster (we already referred to this cluster as 'global problems') as terms concerning climate change. This suggests that quite a large number of editorials deal with the relation between climate change and developing countries.

Terms concerning education ('teaching', 'classroom', 'teacher') are located close to 'religion' and 'intelligent design', in the dark blue cluster. This cluster also contains a considerable number of terms from politics. Clearly, editorials of *Nature* and *Science* pay serious attention to the politics of religion and evolution in the classroom.

Document map

A term map of the main terms in a corpus of documents gives a good overview of the subject areas in the corpus. However, it only shows the relations between the terms in the documents, not necessarily the relations between the documents themselves. We are interested in investigating possible differences in topic choice between *Nature* and *Science* and between an early and a late period. Therefore, we constructed a document map and identified 15 clusters based on the locations of the editorials in the document map. A first iterative analysis of this map with the VOSviewer gave the impression that the clustering of editorials is good at the edges of the map but that the clusters in the centre of the map might be less coherent.

As announced in the methods section, to confirm the homogeneity of the clusters in the document map and to aid in their interpretation, we read, summarized and classified a sample of editorials. We used a sample design with sufficient resolution to determine differences between *Nature* and *Science* in the amount of attention to the various topics. The results were used to establish labels that best characterize the content of each of the clusters in the document map. The document map together with the cluster labels is shown in Figure 2. At www.vosviewer.com/editorials/editorials.php the map can be examined in full detail using the VOSviewer software.

The 15 clusters of editorials are listed in Table 1. The clusters can be aggregated into five groups that roughly correspond to the topics identified in the term map: the scientific publication system (journal policies, science publication), biomedical issues (biopolicies, bioscience, drug development, infectious diseases and toxins, NIH, health), generalized science policy (science policy, research climate, science organization, science and society), global problems (climate change, developing countries and global problems), and space and physics.

Figure 2. Document map of the 1565 *Nature* and *Science* editorials after content-based labelling of the clusters. At www.vosviewer.com/editorials/editorials.php the map can be examined in full detail using the VOSviewer software.

The 'goodness of fit' of the map-based clustering was assessed first by comparing the distribution of the editorials over the map-based clusters with the distribution of the editorials over the content-based clusters. These two distributions are reported in Table 1 (for a more detailed analysis, see Supplementary Material Table 3). The first distribution is based on the map-based clustering. The second distribution is based on the manual classification of the sample of editorials. The sample results have been raised to population totals using the inverse of the sample fraction. This has been done to achieve easy comparability with the population-based results from the map-based clustering.

Table 1 shows that the map-based and content-based distributions differ only marginally. The most important differences are in the science policy clusters. About ten percent of the editorials belong to the two publication clusters. Of this ten percent, four percent is about the rules and products of *Nature* and *Science* themselves and six percent is about more general issues of scientific publishing. Almost 30 percent of the editorials have been assigned to the six biomedical clusters, 40 percent belongs to the four science policy clusters, close to 20 percent to the two clusters on global problems and five percent to the space and physics cluster.

Table 1. Map-based and content-based percentage distributions of the editorials.

	Map	Content		Map	Content
Publication system	*10*	*9*	*Generalized science policy*	*39*	*39*
Journal policies	4	4	Science policy	12	16
Science publication	6	4	Research climate	5	5
Biomedical issues	*29*	*27*	Science organization	13	11
Biopolicies	7	6	Science and society	8	7
Bioscience	4	4	*Global problems*	*18*	*18*
Drug development	4	3	Climate change	9	10
Infect. diseases, toxins	7	7	Dev. countries, global problems	9	8
NIH	2	2	*Space and physics*	*5*	*5*
Health	6	5	Space and physics	5	5

Table 1 compares the *balance* of the map-based and content-based distributions. The effect of an editorial belonging to map-based cluster X and content-based cluster Y is cancelled out by the effect of an editorial belonging to map-based cluster Y and content-based cluster X. A full comparison of the map-based and content-based clusterings can be made using a *transition table*. Table 2 provides a transition table showing for each map-based cluster the distribution of editorials over the content-based clusters. This is the most informative transition table for the validation of the map-based clustering. However, in the Supplementary Material we also provide a transition table showing for each content-based cluster the distribution of editorials over the map-based clusters (Supplementary Material Table 4). Furthermore, transition tables can be constructed for *Nature* and *Science* separately. Such tables are also provided in the Supplementary Material. It turns out that the transition patterns for the two journals are quite similar.

The main diagonal of Table 2 indicates for each map-based cluster the percentage of editorials that have been assigned correctly. This provides a direct verification of the quality of the map-based clustering. In close to half of the clusters at least 90 percent of the editorials is on the main diagonal, and in all but one of the clusters at least two third of the editorials is. Our first impression that the map-based clustering is more accurate at the edges of the map than in the centre is borne out by the transition table. All clusters at the edges of the map (space and physics, climate change, developing countries and global problems, biopolicies, infectious diseases and toxins, drug development, health, NIH, journal policies) have main diagonal values of at least 80 percent, while most of the clusters in the centre of the map (science organization, science and society, research climate, science publication) have lower main diagonal values. However, the central clusters on science policy and bioscience are exceptions to the rule, since their main diagonal values are quite high.

Table 2. Transition table showing for each map-based cluster the percentage distribution of editorials over the content-based clusters.

		Content-based cluster																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Tot
Map-based cluster																		
1	Science policy	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	100
2	Journal policies	6	88	0	0	0	0	3	0	0	0	0	0	3	0	0	0	100
3	Drug development	0	6	94	0	0	0	0	0	0	0	0	0	0	0	0	0	100
4	Space and physics	0	0	0	94	0	0	0	0	6	0	0	0	0	0	0	0	100
5	Bioscience	3	0	0	0	85	0	0	0	0	6	0	0	0	0	0	6	100
6	Biopolicies	0	0	0	0	0	82	0	0	0	7	0	3	0	3	5	0	100
7	Research climate	0	0	0	0	0	7	75	0	10	0	0	7	0	0	0	0	100
8	Health	0	0	0	0	0	9	0	82	0	9	0	0	0	0	0	0	100
9	Climate change	7	0	0	0	0	0	0	0	93	0	0	0	0	0	0	0	100
10	Science organization	18	0	0	0	0	0	8	0	2	63	0	0	0	0	0	10	100
11	NIH	0	0	0	0	0	0	0	0	0	3	97	0	0	0	0	0	100
12	Science and society	15	0	0	0	0	0	0	0	0	4	0	76	3	0	0	3	100
13	Science publication	3	9	0	0	0	0	0	0	0	13	0	6	69	0	0	0	100
14	Dev. countries, global problems	0	0	0	0	0	0	4	0	0	6	0	0	0	90	0	0	100
15	Infect. diseases, toxins	0	0	0	0	0	0	0	0	0	0	0	3	0	0	97	0	100

Put succinctly, the sample-based content classification essentially *confirms* the results of the map-based clustering. Perhaps the most important contribution of the manual classification is to clarify the interpretation of the map-based clusters, that is, to characterize the content of the clusters and to provide appropriate labels.

Topic choice differences between Nature *and* Science

The map-based clustering of editorials made it possible to investigate differences in topic choice between different subsets of editorials. We first investigated whether there are any differences between editorials published in *Nature* and editorials published in *Science*. For each map-based cluster, we calculated the percentage of editorials published in each of the two journals. The percentages were normalized for the fact that the total number of *Nature* editorials in the entire corpus is more than twice as high as the total number of *Science* editorials.

In Figure 3 the differences between *Nature* and *Science* are shown using pie charts. On the whole, the distribution of editorials over the 15 clusters is quite similar for *Nature* and *Science*. However, there are some intriguing differences. The largest difference is in space and physics. *Nature* devotes three times more editorials to this topic (including a substantial number of editorials on NASA) than *Science* (6 percent versus 2 percent). This was confirmed by the content analysis.

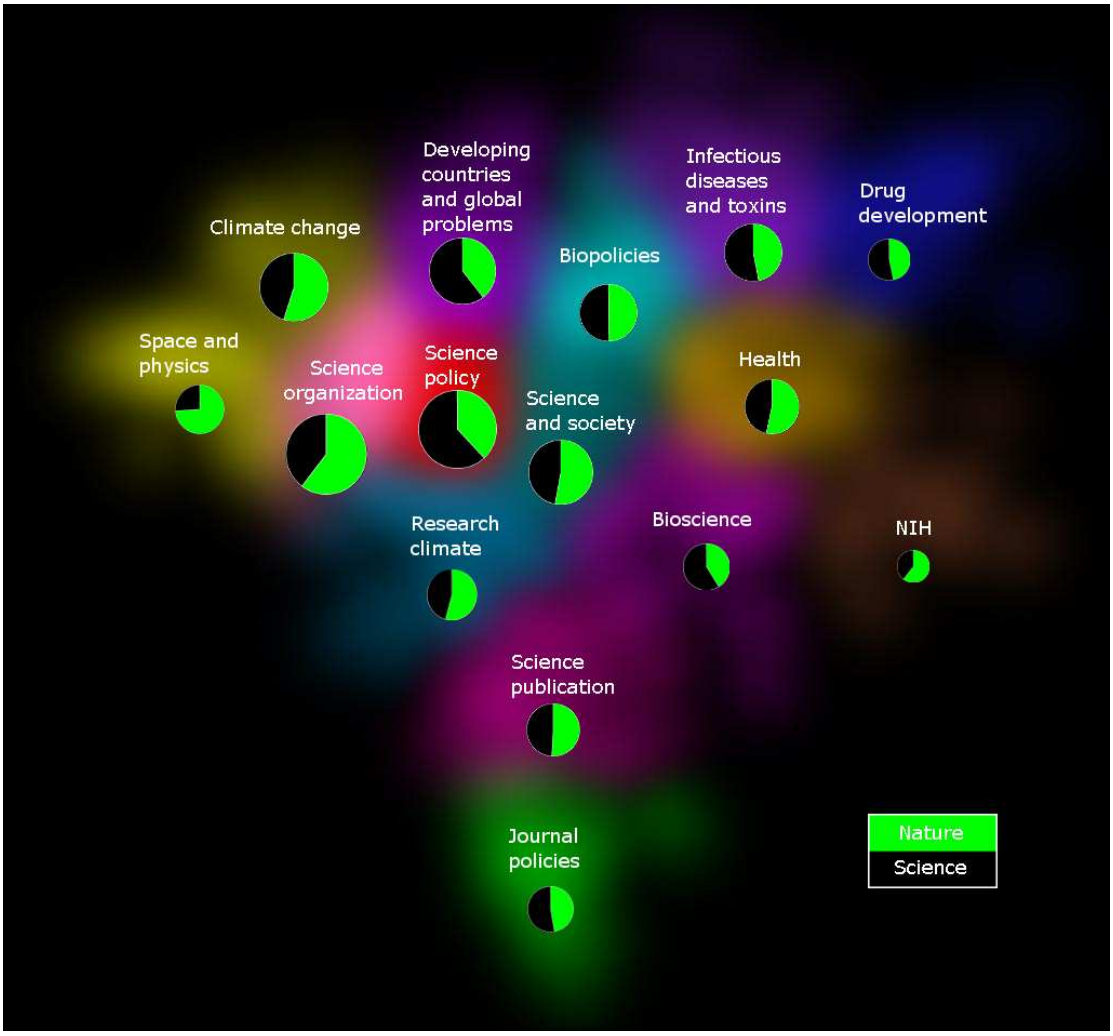

Figure 3. Differences in topic choice between *Nature* and *Science* depicted in the document map. The size of a pie chart indicates the number of editorials in the corresponding cluster.

A remarkable difference concerns the NIH. Two percent of the *Nature* editorials are on this US agency and just one percent of the *Science* editorials. This was again confirmed by the content analysis. In fact, about half of the *Nature* editorials in the NIH cluster concern the organization and management of NIH. One of the editorials points to the reason why the European *Nature* writes so much about this US medical research agency: NIH is the largest research agency in the world. In fact, it is more remarkable *Science* writes so little about NIH.

A further significant difference between *Nature* and *Science* is that a larger percentage of the *Science* editorials is about developing countries, environmental protection, climate change and other global problems. This is mainly due to the cluster on developing countries and global problems. In contrast, *Nature* and *Science* devote approximately the same amount of attention to the related cluster on climate change (ten percent of the editorials).

Perhaps the most striking difference between *Nature* and *Science* concerns the science policy clusters. At first glance, looking at the map-based clustering only, *Science* writes more than *Nature* (17 percent versus 10 percent) about science policy in a narrow sense (policies to maximize scientific output, such as priority setting,

research quality management and impact of science on political decision making) and less about science organization issues. Looking at the content-based clustering, this difference is almost eliminated. 15 percent of the *Nature* editorials is then seen to deal with science policy. Things become really intriguing if we look within this content based cluster. *Nature* turns out to devote more attention to priority setting, while *Science* is more interested in the political influence of science and scientists. Moreover, a number of editorials of both *Nature* and *Science* belonging to one of the biomedical clusters or to the space and physics cluster also deal with priority setting in these fields. Taking this into account, almost 15 percent of the *Nature* editorials deals with priority setting, whereasonly 8 percent of the *Science* editorials does. It appears that *Science* is more reticent than *Nature* in dealing with sensitive within-science issues. This would merit a study into the question whether this difference in editorial policy can be attributed to the greater independence of the commercially published *Nature* from the scientific establishment.

Differences in topic choice between an early and late period

In addition to differences between *Nature* and *Science*, we also investigated possible differences over time. For this purpose we divided the entire period into an early (2000–mid 2004) and a late (mid 2004–mid 2009) period. A normalization was applied for differences in the total number of editorials in each of the two periods. As can be seen in Figure 4, in the late period there was more attention for developing countries and global problems, drug development and climate change. This reflects the increased attention for climate change during the past years. Conversely, in the early period *Nature* and *Science* devoted more attention to journal policies, science and society issues and biopolicies.

Conclusion

In this paper we have shown that it is possible to classify a body of full-text, non-specialist documents using a two-step method that combines bibliometric mapping techniques and manual classification. Our analysis was performed on the editorials of *Nature* and *Science* published between 2000 and mid 2009. The words used in these editorials are less specialistic than the words used in titles and abstracts of scientific papers, which are more commonly analysed using bibliometric mapping techniques. In addition, editorials contain between 500 and 1000 words, which is much more than the average number of words in abstracts of scientific papers.

We used a combination of bibliometric mapping techniques and manual classification of a sample of editorials. The manual classification largely *confirmed* the mapping results. In addition, the manual classification also allowed for a better *interpretation* of the mapping results. Furthermore, the manual classification *augmented* the mapping results with additional details, in particular a further breakdown of the clusters into subgroups.

These findings suggest the recommendation to apply bibliometric mapping techniques to bodies of documents in combination with a manual analysis of a sample of documents, for the purpose of confirmation, interpretation and augmentation. The stratification of the sample using map-based clusters allows a high resolution with a modest absolute sample size.

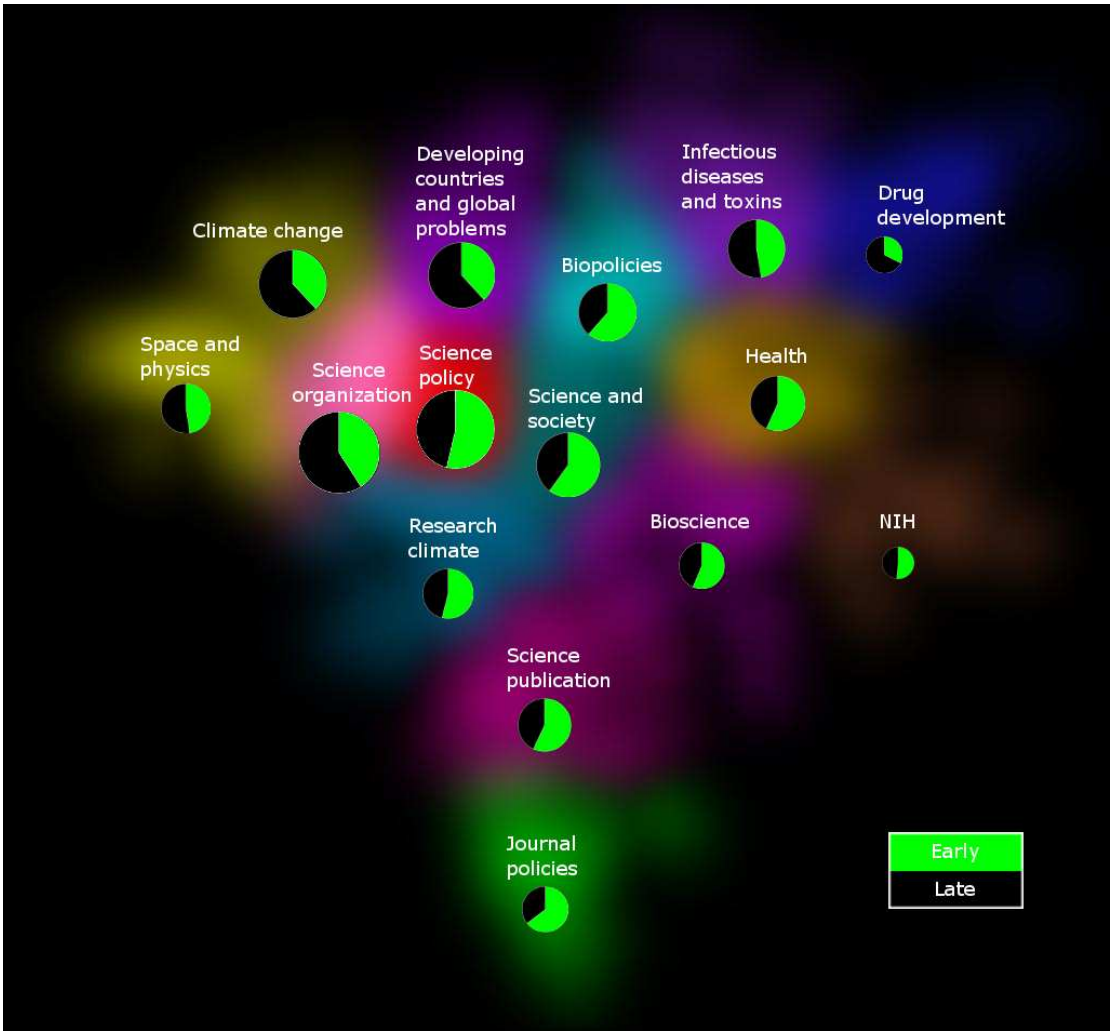

Figure 4. Differences in topic choice between an early (2000–mid 2004) and a late (mid 2004–mid 2009) period depicted in the document map. The size of a pie chart indicates the number of editorials in the corresponding cluster.

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Supplementary Material

On the map: *Nature* and *Science* editorials

Cathelijn J.F. Waaijer, Cornelis A. van Bochove and Nees Jan van Eck

Table of contents

Introduction to interactive maps and editorial content analysis

In this supplementary material we will give an explanation of how to browse through the two interactive maps mentioned in the main text of our paper. We will also give an explanation of the content analysis of the editorials.

Interactive maps

At www.vosviewer.com/editorials/terms.php and www.vosviewer.com/editorials/editorials.php the term map (Figure 1) and the document map (Figure 2) that are discussed in the main text of our paper can be explored using the VOSviewer software. Different views can be examined by selecting different tabs. The *label view* of the term map shows an overview of the map. The size of a label and the size of a circle give an indication of the frequency with which a term occurs in the editorials. The colour of a circle signifies the cluster to which a term has been assigned. The *density view* shows the relative density of the different areas in the term and document maps. In the case of the term map, the density of an area depends on the number of terms in the area as well as on the frequency of occurrence of the terms. In the case of the document map, the density of an area depends on the number of editorials in the area. The *cluster density view* combines the density view with differential colouring based on the clusters to which terms or editorials have been assigned. Finally, the *scatter view* shows the most basic structure of a map. The maps can be explored either using the navigation buttons in the upper right corner or using the mouse. By keeping the left mouse button pressed it is possible to scroll through a map. By keeping the right mouse button pressed it is possible to zoom in or out. When moving the mouse cursor over an editorial in the document map, more information on the editorial will be shown. We have included information on the journal in which an editorial was published, on the year and the week in which an editorial was published and on the title, the first paragraph and the key terms of an editorial. Similarly, when moving the mouse cursor over a cluster label in the document map, information on the cluster will be shown. This information includes a brief description of the cluster, the number of editorials in the cluster and the percentage of *Nature* and *Science* editorials in the cluster.

Finally, in the *action panel* screenshots can be made and more information on the VOSviewer software can be obtained. The *find panel* can be used to search for specific editorials. In the *options panel* settings concerning the way in which labels and densities are displayed can be changed.

Manual content analysis and content-based classification of editorials

Tables 1.1 and 1.2 show a list of all editorials included in our analysis, the map-based classification of each editorial and, for a sample of editorials from each cluster, a summary and a content-based classification of each editorial in the sample. Table 1.1 is concerned with *Nature* and Table 1.2 with *Science*. The numbers shown in the first column of each table were constructed as follows. The first three digits indicate a year (e.g., the year 2000 was abbreviated to '200'), the next two digits indicate a week number (ranging from '01' to '52') and the last digit indicates the order of editorials (1, 2 or 3). For instance, the editorial with number '201162' is the second editorial published in week 16 of the year 2001.

Table 2 provides a description of the content of each of the 15 map-based clusters. As discussed in the main text of our paper, the descriptions are based on the contents of a sample of editorials. Table 2 also provides a sub-classification of the clusters. This sub-classification was obtained by grouping together sample-editorials with a similar subject within each cluster.

Analysis of map-based clusters and content-based clusters

Table 3 shows the divergence between the map-based classification and the content-based classification. Naturally, this relation is based on our sample of editorials, but for convenience the numbers have been raised to population totals by multiplying them with the inverse of the sample fraction per cluster.

Table 4 shows the transition between the map-based clusters and the content-based clusters, again using sample-based population estimates. Tables 4.1 and 4.2 show the results for, respectively, *Nature* and *Science*. Table 4.3 shows the results for *Nature* and *Science* combined. Tables 4.1.1, 4.2.1 and 4.3.1 are matrices that show the comparison between map-based clusters and content-based clusters. The main diagonal shows the number of editorials for which the map-based classification and the content-based classification are identical. Tables 4.1.2, 4.2.2 and 4.3.2 and Tables 4.1.3, 4.2.3 and 4.3.3 show the percentage distributions of the relation between the map-based classification and the content-based classification.

Table 1.1 *Nature* editorials by cluster

Editorial	Content-based classification	Map-based classification	Summary
200081		1	
200091		1	
200131		1	
200152		1	
200221		1	
200312		1	
200321		1	
200341		1	
200351		1	
200432		1	
200452		1	
200471		1	
200491		1	
201162	1,2	1	Funding for environmental research should not be decreased for political reasons
201221		1	
201242		1	
201352		1	
201401		1	
201421		1	
201422		1	
201501		1	
202142		1	
202171		1	
202211	1,2	1	Funding of South-African universities should be built on academic excellence only, not on racial issues
202222		1	
202431		1	
202472		1	
202491		1	
202501		1	
203032	1,7	1	Assessment of book on climate change by Lomborg should be performed thoroughly and independently and not be based on 'hear-say'
203082		1	
203111		1	
203122		1	
203192		1	
203221		1	
203251		1	
203252	1,8	1	Ethics of neuroengineering should be discussed by neuroengineers, because the long-term implications in warfare are large
203301		1	

203312		1	
203472		1	
204031		1	
204041		1	
204062		1	
204071		1	
204102		1	
204131		1	
204161		1	
204212		1	
204232		1	
204241		1	
204252		1	
204292		1	
204321		1	
204402		1	
205062		1	
205092		1	
205141		1	
205171		1	
205172		1	
205191		1	
205212		1	
205262		1	
205321		1	
205341		1	
205343		1	
205393	1,5	1	Pennsylvania court should rule that intelligent design should not be taught in science classes
205433		1	
205442		1	
205512	1,6	1	Scientific assessment in Japan is unfair; it should be based on objective merits
206092		1	
206152		1	
206253		1	
206282		1	
206283	16,1	1	It is impossible to predict the football World Championships and the Italian footballers showed that it is possible to perform in the face of incompetence, like Italian professionals do every day
206313		1	
206332		1	
206362		1	
206441		1	
206463		1	

207023		1	
207043		1	
207083		1	
207152		1	
207153		1	
207171		1	
207173		1	
207201		1	
207231		1	
207242		1	
207252		1	
207293		1	
207401		1	
207403		1	
207463		1	
207503		1	
208053		1	
208163		1	
208192		1	
208263		1	
208273		1	
208283	1,2	1	Social scientists should be employed in wars, but the military should not interfere with their independence
208383	1,1	1	Visualization and mapping are important in science to make information understandable.
208392		1	
208413		1	
208502		1	
209021	1,1	1	Public scientists should collaborate with industry to create large scientific databases that work well and remain running for a long period
209042		1	
209063		1	
209072		1	
209121		1	
209193		1	
209213		1	
200052	2,1	2	Nature now welcomes electronic submissions of manuscripts
200311		2	
200382		2	
201062		2	
201341	2,1	2	Nature establishes new rules for conflicts of interest of authors (notably declarations of interests) and reviewers (must take themselves out in case of conflict of interest)
201371		2	
202042		2	

202081		2	
202102	2,1	2	If authors fail to share data and material, the editor of Nature can be contacted and will take action. Funding agencies and employers should also clarify where complaints can be addressed
202192		2	
202352		2	
202401		2	
203011	2,1	2	Copyright of Nature articles now remains with the authors: republishing in books by the author, publishing on the authors not-for-profit website, re-use of tables and figures
203081		2	
203091		2	
203101		2	
203121	2,1	2	Changes in Nature's guide for authors (how to publish in multidisciplinary journal) and establishment of policies to reach the general public
203421		2	
204011		2	
204012		2	
204101	2,3	2	The Lancet mishandled both the original paper on a link between MMR-vaccine and autism, and the later allegations of conflicts of interest of its author
204112		2	
204371		2	
205112		2	
205241	2,5	2	Clear guidelines are needed about what research is bioterrorism-sensitive and how dual use research should be published
205252		2	
205513		2	
206022		2	
206093	1,1	2	The history of the Scanning Tunneling Microscope and of high temperature superconductivity show that the value of a breakthrough cannot be predicted, which is something research agencies and industrial laboratories should keep in mind
206211		2	
206271		2	
206383		2	
206403	2,2	2	Launch of Nature Nanotechnology
206452		2	
206512		2	
207073		2	
207441	2,3	2	All authors of a paper should make themselves responsible for the integrity of its results
207493		2	
208062		2	
209012		2	
209014	2,2	2	Nature puts documents on its site providing incontrovertible evidence for Darwinian evolution
209093		2	

209182		2	
209223		2	
200232		3	
201141		3	
202301	3,1	3	Large merged drug companies are not good at research and innovation, start ups are; cooperation of large Pharma with starters may be the future
203351		3	
203431		3	
204122	3,1	3	Standardized cancer bioinformatics and tissue banks will speed up cancer research and improve treatment
204201		3	
204302		3	
204332	3,1	3	Patients in a commercial Alzheimer vaccine experiment that was terminated after some of them got brain inflammation ought to be followed to assess the long term impact of the vaccine
204342		3	
204372		3	
205032	3,1	3	The US HERITAGE long term fitness survey showed that free, open ended research can lead to major unexpected discoveries
205131		3	
205132		3	
205303	3,2	3	There are some doubts about the independence and alertness to risks of newly confirmed FDA director Crawford. He must prove himself in these respects
205402		3	
205412		3	
206162	3,3	3	To prevent other UK commercial clinical trials of new drugs to go badly wrong, independent review is needed before approval; to guarantee confidentiality this should be done in-house by the regulator; this requires organization at the European level
206372		3	
206393		3	
207232	3,2	3	Improvement of drug regulation in China requires open and transparent processes, not melodramatic death sentences for misbehaving high officials
207292		3	
207313		3	
207381	3,2	3	After patents on protein based drugs run out, approval of biosimilars, which fully mimic the drug but are not a simple generic version, is rapid in Europe; it must also be sped up in the US
207462		3	
208101		3	
208122	3,2	3	The right to sue companies for inadequately labeled side effects of FDA-approved drugs and drug labels should not be limited by the US Supreme Court
208143		3	
208152		3	
208212	3,3	3	The FDA should apply the Helsinki standards provision on ethical conduct of drug trials in case of drugs tried in other countries, and not condone unethical treatment of trial subjects abroad

208272		3	
208322		3	
208462	3,2	3	New FDA regulation of GM animals is based on the 1938 food and drug law and hence on the strange premise that GM animals contain a drug. Congress should produce a better law
209122		3	
209143		3	
209162	2,6	3	In memoriam John Maddox. He established a strong tradition of journalism in Nature
209173		3	
200141	4,2	4	Mars Mission did not just fail because of NASA, but also because politics is pushing NASA's system to the limits by demanding too much with too little resources
200172		4	
200442	4,4	4	US high-energy physicists need to reach consensus on their long-term goals rather than protecting their own project in the short run. However, also until then, high-energy physics should be financially supported by Congress
200451		4	
201102		4	
201122	4,4	4	Large linear accelerators should be developed in a global approach, which will need political support from all levels and acceptance of the global nature of the project by Europeans
201172		4	
201271	4,4	4	The fact that neutrinos have mass and can switch identity will open doors to new theories in physics
201312	4,1	4	Budget cuts due to rising costs of ISS are cause to critically look at the prioritization of research subjects at NASA
201372		4	
201411		4	
201432		4	
202161	4,1	4	For space astronomers and planetary scientists, the policy of NASA to let science dictate NASA's direction is very welcome, but NASA should not abandon human space exploration either, because it holds romantic appeal (to the public)
202421	4,1	4	NASA should explore robotic space exploration more, because human space exploration is very expensive. However, they should also realize space exploration has a romantic side to it as well.
202512		4	
203042		4	
203061		4	
203201		4	
203322		4	
203361	4,1	4	Report on the Columbia crash shows NASA is trying to do too much with too little. NASA should prioritize better on science vs. human space exploration and follow up on that choice with corresponding funding
203461		4	
203501		4	
204021		4	
204042		4	
204182		4	

204281		4	
204401	4,1	4	The science projects at NASA such as Hubble and Mars Exploration Rovers have good results, while the space exploration programme has lesser results. Budget deficits from Space exploration budget deficits should not be filled by science programme
205022	4,2	4	Influence of rocket launches on human health should be investigated
205051		4	
205182		4	
205311		4	
205401		4	
205462		4	
206061		4	
206073		4	
206101		4	
206132		4	
206153	4,3	4	While exploration of Mars holds a great appeal because of its chances of previous livable condition, Venus has many interesting scientific mysteries of its own. Explorations of Venus should be sold better to the public
206241		4	
206262		4	
206311		4	
206331		4	
206402		4	
206413		4	
206483	4,1	4	As part of the 'faster, better, cheaper' NASA missions, the Mars Global Surveyor has resulted in the gathering of a lot of information and has shown the potential of these type of missions
207051	4,1	4	Monitoring the state of the Earth is more important than space exploration given the current changes to the Earth
207191		4	
207263		4	
207291	4,4	4	The LHC offers a chance for the public to become interested again in fundamental physics, as the LHC will address fundamental principles of the Universe
207353		4	
207362		4	
207443		4	
207511	9,2	4	Rajendra Pachauri is celebrated as the 'newsmaker of the year' for leading the IPCC in its goal to provide independent assessments of climate change made possible by the cooperation of hundreds of scientists who willingly donate their time
208022		4	
208031		4	
208261		4	
208362	4,4	4	The LHC offers fundamental physicists the chance to raise the interest of the public for fundamental physics. They should stay away from equations when doing that, but rather focus on the concepts underlying the subject
208493		4	

208503	4,1	4	Europe is right in trying to set up the application of space science for societal needs, but what is needed in addition are the resources for data mining
208511		4	
209011	4,1	4	The study of the Universe will continue to humble us like it has done for many years, but the face of astronomy will change (from serendipitous discoveries to extremely large datasets that need data mining)
209043		4	
209083		4	
209102	4,1	4	NASA should launch a second Orbiting Carbon Observatory to help in measuring greenhouse gas emissions as quickly as possible, because monitoring these emissions is of great importance
209163		4	
209192		4	
200021	5,1	5	Too strict control by Celera of the use of its sequencing data is at odds with public interest
200041		5	
200082		5	
200191		5	
200422	5,1	5	Systems biology has great potential for modeling the behaviour of cells, genes, etc.
201051		5	
201071		5	
201151		5	
201161	5,1	5	Standardization and public databases of gene expression data are needed
202221		5	
202271		5	
202502		5	
203141	5,1	5	Francis Crick's work on the neuroscience of consciousness is important
203342		5	
203381		5	
203432		5	
204192	5,2	5	Procedures and ethical aspects of Korean therapeutic cloning experiment urgently need clarification
204352		5	
205362		5	
205421		5	
205422	5,2	5	People with financial links to Pharma should not work on US prescription guidelines; an independent UK-type publicly funded institute should oversee guideline writing
205482		5	
206173		5	
206212		5	
206281	5,1	5	Neuroprosthetics is becoming possible, partly due to basic research done with primate testing
206343		5	
206443		5	
207081		5	

207262	5,2	5	The emergence of synthetic biology challenges traditional and religious views on what life is
207352		5	
207361		5	
207413		5	
207472	5,2	5	Nature has had an experiment (nuclear transfer in a primate) replicated as part of the peer review process. In extraordinary cases this is justified
207482		5	
208113		5	
208172		5	
208291	5,2	5	Thirty years after the first IVF baby more new technology in human reproduction will emerge; safety and ethical requirements must be ensured; long term effects of IVF must be evaluated
209061		5	
209082		5	
209211		5	
209262	16,2	5	An index showing how well Chinese cities inform the public about air pollution will have great impact
200162		6	
200171		6	
200181	6,4	6	Too little money goes to publicly funded agricultural research in the US
200192		6	
200231		6	
200281		6	
200372		6	
200391		6	
200411		6	
201041	6,1	6	Destruction of Huntington LS by animal rights activists has barely been avoided. Government should have acted earlier; Pharma should publish more on need for animal testing; testing should use 'lowest' possible animals
201061		6	
201201		6	
201231		6	
201311		6	
201391		6	
201392		6	
201441	6,3	6	Research into safety of GM crops must be independent of commercial interests
202011		6	
202071		6	
202072		6	
202132		6	
202241		6	
202381		6	
202462	10,1	6	The 15 thousand expressions of interest in FP6 show that small projects should be included next to large networks of excellence
203071		6	

203212		6	
203241		6	
203242		6	
203291		6	
203441		6	
203451	6,3	6	The scientific community's defense of Butler's careless handling of Plague bacteria may undermine public trust in science
204231		6	
204242		6	
204291		6	
204311		6	
204431		6	
205151		6	
205222	6,5	6	The US should invest 260 mln in an endowment for the global crop diversity trust, which should then support ICARDA, an international seed bank with its headquarters in Syria
205251		6	
205352		6	
205452		6	
206041		6	
206112		6	
206202		6	
206223	6,1	6	Alternatives methods to carbon dioxide gas for killing lab animals must be developed
206333		6	
206342		6	
206373		6	
206381		6	
206382		6	
206401		6	
207093	6,5	6	Japan's Institute of Cetacean Research should act to protect the grey whale
207112		6	
207162		6	
207163		6	
207222		6	
207273		6	
207282		6	
207363	6,5	6	China should concentrate on protecting natural habitat of Siberian tigers and less on rapid breeding in confinement
207412		6	
207431		6	
208072		6	
208111		6	
208222		6	
208271		6	

208341	6,2	6	An independent inquiry is needed into the FBI's allegation that Bruce Ivin conducted the 2001 anthrax attacks
208443		6	
208453		6	
208482		6	
209092		6	
209133		6	
209201		6	
200011		7	
200031		7	
200032		7	
200112		7	
200512	6,3	7	The Cartagena Protocol on Biosafety is a good agreement, even though the US and the agricultural biotechnology industry had to make some pragmatic concessions on labeling, which isn't necessary scientifically
201021		7	
201032		7	
201132		7	
201182		7	
201202	7,3	7	Introduction of a science survey ('yearbook') by *Nature*
201211		7	
201381		7	
202062		7	
202141	12,3	7	Scientists should not attack journalists for announcing wrong information, but manage the media better themselves
202232		7	
202281		7	
202382		7	
202482		7	
203012	9,2	7	The US will undoubtedly act on climate change in the future, just not at this moment when the Bush administration is still in place
203232		7	
203321		7	
204032	7,1	7	A robot that is able to perform experiments could help in freeing PhD students and postdocs from doing cheap manual labour and guide them to creative research instead
204262		7	
204341		7	
204422		7	
204482	7,1	7	The release of Google Scholar is very exciting and will enhance innovation in search technology, even though it still lacks some functions
205082		7	
205121		7	
205202	7,2	7	Iranian scientists should be supported in their effort to build a good science system in Iran
205203		7	
205213		7	
205272		7	

205283		7	
205353		7	
205382		7	
205463		7	
205483	7,2	7	South-Korea should not protect fraudulent stem cell researcher Hwang, but rather start a thorough inquiry into what happened in his lab
206013		7	
206203		7	
206231		7	
207013		7	
207031		7	
207033		7	
207052		7	
207251		7	
207333		7	
207342		7	
208043	7,2	7	DARPA has brought some excellent technologies in the past, but it should not be 'too creative' and rather go back to basics
208183		7	
208251		7	
208313		7	
208361		7	
208423		7	
209053		7	
209123		7	
209132		7	
209241	7,4	7	English libel law should be changed, because the current one that says a publisher needs to be able to prove everything he says in a court of law, limits freedom of speech
209261		7	
200292	8,6	8	Department of Energy must have sufficient funds to maintain infrastructural facilities for science, including NIH science
200331		8	
200342		8	
200352		8	
200402		8	
200461		8	
201031	8,1	8	A polio outbreak was based on mutation of weakened virus from a vaccine. This shows the importance of techniques like gene sequencing for rapid response to new infectious diseases
201081		8	
201121		8	
201291		8	
201301		8	
201351		8	
201461	6,2	8	Following the anthrax attack and similar to what was done in the seventies with DNA recombinant technology, the science community

			should now discuss what to do about dual use risks of the new biological technologies
201471		8	
201491		8	
202012		8	
202162		8	
202191		8	
202451	8,2	8	US embryo and embryonic stem cell research would be better off with a British style regulating law
202461		8	
203161		8	
203171		8	
203202		8	
203231		8	
203352	8,2	8	To ensure that results are in the public domain and contribute to knowledge, there should be publicly funded research with fetal cells and embryonic stem cells
204121		8	
204151		8	
204382		8	
204412		8	
204451		8	
204462	8,2	8	By referendum California has established a 300 million per year embryonic stem cell institute. This has intriguing implications
204472		8	
205273		8	
205281		8	
205313		8	
205322		8	
205373	10,4	8	Lack of affordable child care is a leading cause of under representation of women in research. Governments should provide subsidies and tax breaks for child care in research institutions
205381		8	
205423		8	
206172		8	
206183		8	
206201		8	
206263	8,1	8	Cases in China and Indonesia show that it is urgent that bird flu data are rapidly shared internationally
206301		8	
206321		8	
206353		8	
206412		8	
206473		8	
207011	8,4	8	Scientists must clearly set out the safety and ethical risks and the benefits of interspecies research involving human cells and embryos, and make recommendations in order to prevent overly restrictive regulation

207132		8	
207192		8	
207212		8	
207312		8	
207351		8	
207391	8,2	8	German stem cell regulations are too severe; German researchers must persevere, in spite of fickle public opinion, in urging for improved regulation
207422		8	
208081		8	
208171		8	
208181		8	
208241		8	
208282	8,4	8	Geneticists and neuroscientists must cooperate to combat mental diseases, not fight each other
208421		8	
208461		8	
209062		8	
209111		8	
209131		8	
209151	8,6	8	The early stages of slow growing cancers are easier to detect than of aggressive ones, reducing the effectiveness of screening programs. Research must continue on a broad front
200062		9	
200092		9	
200101		9	
201131		9	
201222		9	
201252		9	
201281		9	
202032		9	
202152		9	
202172		9	
202341		9	
203031		9	
203102		9	
203131		9	
203332		9	
204081		9	
204091		9	
204191		9	
204211		9	
204221		9	
204222	9,3	9	Russia's climate research has become a pawn in Russian politics
204272		9	

204312		9	
204362		9	
204391		9	
204411		9	
204461	9,1	9	International community should help Indonesia with counteracting carbon emissions from peat lands
204471		9	
205011		9	
205042		9	
205081		9	
205232		9	
205271		9	
205282		9	
205291		9	
205372		9	
205391		9	
205472		9	
206033		9	
206043		9	
206083		9	
206102	9,4	9	Interest in climate change from evangelicals is good for climate scientists and the scientists should communicate with them
206161		9	
206191		9	
206192		9	
206213	9,1	9	Carbon emissions trade is a good measure and it should be helped to become a more stable market
206252		9	
206302		9	
206361		9	
206423		9	
206442		9	
206481		9	
206493	9,1	9	Biomass holds many promises, both environmentally and developmentally for developing countries, but should be sustainable in a real way and cost-effective
206511		9	
207022		9	
207042		9	
207061		9	
207101		9	
207103		9	
207123		9	
207133	9,2	9	It is a good development that politicians are becoming more aware of climate change and the actions to counteract it
207151		9	

207172		9	
207221	9,2	9	Climate change policies should be supported by all developed countries, but include developing countries as well
207301		9	
207372		9	
207411		9	
207421		9	
207433		9	
207461		9	
208021		9	
208051		9	
208061	1,4	9	Science should be made a more relevant issue in political debates
208063		9	
208082		9	
208083		9	
208112		9	
208121		9	
208142		9	
208173		9	
208211		9	
208242		9	
208302		9	
208312		9	
208353		9	
208371		9	
208381		9	
208382	9,2	9	Man should actually act in the preservation of nature, instead of letting nature run its course.
208401		9	
208433		9	
208471		9	
208523		9	
209031		9	
209032		9	
209041	9,1	9	China should invest in wind energy in a better way
209052		9	
209091		9	
209112		9	
209141		9	
209152		9	
209172		9	
209181		9	
209202		9	
209212		9	

209222		9	
209253		9	
209272		9	
200072		10	
200211		10	
200251		10	
200272		10	
200301		10	
200361		10	
200381		10	
200401		10	
200412	10,1	10	Spain should make a distinction between civilian and military research in its budget, because the current situation is very non-transparent
201082		10	
201181		10	
201251		10	
201292	10,1	10	The Italian science system should be changed to be based on academic excellence, not on politics. Also, funding on science should be increased
201302		10	
201431		10	
201451		10	
201482		10	
201502		10	
201511		10	
202031		10	
202051		10	
202091		10	
202131		10	
202182		10	
202261		10	
202291		10	
202331		10	
202332		10	
202422		10	
202452	10,1	10	Italian science should not be controlled by politics, but rather be an independent endeavour, and its budget should not be cut
203052		10	
203162		10	
203181		10	
203191		10	
203211		10	
203222		10	
203302		10	
203452	7,4	10	A warning that libellous manuscripts are on preprint servers could lead to prosecution of the website's owners

203471		10	
203482		10	
203491		10	
204051		10	
204111		10	
204141		10	
204171		10	
204181		10	
204251		10	
204261		10	
204331		10	
204442		10	
204481		10	
204521		10	
205102		10	
205192		10	
205201		10	
205231		10	
205253		10	
205302		10	
205323		10	
205333		10	
205451	10,2	10	The founding of an independent, more risk-taking agency for energy research modelled after DARPA can only become successful if the energy department is restructured
205481		10	
205492		10	
205493		10	
205502		10	
205503		10	
206011		10	
206032		10	
206042		10	
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206091		10	
206111		10	
206121		10	
206142		10	
206143		10	
206171		10	
206182		10	
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206221		10	
206242		10	
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206391		10	
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206461	10,1	10	Democrats need to improve the research system in terms of priority setting, while not increasing the science budget
206471		10	
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206513		10	
207063		10	
207082		10	
207092		10	
207122		10	
207161		10	
207183	16,1	10	The need for a US missile defence system needs to be questioned by politicians, because it is undesirable and technically flawed
207203		10	
207213		10	
207261		10	
207271		10	
207281		10	
207302		10	
207321		10	
207332		10	
207343		10	
207383		10	
207481		10	
207483		10	
207491		10	
207512		10	
207513		10	
208011	1,4	10	Researchers need to make sure their opinions are heard with the elections coming up after eight years of manipulation of scientific advice by the Bush administration
208023		10	
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208042		10	
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208073		10	
208091		10	
208102		10	
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208232		10	
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208253		10	
208262		10	
208293		10	
208331		10	
208342		10	
208343		10	
208352		10	
208363	10,3	10	Western and Eastern scientists should collaborate, even if the political climate between their countries is bad
208372		10	
208391		10	
208422		10	
208441		10	
208451		10	
208472		10	
208481		10	
208491		10	
208513		10	
208522		10	
209022		10	
209103		10	
209113		10	
209171		10	
209203	1,1	10	Science should focus more on time and changes over time in systems. Also, some data should be gathered now for other generations to identify changes in, even though we cannot comprehend the data at this moment
209271		10	
201101	11,2	11	Following the example of new philanthropies NIH should spend a small part of its grant budget on low burden grants for excellent researchers
202061	11,1	11	NIH budget is up, vacancy of director must be filled
202111	11,5	11	Zerhouni's appointment to director of NIH must not depend on his

			position on embryonic stem cells
202251	11,1	11	Congress must prevent the transfer of bio-terror research from NIH to department of homeland security
203331	11,1	11	Modest reforms of NIH proposed by the National Academies Institute of Medicine should be put through
203411	11,1	11	Positive comments on Zerhouni's NIH roadmap
203442	11,4	11	Congress should not interfere in NIH decisions to fund research into public health effects of homosexuality and other socially sensitive behaviours
203511	11,3	11	Transparency is needed to avoid the appearance of lack of integrity of NIH researchers with money from the business sector
204162	11,1	11	China needs an NIH
204271	11,3	11	NIH needs strict rules on conflict of interest of its employees
204351	11,4	11	NIH will/must apply strict standards on sharing research materials by the researchers it funds
204502	11,3	11	Scientists at NIH and elsewhere must speak with journalists plainly and without interference from press officers
205061	11,3	11	The strict new rules on conflicts of interest at NIH should be an example for other research sectors
205293	11,3	11	Following further cases of conflicts of interest at NIH, Congress wants to centralize NIH. This goes too far. But researchers should be more aware of conflict of interest issues
206181	11,1	11	NIH Director Zerhouni has done his job reasonably well in his first four years
206501	11,1	11	The NIH ("the world's largest research agency") 2006 reform act is important and helps to give NIH better prospects
207032	11,4	11	NIH must take the lead in linking, widening access and improving ease of use of biomedical databases
207062	11,1	11	At last a small budget hike for NIH; scientists must remain involved in political activities and outreach process to ensure further increases
207322	11,1	11	NIH management and Congress must listen to disease lobby groups, but not let them dictate priorities
207371	11,1	11	Peer reviewed funding system at NIH badly needs radical modernization
207423	11,5	11	It is regrettable that NIH must follow Bush's political guidelines on stem cell research
208231	11,1	11	Successor of departing director of National human genome research institute (NIH institute funded from flat NIH budget) will have a tough job.
208402	11,1	11	New director NIH must be appointed quickly
208483	11,5	11	NIH must prepare well informed embryonic stem cell research strategy to use when Obama lifts the ban
209232	11,5	11	New NIH stem cell research guide lines ok, but must be revised as science progresses
200061		12	
200121		12	
200161	10,4	12	The NSTC should have recommended more decisive moves to increase the number of women and especially minorities in science and technology
200201		12	
200261		12	
200262		12	
200282		12	
200322	12,5	12	The WHO and other scientific institutions involved in tobacco research should guard themselves even better against the influence of the tobacco industry, as a recent report has shown the tobacco industry's attempts to manipulate scientific results

200421		12	
200431		12	
200441		12	
200501		12	
200511		12	
201152	12,5	12	German scientists should think well on whether to accept a prize from a tobacco company with a bad track record of manipulation of scientific results
201191		12	
201192		12	
201321		12	
202041	12,1	12	Therapeutic cloning is being demonized by the NBAC as being the same as human reproductive cloning; scientists should step up to educate the panel in order to avoid prejudice to therapeutic cloning
202092		12	
202101		12	
202121		12	
202122		12	
202151	1,1	12	The unravelling of the rice genome could have a major contribution in the fight against poverty. Therefore, the project should receive the funding it needs to be finished. However, although transgenic technology might reduce the problem, rich countries must also reconsider trade barriers against exports from developing countries
202212		12	
202312		12	
202322		12	
202351		12	
202361	12,6	12	The US is unprepared for biological and chemical attacks. Defensive technology, vaccine production and development of good models are needed
202371		12	
202392		12	
202492		12	
202511		12	
203041	12,1	12	Public needs to be informed about the possible dangers of nanotechnology in a balanced way; their opinion should not only be based on science fiction
203112		12	
203151		12	
203262		12	
203311	12,1	12	A scientific review of GM crops should lead to acceptance of GM agriculture and should let both GM and organic agriculture prosper. However, the organic movement should be less rigid in their stance
203372		12	
203391		12	
204061	12,4	12	Animal rights activists may have succeeded in the cancellation of plans to build a new centralized animal research facility, the public and media opinion is against them due to good PR by researchers, so the activists should not claim victory
204202		12	

204392		12	
204421		12	
204501	12,2	12	Researchers should accept religion as a very important part of life of many people and take religious objections to some forms of research seriously. However, they should also not forget that some dogmas are not agreed upon by all theologians
204511		12	
205041		12	
205091		12	
205221		12	
205233		12	
205242		12	
205331	12,2	12	The Dalai Lama should not be stopped from giving a talk on science and society at a neuroscience meeting at which he can give his opinion as a non-scientist, just because he is a religious leader
205351		12	
205371		12	
205392		12	
205431		12	
205441		12	
205461		12	
205473		12	
206012	12,5	12	An independent health organization that can be trusted by government and public alike, should be established to conduct independent research into health risks. Case at hand: resistance to MMR vaccination in Great Britain
206062		12	
206131		12	
206163		12	
206251	12,1	12	Neuroscientists should discuss the ethical implications of their work and talk to the public about it
206433		12	
206462		12	
206472		12	
206502		12	
207113	1,6	12	The grant review process of California's stem cell institute CIRM is already sufficiently transparent. Naming the researchers who failed to get a grant in addition to the successful applications only breaches confidentiality
207131		12	
207143		12	
207202		12	
207211	12,4	12	Labelling animal rights activism as terrorism is counterproductive as it will only undermine a future possibility of calm discussion
207241		12	
207272		12	
207303		12	
207341	1,6	12	Scientists should resist the valuation of their research on the basis of economic impact in today's harder economic times, because valuation

			should be based on scientific excellence, not on specious metrics functioning as surrogates for economic impact
207392		12	
207402		12	
207452	12,7	12	Conservation biologists and practitioners who work to save species should resolve their theory-practice divide and work together more to save species from extinction
207501		12	
208033		12	
208092		12	
208243		12	
208292		12	
208301		12	
208393		12	
208432		12	
208463		12	
208512		12	
209071	12,2	12	Science can be a great source of strength in understanding the world, but it cannot make distinctions between right and wrong
209142		12	
209221		12	
209231		12	
209233		12	
200111	12,3	13	A House of Lords report on science and society teaches the lesson that science should work with the media as they are. Science should also be competent in a little spin doctoring to convince the public
200122		13	
200142		13	
200241		13	
200252		13	
201011		13	
201091	13,1	13	China invests much in research, but needs more peer review in funding and more transparency of decision making; rewards for international publications are too direct, leading to plagiarism
201142		13	
201241		13	
201261		13	
201331		13	
201361		13	
201462	13,1	13	China must raise research salaries and rely less on (publications-linked) rewards with unintended effects; and a wider network of external project reviews
201481		13	
202021		13	
202231		13	
202242		13	
202391		13	
202441	13,4	13	Japanese complaints of bias of international Journals against papers

			written by Japanese due to their imperfect command of English are a matter of perception rather than reality; Japanese scientists have to put more effort and courage into communication with foreigners
202471		13	
203123		13	
203132		13	
203271		13	
203502		13	
203512	13,2	13	Nature publishes the project description of the international HapMap project, thus facilitating the giving of credit where it is due of this type of community resource project
204282		13	
204522		13	
205031		13	
205181		13	
205223		13	
205263	13,2	13	It is standard practice that atomic coordinates and structure-factor files should be made public at the publication of papers based on the structure of proteins; if requested they must also be made available for the peer reviewers of Nature
205312		13	
205332		13	
205342		13	
205403		13	
205443		13	
206021	13,5	13	Scientific fraud and unethical behaviour in research and research management often go hand in hand; research ethics are immensely important to the health of science; better national policies with oversight and complaints procedures are needed in many countries
206031		13	
206063		13	
206082		13	
206113		13	
206133		13	
206141	13,3	13	The US National Science Advisory Board for Bio-security is slowly making very important progress in making specific recommendations on how to identify and publish bio-security sensitive results; its approach is sensible
206222		13	
206233		13	
206243		13	
206303		13	
206352		13	
206451	10,1	13	ETH president Hafen stepped back after eleven months, having failed to achieve the reform he initiated. He did not listen enough to his senior faculty. The council must now appoint a president inspiring the confidence of ETH staff
206492		13	
207182		13	

207193		13	
207233		13	
207243		13	
207373	13,1	13	A rapidly increasing budget, more peer review in funding, participation in Framework programs, and general reforms due to EU entry negotiations are great for Turkish science and have already led to a higher rank on the in international publication list
207393		13	
207471		13	
208133		13	
208151		13	
208203		13	
208473	10,2	13	The great collection of the Berlin Medical History Museum, owned by Charité (merger of medical faculties of east Berlin's Humboldt University and West-Berlin's Free University) is stored and conserved extremely badly; new Charité management must change this
209153		13	
209243		13	
200051		14	
200102		14	
200151		14	
200332		14	
201111		14	
201492		14	
202022		14	
202112		14	
202181		14	
202321		14	
202411		14	
203182		14	
203261		14	
203341		14	
203371		14	
203382	14,3	14	Developing countries must continue to demand free trade in agriculture
203481		14	
204072	14,1	14	Research in developing countries needs to be supported, as it is one of the best ways for these countries to not develop an unbridgeable gap to developed countries
204142	14,1	14	Researchers in developing countries should not have to pay more for lab equipment than researchers in developed countries
204152		14	
204301		14	
204361		14	
204381		14	
204452		14	
204491	14,2	14	Technology should be developed for developing countries
204512		14	

205071		14	
205111		14	
205243		14	
205261		14	
205292		14	
205301		14	
205361		14	
205363		14	
205383		14	
205411		14	
205413		14	
205432		14	
205471	14,1	14	Education in the sciences in Africa should be supported
205501		14	
206072		14	
206103		14	
206122		14	
206151	10,2	14	Botanical science needs to do more relevant research and botanical gardens should cooperate more
206261		14	
206273		14	
206292		14	
206293		14	
206312		14	
206322		14	
206392		14	
206482	14,4	14	Safety, environmentally and otherwise, of nanotechnology applications needs to be evaluated properly
207041		14	
207071		14	
207111		14	
207121		14	
207141		14	
207142		14	
207223		14	
207253	14,4	14	Luckily, political influence on the EPA is decreasing
207323		14	
207442		14	
207451		14	
207473		14	
207492		14	
208012		14	
208032		14	
208103		14	

208162		14	
208182		14	
208202		14	
208223		14	
208351		14	
208412	14,4	14	Ecosystems should be protected in order to prevent species from extinction
208442		14	
208452		14	
208492	14,2	14	Africa should be helped to develop new (GM) agriculture technologies, but these should be monitored well
209013		14	
209023		14	
209051		14	
209081		14	
209252		14	
200022		15	
200071	15,2	15	One third of world population is infected by the TB bacterium. A new innovative private public partnership for drug and vaccine development is a good development, but developing countries governments must play their part as well
200271		15	
200291		15	
200371		15	
200392		15	
201112		15	
201171		15	
201412	15,4	15	In Bangladesh 75 million people are at risk from arsenic poisoned drinking wells sunk into the floodplain from the 1970's at the advice of western hydro-geologists. Local governments and western experts long ignored danger signs. The scientific community must accept the blame
201442		15	
201452		15	
202201		15	
202311		15	
202402		15	
202481		15	
203021	15,3	15	Malaria genome now complete. Combination of basic and applied research needed for eradication of Malaria. US has strategic interest in eradication
203051		15	
203152		15	
203281		15	
203401		15	
204022		15	
204441		15	
205021	15,1	15	Even after SARS and avian flu governments are scandalously inactive in monitoring and preparing (stocking Tamiflu, increasing vaccine

			production capacity) for viral pandemics
205101		15	
205161		15	
205211		15	
205453		15	
205491		15	
205511		15	
206051	15,3	15	It would be great if Baxter were to put a vaccine against Lyme in clinical trial, in spite of unfounded public fears of some vaccines including an earlier one against Lyme
206053		15	
206232		15	
206291		15	
206323		15	
206341		15	
206351		15	
206421	15,2	15	International companies should become far more active in battling (among their employees) the HIV epidemic in the developing word
206503		15	
207012		15	
207021		15	
207053		15	
207072		15	
207091		15	
207102	15,2	15	Compared to HIV, not enough money is spend on TB research; campaigns to fight HIV and TB should collaborate far better. Stronger leadership from major governments is needed
207181		15	
207283		15	
207311		15	
207331		15	
207382		15	
207453		15	
207502	15,2	15	Downward revision of global HIV and AIDS statistics are due to better statistical techniques only; vaccines not to be expected soon, microbicide research only hope for now
208093		15	
208141		15	
208153		15	
208221		15	
208233		15	
208281		15	
208311	15,2	15	More needs to be done to widen worldwide access to life saving treatments of HIV; quarrels between governments and organizations must be replaced by effective policies
208321		15	
208373		15	

208403		15	
208411		15	
208431		15	
208501		15	
209033	15,2	15	Bush's Presidents (international) Emergency Plan For Aids Relief should be supported by Obama and a similar program initiated at home
209101		15	
209191		15	
209242		15	
209251		15	
209263		15	

Table 1.2 *Science* editorials by cluster

Editorial	Content-based classification	Map-based classification	Summary
200151		1	
200161		1	
200181		1	
200301		1	
200321		1	
200381		1	
200411	1,4	1	Evaluation of differences between presidential candidates' answers to questions from *Science*
200421		1	
200471	1,4	1	More scientists should serve as staff in public policy bodies, because they can help make informed decisions
200481	16,1	1	Sarcastic commentary on the chaos of counting votes that ensued after the US elections
200491		1	
201191		1	
201281		1	
201291		1	
201351		1	
201381		1	
201411		1	
201451		1	
202061		1	
202121		1	
202151		1	
202241	1,3	1	Science minister UK says UK needs to collaborate internationally and with industry, and says which methods UK has taken
202371		1	
202391		1	
203051		1	
203111		1	
203461		1	
203491		1	
204081		1	
204221		1	
204351		1	
204441		1	
204521		1	
205041	1,5	1	US mathematics education is improving, but it would be better if regulations regarding education are decided on a national level
205081		1	
205141		1	
205201		1	

205261		1	
205341		1	
205441		1	
205491		1	
205501		1	
205511		1	
206061		1	
206101		1	
206181		1	
206241		1	
206281		1	
206351	1,3	1	Japan science minister says Japan needs to develop its SAT more to boost its economy
207021		1	
207201		1	
207231		1	
207271		1	
207321		1	
207341		1	
207371		1	
207401		1	
207451	1,4	1	In memoriam Bill Golden, treasurer of the AAAS, who advocated more scientific input into Department of State policy and facilitated it
207491		1	
208031		1	
208051		1	
208121		1	
208141		1	
208151		1	
208161		1	
208261		1	
208321		1	
208391	1,4	1	US scientists need to be more involved in politics than just vote
208471		1	
208491		1	
208501		1	
209021		1	
209041	1,5	1	The scientific literacy of adults is defective and therefore the way science is taught in the curriculum should change, starting with the introduction of assessment
209091	1,1	1	Interdisciplinary research in the life sciences will result in the next scientific revolution and should therefore be encouraged
209101		1	
209111		1	

209141		1	
209161		1	
200011	2,2	2	Science introduces new features such as 'Editor's choice' about articles in other journals and electronic submission
200041		2	
200071	7,7	2	Reason must prevail in the regulation of biotechnology; the latter has great benefits
200331		2	
201051	13,2	2	Accepted Community Standards on data sharing/freedom of use differ by community and are not universally followed; a study of the US national academy must start at the true situation
201311		2	
202011	2,1	2	Innovations at Science: facilities for members, rules on web posting and review of supporting materials, open Access to articles and reports after 12 months
202101		2	
202231	2,1	2	Political convictions are no reason to refuse the sharing of research material, e.g. with an Israeli scientist
202271		2	
202421	2,3	2	Peer Review is no guarantee against scientific fraud as in the Schön affair; co-authors should share some of the responsibility in cases of scientific misconduct
203011		2	
203321	2,1	2	In papers with multiple authors, Science will allow each author's contribution to be spelled out
205411		2	
206021	2,3	2	The Hwang case shows that fraud cannot be banned by peer review; integrity must be assumed even if it is occasionally violated; a court decision that ID is not science must be applauded
206091		2	
206151	2,1	2	Editor in chief Cozarelli (PNAS) died; by tightening peer review he greatly increased PNAS circulation. Peer reviewers are invaluable; they would get more credit if reviews were public
206481		2	
207441	2,2	2	Science experiments with 'Author's summaries', which translate papers to the general public
208091		2	
208411	2,4	2	Impact factors of journals are a bad indicator for the quality of individual papers and authors
201321	3,3	3	A death in a trial at John Hopkins shows that trial oversight procedures must be overhauled, universities must put more resources in patient protection, but not all risks can be precluded
202021		3	
202091	3,3	3	Botox is as dangerous as a bio-terror weapon as anthrax; a military vaccine is being developed; its widespread cosmetic use should not get FDA approval without careful risk assessment
203331		3	
204121	3,1	3	Drug development are slowing down due to high cost and controlled prices of drugs. Several solutions might be tried, notably more government support for basic R and D in infectious diseases

204141		3	
204301	3,1	3	New proposals could and must solve the problem of incomplete reporting and registering of negative drug trial results, and consequent biased reporting of efficacy in meta studies
204421		3	
204491	3,2	3	Congress should fund an office of drug safety in response to a series of incidents with approved drugs
205231	3,3	3	Safety and efficacy of new drugs in the US must now be demonstrated for women as well as men. There are several solutions for lack of power of samples to spot sex differences, including an international drug trial registry
205301	3,1	3	Pharmaceutical companies should get more intelligent market incentives to develop the right new drugs
205431		3	
206141	3,2	3	The FDA is turning 100. This is a political miracle as is its reasonably positive image with consumers. It is permanently underfunded and treated badly by the Bush administration
206211		3	
207221	3,1	3	Elements of US innovation ecology such as intellectual property rights laws and antitrust laws are outdated by current information and biomedical technologies
207251		3	
208181	3,2	3	Daniel Troy advocates immunity from liability suits for FDA approved drugs. This is wrong because FDA is underfunded and cannot monitor already approved drugs
208251		3	
201241	4,1	4	Earth System Science is a very important emerging field as it deals with the changes to the Earth's system and this interdisciplinary field should therefore be supported ('Venus' and 'Mars' were mentioned to explain why people can live on Earth)
202161	4,1	4	The ISS could serve important scientific and engineering purposes, but because it is only a minimally equipped space station now, it cannot meet its promises. Instead, it should be fully financially supported
204051	4,1	4	Space exploration should be done robotically instead of by human space explorations, for which costs have risen but contributions to science have decreased.
205101	4,1	4	NASA should get a new administrator who supports science by ordering a Hubble repair mission and not letting the science budget be cut because of planned human exploration of Mars. NASA should support an Earth-observing system for the environmental sciences
205161	4,1	4	A new administrator was appointed at NASA. He should focus on the goal of exploration whether it be of oceans, of stars or of Mars and whether it be done by humans or robots. No funding should be taken away from the science budget to fund human exploration of Mars
205471	4,1	4	Appointment of new NASA administrator has not strengthened the science programme. NASA has dropped all scientific research needed for human space exploration. Basic research, particularly in life sciences should be incorporated in NASA's exploration programme
206071	4,2	4	NASA and NOAA scientists are being gagged in telling about the effects of climate change by the administration
207121	4,2	4	Pan-European space and astronomy organizations work very well on a limited budget and should be fully supported by Europe if it wants to

			keep excellent space astronomy
207281	4,2	4	Director of NASA, Michael Griffin, is underestimating the anthropogenic effect on climate change, while another important NASA scientist is saying the opposite, which is very confusing
208111	9,2	4	Although it takes a lot of time to write IPCC assessments and much effort to make them acceptable to multiple governments, the IPCC's objectivity, secured by the fact they only carry out assessments and don't perform research, has provided good-quality and objective assessments. The IPCC should keep its scientific excellence
201141		5	
201161	5,2	5	Establishing inheritable genetic modifications in humans inadvertently as a by-product of fertility therapy must not be done without public debate
201171		5	
201511	5,1	5	Nanodevices breakthrough of the year, important advances in bioscience and technology
202381		5	
202431	5,2	5	The Bush Administration has altered advisory committees in medicine and environmental health to better reflect the Administration's views. This is wrong
202511		5	
203151	5,1	5	Fifty years after Watson and Crick's discovery of DNA structure, the field is still full of surprises
203191		5	
203471	5,1	5	It is time to adapt a national biomedical research strategy to exploit the great possibilities and align industry and public research
204111		5	
204211	5,2	5	New rules for the process to formulate federal guidelines and regulations and for dealing with alleged scientific misconduct in health research deserve praise
204251		5	
204341	10,6	5	Budgets, visa rules and knowledge export rules all display a mixed picture of the state of Academia
204361		5	
204481	5,1	5	The scientific community should invest substantially in signal transduction bioinformatics development
205331		5	
206131	5,2	5	Workers in life sciences must be aware of and address bio-security risks or regulations will be imposed
206231		5	
206491		5	
207041	10,4	5	A conference of women leaders of S&T in Kuwait shows that women are becoming important in Arab science and deserve support
207181		5	
207331	1,2	5	Congress should not overrule the results of competitive science funding, either by funding its own pet projects or by blocking competitively approved projects
208201		5	
208451	5,1	5	Neurogenetics, the study of genes and behaviour via genes and the brain, is promising but has just started and must be done carefully

200391	6,5	6	A global biodiversity map, based on a global survey, must be made
201101		6	
201151		6	
201361	15,1	6	A global (distributed) influenza lab is needed
201391		6	
201421		6	
201461	6,2	6	The anthrax attacks have demonstrated that the use of biological weapons is no longer a theoretical threat. Scientists must work closely with policy-makers to reduce the threat
202131		6	
202171		6	
202291	12,6	6	The research and intelligence communities should cooperate more closely to study and counter the terrorism threat
202331		6	
202351		6	
202451	6,2	6	Clear secrecy and other security regulations, supported by the international scientific community, are needed to prevent use of research results and materials for bioterrorism
203041		6	
203381		6	
203411	14,5	6	Knowledge on science and technology must be put at the disposal of women in the third world to counter poverty and further sustainable development
203421		6	
203451		6	
204261	6,6	6	“Access for all” in case of HIV treatment can only be achieved by solutions which provide a fair reward for research into treatments
204461		6	
205031		6	
205111	15,1	6	A European Centre for Disease Control is needed, with a restricted role as coordinator of the national agencies
205121		6	
205191		6	
205251	6,2	6	Scientists must make every effort, advise governments and collaborate with others to secure a world in which nobody risks being subject to poisoning and the deliberate spreading of disease
206371		6	
207091		6	
207151	6,1	6	Primates must be used restrictively in research, but some use is still unavoidable
207411		6	
208171	6,4	6	A new green revolution is needed and requires modern agriculture infrastructure everywhere; investment in training and labs; and simple, not overly restrictive, regulations
208401		6	
200021		7	
200281	7,1	7	Libraries are a vital part to science, because they help in disseminating

			information and should be supported accordingly
200311		7	
202181	7,2	7	The Research Assessment Exercise has succeeded in raising the level of research in the UK and such a system should be implemented in other countries as well. However, it has reached its limits in the UK because too many researchers are awarded an excellent mark, so the system needs to be adjusted
202461		7	
203021	7,6	7	More attention should be paid to good education and it should be rewarded as well as research excellence
203251		7	
203351	7,2	7	Science policy in the EU should be more transnational, scientists should be able to move more freely between the EU and Europe, and priorities of basic vs. applied research should be restructured in Europe
203501		7	
204061		7	
204151	7,4	7	US Treasury did the right thing in reversing the rule that journals cannot offer editorial services to embargoed countries
204371		7	
204501	7,5	7	Sino-US collaboration is being damaged by visa restrictions. Barriers should be lifted
205221	7,1	7	The persistence of the ivory-billed woodpecker which was thought to have been extinguished is exciting and underscores how important amateur observers/scientists are in monitoring species
206031		7	
206051		7	
206121	9,3	7	Ice can teach us many things about how to measure climate change; we should not refer to baseline CO2-levels, but see the climate as a dynamic system
206441		7	
207081		7	
208101	7,3	7	In his first editorials as editor-in-chief, Bruce Alberts comments on how well his predecessor did and why he took up the job (he thinks *Science* promotes research very well)
209071	7,3	7	President Obama should take President Lincoln's example, who valued science and improved the research climate
200101	8,4	8	Gene therapy clinical researchers have promised much but delivered nothing. Conflicts of interest abound. Researchers should pledge themselves to sound research and eschew gambles
200121		8	
200351	8,2	8	New NIH stem cell research guidelines are a step in the right direction, but may be less liberal than a new law in Britain and the politics of whether they will be actually applied are uncertain
201041		8	
201231		8	
201431	8,3	8	A Congressional proposed law to ban human cloning is far too broad and should not pass
201441		8	
202041	8,1	8	In view of the huge increases in research funds and of terror attacks,

			local capabilities to respond to threats, clinical research and public education must be increased
202201		8	
202251		8	
202471	6,1	8	It is deplorable that animal rights activists caused Podel to abandon his NIH-funded HIV research. NIH is to be recommended for transferring the funding to other qualified project staff
203341		8	
203391	8,5	8	Medical doctors in the US have opposed universal health insurance for a century, thus leaving the debate to politicians. A group has now released a plan; it is important that physicians start to participate in the dialogue
203441		8	
204231		8	
204271	8,3	8	FDA decision to ban over the counter sales of morning after pill is another example of US family planning policies at home and abroad that hurt the well being of women and girls world-wide
205171		8	
205291	8,4	8	Invoking the Nazi analogy in debates on research issues and medical treatments is rarely appropriate and shows a lack of knowledge of Nazi practices
205401		8	
206331		8	
206381	8,6	8	The first results of the WHI (long term health survey of 1million women of 50-79) show that three treatments are not as effective as thought in the whole population. Next stage is study of diseases in specific groups and of genetic susceptibilities
206411		8	
206451	10,4	8	More must be done to involve women in research. A new Academies study argues that outdated institutional practices and a male climate are to blame for the lack of women, not the pipeline
207161		8	
208131		8	
200061		9	
200341		9	
200441	9,1	9	The US and developed world should investigate the use of non-sustainable power, because of a lack of sustainable alternatives
200451		9	
201081		9	
201131		9	
201201		9	
201331		9	
201471		9	
202301	9,3	9	Climate change is evident in biogeography change
202311	9,4	9	Better communication on climate change is needed to convince public climate change is real
202491		9	
203031		9	

203121	9,2	9	The US should have taken part in the Kyoto protocol
203361	9,4	9	Scientists should communicate better on the preservation of nature
204041	9,1	9	Nuclear power should be supported as a carbon-free source of energy
204101		9	
204181		9	
204191		9	
204241		9	
205371		9	
206041	9,1	9	Biofuels should be developed in a more focused way
206321		9	
206461		9	
206471		9	
206501		9	
207011		9	
207051		9	
207071		9	
207111		9	
207131		9	
207141		9	
207291	9,2	9	The burden of carbon emission reduction should be shared by the whole world
207301	9,2	9	The US are finally taking climate change seriously and are doing something about it
207351	9,3	9	Update on climate change (US bill on fuel economy) and biofuels (problems with food production for poor countries), but also on science fraud, animal activism and secrecy within US government
207381		9	
207481		9	
208441		9	
200091	10,3	10	Multilateral collaboration helps the advancement of science and the ability to address worldwide problems a great deal
200131		10	
200241	10,3	10	European countries should collaborate more with other countries within the European Union; new technology will enable this process
200291	10,1	10	Russian science is developing well, even though there is still much that should change, and this good development needs to be supported
201061		10	
201181		10	
201211		10	
202051	10,5	10	Privatization of US nuclear agency turned out badly and it should be controlled better by US government in order to prevent proliferation of nuclear weapons
202361	10,1	10	European science needs to be reformed in terms of career opportunities and boundaries between academia and industry
202481		10	
203141	16,1	10	US government should act to overcome problems caused by trade

			deficit and dependence on fossil fuels
203301		10	
203311		10	
203511		10	
204021		10	
204321		10	
204331		10	
204381		10	
204401		10	
204451		10	
204511		10	
205181		10	
205241	9,2	10	A major fight on climate change between Bush and Schwarzenegger is about to unfold.
205481		10	
206011		10	
206191		10	
206261		10	
206311		10	
206341		10	
207031		10	
207061		10	
207211		10	
207241	10,5	10	US expertise on nuclear weapons should be used to find the best way to prevent proliferation; these include intelligence and cooperative measures instead of military coercion
207391	10,4	10	The EURYI grants were good and effective awards that gave young scientists independence. However, they are now replaced by ERC grants and it remains to be seen if the latter grants will be as good
207461		10	
207501		10	
207511		10	
208011		10	
208281		10	
208381		10	
208461		10	
209031		10	
209051		10	
209121		10	
209151	10,1	10	Scientific fields need to work together more to ensure universal conditions, like scientific integrity, good career opportunities etc in Congress
201301	11,2	11	To increase the number of clinical researchers, NIH must start a study loan repayment program for them
201341	11,5	11	It is important to have explicit and timely embryo research policies (experience with NIH proposals cited)

201371	11,5	11	Less restrictions must be put on human embryonic stem cell research; NIH must still release registry of eligible cell lines and must expedite funding decisions
202411	11,2	11	NIH must establish policies to increase the share of young researchers in the total research workforce
205091	10,7	11	After 25 years an evaluation of the Bayh-Dole Act is called for, measuring the balance of innovation created and costs to universities and public trust in science
205311	11,1	11	Congress should pay attention to stability of NIH work in spite of an end to budget growth
206171	11,1	11	Scientists should not blame NIH for its declining budget but support NIH in its political quest for increased budget
200081		12	
200141		12	
200191		12	
200231		12	
200511		12	
201071	13,2	12	The unravelling of the human genome by Celera in Science (and by the Human Genome Project the same week in Nature) will lead to new, exciting research. It is a good thing that the data from a commercial venture are made public, which was helped by the adaptability of Science to the way the data is made available
201121		12	
201401		12	
201501		12	
202031	12,6	12	Terrorism research will have implications for natural disasters, as well, because both have the tendency to act on important nodes in social and technological networks. Science can help in redesign and repair after both terrorist and natural attacks
202111		12	
202191		12	
203061		12	
203071	12,3	12	Communication to the public about science needs to be more open and less paternalistic. AAAS has established an initiative to engage the public in science
203161		12	
203221		12	
203241		12	
203291	1,1	12	Discussion how time could be incorporated in genetic information and how this could be investigated
203401		12	
203481		12	
204091		12	
204131	16,1	12	In investigating the presence of weapons of mass destruction in Iraq, intelligence agencies probably did a pretty good job, but their conclusions were changed by 'reverse peer review', review that strengthened rather than weakened conclusion based on the desired conclusions
204171		12	

205051		12	
205061	12,3	12	Scientists should use diplomacy and discussion to talk to public about what science can and cannot do
205271		12	
206081	12,2	12	Evolution is an important aspect of medicine and should be incorporated into curricula at school, colleges and universities and funding agencies should have evolutionary expertise
206271		12	
206431		12	
207361		12	
207431	12,1	12	Neuroethics is an important and interesting development, and it is necessary to study the implications of the development of neuroscience
208071		12	
208331		12	
208481	12,7	12	Scientists should play a role in the establishment of human rights by all governments; science has already played a big role in the protection of human rights
208511		12	
209011	12,8	12	Good education is vital to ensure a nation's survival, and more emphasis on education and the science of education is needed
200051		13	
200111	2,1	13	Readers' complaints about use of online tools in science are understandable, but proper digital communication and other tools have great benefits in science and will be promoted by Science
200211		13	
200221	2,1	13	Farewell of Chief Editor Bloom. Many changes have and will come in submission, publication, data access due to digital tools and internet
200271		13	
200431		13	
200501	1,1	13	Now that the whole genome sequence of Arabidopsis is published, more research must be done to understand how Arabidopsis functions, turning it into the reference organism for other plants
201011		13	
202071	13,7	13	The great importance attached to being published in Science and Nature should be played down some; Science must be as transparent as possible, explaining what its decisions (don't) mean
202141		13	
202221		13	
202341	13,5	13	'Tacky" practices violate generosity and straight dealing in science. Examples are non- or conditional sharing of research materials; media releases about non-peer reviewed research; Craig Venter's announcement that the DNA of the human genome project was mostly his
202501		13	
203081	13,3	13	The cultures of science and security are threatened to be divided. It can be prevented by a sense that some scientific information should not be published, but that in such decisions benefits and costs need to be considered together
203231		13	

204011		13	
204291	13,6	13	In a health damage claims lawsuit of IBM employees, the judge threw out epidemiological evidence and IBM prevented its peer reviewed publication. Both actions are dubious
204411		13	
205011	2,2	13	Science celebrates its 125 anniversary with 12 essays by third world scientists on their work. The first is a useful model on how to make work accessible to people from outside the specialty
205131		13	
205461		13	
206511	13,5	13	Perelman's proof of Poincaré conjecture breakthrough of the year; retraction of two Science papers for fraud breakdown of the year; Science's predictions reasonably adequate
207311		13	
208081	13,6	13	Pfizer demands access to the peer reviews of two articles in New England Journal of Medicine to support its defence in a damage claim lawsuit. Pfizer has insufficient grounds for its demand
208271		13	
208361		13	
200031		14	
200261		14	
200361	14,2	14	Agricultural research should be directed more at food production in poor countries
200371		14	
201221		14	
201251	14,2	14	GM agriculture could solve food requirement problems
201261		14	
201271		14	
201481		14	
202281		14	
202321		14	
203091		14	
203101	14,5	14	Science needs to help solve the world's problems such as poverty, sea level rise and proliferation of nuclear weapons
203131	14,5	14	Science needs to help with the war in Iraq by helping to reconstruct the country
203211		14	
203281		14	
203371		14	
204031		14	
204071		14	
204391	7,3	14	Bush administration should respect science in its policy on HIV/AIDS in developing countries, on climate change and on stem cells
204471		14	
205071		14	
205151		14	

205211	14,4	14	Nature in cities should be protected
205351	14,4	14	Apes need to be protected from dangers caused by developing countries' problems
205361		14	
205391		14	
205421	14,2	14	Information technology should become more available to developing countries
205451		14	
206201		14	
206221		14	
206251		14	
206361		14	
206421		14	
207101		14	
207171		14	
207261	14,1	14	Science should be encouraged in developing countries
207421		14	
208021		14	
208041		14	
208061		14	
208211		14	
208221		14	
208231		14	
208241		14	
208291		14	
208311		14	
208341		14	
208351		14	
208371		14	
208421		14	
208431	14,1	14	Science in developing countries should be supported
209061		14	
209131		14	
200201		15	
200251	15,2	15	Many concerns about AIDS vaccine trials in developing countries should be addressed
200401		15	
201031		15	
202081	15,1	15	The US public health system must be strengthened at many levels to combat threats of infectious diseases and bio-terror
202211		15	
202261		15	
202401	15,3	15	Science reports the genome of the Malaria mosquito, Nature that of the parasite; they must be used to develop the new tools, relations and so on needed to reduce Malaria

202441		15	
203171		15	
203181	15,1	15	Following SARS, US must support WHO and global networks of labs to battle infectious diseases and bio-terror threats
203201		15	
203261		15	
203271	15,1	15	US bio-terror defence should concentrate less on a single agent (smallpox) and more on strengthening the public health system as a whole against a broad range of threats
203431		15	
204161		15	
204201	15,3	15	Priorities in health research should focus not on exotic 'diseases of the day' but on the real killers such as flu, hepatitis, Malaria, Rotavirus, and so on
204281		15	
204311		15	
204431	15,4	15	Scientific consensus on toxicogenomic data standards and interpretation would mean fewer safety concerns and fewer delays in the drug approval process. Toxicogenomic data submission standards promise to significantly improve the drug risk assessment process
205021		15	
205281		15	
205321	15,1	15	If an H5N1 pandemic does not emerge in the short term, the political will to continue the global preparations for a future pandemic may falter. We cannot afford such a misstep
205381		15	
206111		15	
206161	15,3	15	With respect to new strains of flu, we need to put a major effort behind the development of tests that are quick, sensitive, specific, simple, and inexpensive
206291		15	
206301		15	
206391	12,1	15	There should be regulation of the accuracy of genetic testing for disease susceptibility
206401		15	
207191		15	
207471	15,4	15	In Europe, the chemical industry is required to establish safety before a product can continue to be marketed. Congress should reform the U.S. Toxic Substances Control Act (TOSCA) similarly by introducing a real proof-of-safety provision
208191		15	
208301		15	

Table 2 *Nature* and *Science* editorials content classification

Content–based classification code	Title	Description
1	Science policy	Policies to optimize science output. Includes: research priorities; quality of science; science in education; ethics of use of science results; relation of science with politics
1.1	Research priorities	Identification of promising/important research areas; pleas to provide sufficient resources for specific research areas; reflections on predictability of science
1.2	Political independence of priorities	Need for independence of funding and research decisions from political considerations
1.3	National research policies	Remarks on science, research and innovation policies of specific countries
1.4	Science and politics	Impact of science on general political decision making or of scientists on general politics
1.5	Science in education	Amount and quality of science in education; choice of scientific subjects in education
1.6	Research assessment	Proper criteria and methods to assess the scientific quality of research
1.7	Quality of scientific debate	Quality criteria for assessment of and debate on scientific issues
1.8	Ethics of use	(Need to debate) ethical implications of the use of new scientific results
2	Journal policies	Rules, policies and products of *Nature*, *Science* and other journals
2.1	Journal rules	Rules/guidelines of *Science* and *Nature* for submissions, availability of research materials, authorship, author integrity
2.2	Journal products	Products of *Science* and *Nature*, such as new journals, new formats, new publication business models
2.3	Handling of fraud and misconduct	Policies of *Science*, *Nature* and other journals for dealing with scientific fraud and misconduct
2.4	Impact factors	Impact factors, their value and shortcomings
2.5	Journals and dual use dilemmas	Publication of terrorism sensitive results: the role of journals
2.6	In memoriam Maddox	In memoriam on former *Nature* Editor John Maddox
3	Drug development	Development and regulation of medical drugs
3.1	Pharmaceutical innovation	Innovation processes in the pharmaceutical industry; the development of new drugs
3.2	Drug regulation	Rules and laws on the regulation of new and existing drugs; the organization of drug regulation; dual use risk regulation
3.3	Regulation of drug trials	Safety rules for drug trials
4	Space and physics	Space and astronomy; accelerator and other high energy physics
4.1	Space priorities	Priorities in space exploration and space science; total priority of space and astronomy
4.2	NASA/ESA management	Management of NASA and European space and astronomy programs; independence of NASA scientists; collateral issues (e.g. health risk of launches)
4.3	Space communication	Communication on space with general public; reports on space missions
4.4	Physics	High energy and theoretical physics: opportunities, priorities, organization
5	Bioscience	Biological science n.e.s.: new developments and priorities; research strategy and researcher involvement in bioscience and society issues
5.1	New developments	New developments in bioscience; potential of new bioscience developments; bioscience research strategy, including priorities data availability and standardization NB Includes

		breakthrough of the year: nano and important bioscience
5.2	Bioscience and society	Ethical and biosecurity issues in bioscience: researcher awareness; research, transparency and debate concerning ethical and security issues; safeguards
6	Biopolicies	Policies on the conditions for bioscience and its application
6.1	Research animals	Use and handling of animals in research; effects of animal rights activism (NB: handling of a.r.a. is 12.4)
6.2	Bioterrorism	Research to counter bioterrorism; prevention of use of bioscience results and research materials for terrorism
6.3	Biosafety	Organization of biosafety research; communication about (breaches of) biosafety rules
6.4	Agriculture	Innovation and R and D in agriculture: funding and organization
6.5	Biodiversity	Mapping of biodiversity; wild life and habitat protection; seed banks
6.6	Price of HIV drugs	Pricing of HIV drugs, notably in developing countries
7	Research climate	Conditions and infrastructure for science
7.1	Infrastructure	Importance for science of science infrastructure, technology and amateur observers
7.2	Quality policies	Policies aimed at maintaining or increasing the quality of science
7.3	Appreciation	Appreciation of science by politicians and public; promotion of science by scientists and science journals; respect of governments for scientific advice
7.4	Freedom of publication	Independence of scientific publishing from government interference
7.5	Researcher freedom of movement	Impediments to researcher mobility, e.g. visa restrictions
7.6	University education	Issues in higher education, e.g. priority of education in universities
7.7	Regulation	(Restraint in) regulation of science and technology
8	Health	Health care, general health research, human reproduction and genetics
8.1	Reaction capability	Capabilities of local, national, international to react on health threats like outbreaks of infectious diseases and bioterror attacks
8.2	Embryos and stem cells	Human embryos and stem cells: research, ethics, regulation; regulation ; ethics
8.3	Human reproduction	Family planning policies, regulation of human cloning
8.4	Human genes and genetics	Research in altering human genes, e.g. gene therapy and interspecies research; neurogenetics; communication about genetics
8.5	Health care insurance	Policies and views in US health care insurance
8.6	Health research	General health research; cancer research; infrastructure for health research
9	Climate change	Climate change: research and policies
9.1	Specific policies and technologies	Specific policies and technologies (e.g. biomass, wind energy, etc.) to deal with climate problems
9.2	General policies	General global and national policies and institutions to deal with climate change, including IPCC
9.3	Climate science	Evidence of climate change; climate research and theory; independence of climate researchers
9.4	Climate communication	Public communication on climate change
10	Science organization	Organization and management of the research system and of research organizations
10.1	General organization	Overall national organization and management of science/research; structure of research programs

		(e.g. EU framework programs); performance of the national research system
10.2	Organization in fields	Organization and management in specific research fields; liability of owners of preprint servers
10.3	International science	Issues in the management and organization of international science/scientific cooperation
10.4	Science HRM	Issues in human resources management in science, e.g. person oriented funding schemes, women in science
10.5	Organization of nuclear knowledge	Organization of nuclear agencies, organization and use of knowledge to prevent proliferation of nuclear weapons
10.6	State of science	General information on the state and development of universities and research institutions
10.7	Innovation	Policies and laws (e.g. Bayh-Dole) to stimulate innovation
11	NIH	National Institutes of Health: organization, management, funding and policies
11.1	NIH organization	Organization, management and funding of NIH
11.2	NIH HRM	NIH incentives for specific groups of researchers (e.g. young researchers, clinical researchers)
11.3	NIH integrity	Integrity/independence of NIH research(ers), including freedom to talk to press
11.4	NIH data	NIH funding of data; access to NIH funded data
11.5	NIH embryos/stem cells	Embryo and stem cell research: NIH policies; restrictions on NIH policies; contribution of NIH to regulation
12	Science and society	Science's attitude towards and involvement in society
12.1	Implications of science	Implications of new scientific developments: ethics, societal debate, regulation
12.2	Science and religion	Science's dealing with religion and religious views of science; science and issues of right and wrong; evolution expertise in medical education and funding
12.3	Science communication	Communication of science to the general public
12.4	Handling animal rights activism	Science's handling of animal rights activism (NB: effects of a.r.a. are 6.1)
12.5	Public trust	Public trust in science; relation between independence of science and public trust; guarding of independence
12.6	Calamities	Role of science in prevention and relief of natural and manmade disasters (including terrorism) NB Bioterrorism in 6.2
12.7	Collaboration with practitioners	Collaboration of scientists and concerned citizens/practitioners (e.g. in conservation); engagement of scientists in human rights
12.8	Education science	Scientific analysis of education
13	Science publication	Issues in science publication that are not journal-specific
13.1	Publications and funding	Links between science funding and number of publications
13.2	Accessibility of research materials	Data infrastructure and publication credits; accessibility of data and materials underlying published scientific results. NB If the emphasis is on specific journal rules, the code is 2.1; if the emphasis is on content or the relation with publication in general, the code is 13.2
13.3	Dual use dilemmas	Publication of terrorism sensitive results: general (role of journals is 2.5)
13.4	Level playing field	Openness of international journals to authors from non-western countries, e.g. Japan
13.5	Unethical research practices	Fraud and research ethics; publication-related shady research practices. NB Includes Science Breakthrough of the year editorial that paid attention to fraud ('breakdown of the year')
13.6	Litigation and publication	Lawsuits related to scientific publication (e.g. on confidentiality of peer review)
13.7	Status and publication	Influence of publication in high impact journal on scientists'

		status
14	Developing countries and global problems	Policies to support developing countries; role of science in major international problems; environmental protection
14.1	DC's: research and education	Support for research and education in developing countries
14.2	DC's: technology	Technology for developing countries
14.3	DC's: trade barriers	Trade barriers/free trade and developing countries
14.4	Conservation	Protection of nature and species; management and organization of environmental protection agencies; research/regulation of environmental safety of specific technologies
14.5	International problems	Role of science in fight against poverty, sea level rise, proliferation, conduct and aftermath of wars (e.g. Iraq war)
15	Infectious diseases and toxins	Infectious diseases and diseases caused by toxic substances
15.1	General	General capacity of health care system to combat infectious diseases
15.2	TB and HIV	Tuberculosis, AIDS and HIV: research, care
15.3	Other infectious diseases	Malaria, flu, Lyme and other: research and care
15.4	Toxins	Health risks of chemical substances (including regulation); toxicogenomics
16	Not elsewhere specified	
16.1	Current affairs	Comments on (non-science) current affairs from a general scientific world view, e.g. vote counting in the US; world cup football; misestimate Iraqi weapons of mass destruction
16.2	Impact of transparency	Impact of transparency on political decision making (example: indicator of quality of information on air pollution in China)

Table 3 Number of *Nature* and *Science* editorials per sub-cluster. Map-based results and content-based results based on a sample of editorials. Sample numbers raised to population totals

		Nature		*Science*		*Nature* plus *Science*	
		map	content	map	content	map	content
1	Science policy	112	163	78	83	190	246
1.1	Research priorities	22	48	8	14	30	62
1.2	Political independence of priorities	34	34	0	2	34	36
1.3	National research policies	0	0	16	16	16	16
1.4	Science and politics	0	27	31	35	31	62
1.5	Science in education	11	11	16	16	27	27
1.6	Research assessment	11	22	0	0	11	22
1.7	Quality of scientific debate	11	11	0	0	11	11
1.8	Ethics of use	11	11	0	0	11	11
16.1	Current affairs	11	0	8	0	19	0
2	Journal policies	44	43	21	25	65	68
2.1	Journal rules	20	20	8	13	28	33
2.2	Journal products	8	8	4	6	12	14
2.3	Handling of fraud and misconduct	8	8	4	4	12	12
2.4	Impact factors	0	0	2	2	2	2
2.5	Journals and dual use dilemmas	4	4	0	0	4	4
2.6	In memoriam Maddox	0	3	0	0	0	3
1.1	Research priorities	4	0	0	0	4	0
7.7	Regulation	0	0	2	0	2	0
13.2	Accessibility of research materials	0	0	2	0	2	0
3	Drug development	37	34	18	18	55	52
3.1	Pharmaceutical innovation	12	12	7	7	20	20
3.2	Drug regulation	15	15	5	5	21	21
3.3	Regulation of drug trials	6	6	5	5	12	12
2.6	In memoriam Maddox	3	0	0	0	3	0
4	Space and physics	66	63	10	9	76	72
4.1	Space priorities	35	35	6	6	41	41
4.2	NASA Management	7	7	3	3	10	10
4.3	Space communication	3	3	0	0	3	3
4.4	Physics	17	17	0	0	17	17
9.2	Climate change, general policies	3	0	1	0	4	0
5	Bio science	41	37	25	19	66	56
5.1	New developments	19	19	10	10	29	29
5.2	Bio science and society	19	19	8	8	27	27
1.2	Political independence of priorities	0	0	2	0	2	0
10.4	Science HRM	0	0	2	0	2	0
10.6	State of science	0	0	2	0	2	0
16.2	Impact of transparency	4	0	0	0	4	0

6	Bio policies	72	76	31	22	103	98
6.1	Research animals	14	14	3	5	17	20
6.2	Bio terrorism	7	13	8	8	16	21
6.3	Bio safety	14	20	0	0	14	20
6.4	Agriculture	7	7	3	3	10	10
6.5	Bio diversity	22	22	3	3	24	24
6.6	Price of HIV drugs	0	0	3	3	3	3
1.1	General science organization	7	0	0	0	7	0
1.6	Calamities	0	0	3	0	3	0
14.5	International problems	0	0	3	0	3	0
15.1	Infectious diseases, general	0	0	6	0	6	0
7	Research climate	58	57	21	26	79	82
7.1	Infrastructure	12	12	4	4	16	16
7.2	Quality policies	17	17	4	4	22	22
7.3	Appreciation	6	6	4	9	10	15
7.4	Freedom of publication	6	22	2	2	8	24
7.5	Researcher freedom of movement	0	0	2	2	2	2
7.6	University education	0	0	2	2	2	2
6.3	Bio safety	6	0	0	0	6	0
9.2	Climate change, general policies	6	0	0	0	6	0
9.3	Climate science	0	0	2	0	2	0
1.3	Science communication	6	0	0	0	6	0
8	Health	67	56	25	20	92	76
8.1	Reaction capability	11	11	3	3	14	14
8.2	Embryos and stem cells	22	22	3	3	25	25
8.3	Human reproduction	0	0	5	5	5	5
8.4	Human genes and genetics	11	11	5	5	16	16
8.5	Health care insurance	0	0	3	3	3	3
8.6	Health research	11	11	3	3	14	14
6.1	Research animals	0	0	3	0	3	0
6.2	Bio terrorism	6	0	0	0	6	0
10.4	Science HRM	6	0	3	0	8	0
9	Climate change	107	106	38	45	145	151
9.1	Specific policies and technologies	43	43	11	11	54	54
9.2	General policies	32	41	11	16	44	58
9.3	Climate science	11	11	8	10	18	20
9.4	Climate communication	11	11	8	8	18	18
1.4	Science and politics	11	0	0	0	11	0
		0	0	0	0	0	0
10	Science organization	159	133	45	40	204	173
		0	0	0	0	0	0
10.1	General organization	64	77	12	12	76	89
10.2	Organization in fields	16	30	0	0	16	30

10.3	International science	16	16	8	8	24	24
10.4	Science HRM	0	11	4	9	4	19
10.5	Organization of nuclear knowledge	0	0	8	8	8	8
10.6	State of science	0	0	0	2	0	2
10.7	Innovation	0	0	0	1	0	1
1.1	Research priorities	16	0	0	0	16	0
1.4	Science and politics	16	0	4	0	20	0
7.4	Freedom of publication	16	0	0	0	16	0
9.2	Climate change, general policies	0	0	4	0	4	0
16.1	Current affairs	16	0	4	0	20	0
11	NIH	25	25	7	6	32	31
11.1	NIH organization	12	12	2	2	14	14
11.2	NIH HRM	1	1	2	2	3	3
11.3	NIH integrity	5	5	0	0	5	5
11.4	NIH data	3	3	0	0	3	3
11.5	NIH and embryos and stem cells	4	4	2	2	6	6
10.7	Innovation	0	0	1	0	1	0
12	Science and society	94	85	36	31	130	116
12.1	Implications of new science	21	21	4	7	24	28
12.2	Science and religion	16	21	4	4	19	25
12.3	Science communication	0	6	7	7	7	13
12.4	Handling animal rights activism	10	10	0	0	10	10
12.5	Public trust	16	16	0	0	16	16
12.6	Calamities	5	5	4	6	9	12
12.7	Collaboration with citizens	5	5	4	4	9	9
12.8	Education science	0	0	4	4	4	4
1.1	Research priorities	5	0	4	0	9	0
1.6	Research assessment	10	0	0	0	10	0
10.4	Science HRM	5	0	0	0	5	0
13.2	Accessibility of research materials	0	0	4	0	4	0
16.1	Current affairs	0	0	4	0	4	0
13	Science publication	63	46	26	21	89	67
13.1	Publications and funding	17	17	0	0	17	17
13.2	Accessibility of research materials	11	11	0	6	11	17
13.3	Dual use dilemmas	6	6	3	3	8	8
13.4	Level playing field	6	6	0	0	6	6
13.5	Unethical research practices	6	6	5	5	11	11
13.6	Litigation and publication	0	0	5	5	5	5
13.7	Status and publication	0	0	3	3	3	3
1.1	Research priorities	0	0	3	0	3	0
2.1	Journal rules	0	0	5	0	5	0
2.2	Journal products	0	0	3	0	3	0
1.1	General organization in science	6	0	0	0	6	0

10.2	Organization in science fields	6	0	0	0	6	0
12.2	Science communication	6	0	0	0	6	0
14	Developing countries, environment	82	74	54	51	136	125
14.1	DC's: research and education	25	25	11	11	35	35
14.2	DC's: technology	16	16	16	16	32	32
14.3	DC's: trade barriers	8	8	0	0	8	8
14.4	Conservation	25	25	11	11	36	36
14.5	International problems	0	0	11	14	11	14
7.3	Appreciation	0	0	5	0	5	0
10.2	Science organization in fields	8	0	0	0	8	0
15	Infectious diseases and toxins	70	70	34	36	104	106
15.1	General	7	7	12	18	19	25
15.2	TB and HIV	42	42	3	3	45	45
15.3	Other infectious diseases	14	14	9	9	23	23
15.4	Toxins	7	7	6	6	13	13
12.1	Implications of science	0	0	3	0	3	0
	Total	1097	1066	468	453	1565	1519
16	NES	0	31	0	15	0	46

Table 4.1.1 *Nature*: Transition between map-based clusters and content-based clusters, in absolute population numbers

		Content-based clusters																Tot
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	Map-based clusters																	
1	Science policy	101															11	112
2	Journal policies	4	40															44
3	Drug development		3	34														37
4	Space and physics				63					3								66
5	Bio science					37											4	41
6	Bio policies						65				7							72
7	Research climate						6	41		6			6					58
8	Health						6		56		6							67
9	Climate change	11								96								107
10	Science organization	32						16			95						16	159
11	NIH											25						25
12	Science and society	16									5		73					94
13	Science publication										11		6	46				63
14	Dev. c'tries, environ.										8				74			82
15	Infect. dis., toxins															70		70
	Total	163	43	34	63	37	76	57	56	106	133	25	85	46	74	70	31	1097

Table 4.1.2 *Nature*: Transition between map-based clusters and content-based clusters, in percents of map-based numbers

		Content-based clusters																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Tot
	Map-based clusters																	
1	Science policy	90															10	100
2	Journal policies	9	91															100
3	Drug development		8	92														100
4	Space and physics				95					5								100
5	Bio science					91											9	100
6	Bio policies						90				10							100
7	Research climate						10	70		10			10					100
8	Health						8		83		8							100
9	Climate change	10								90								100
10	Science organization	20						10			60						10	100
11	NIH											100						100
12	Science and society	17									6		78					100
13	Science publication										18		9	73				100
14	Dev. c'tries, environ.										10				90			100
15	Infectious dis., toxins															100		100

Table 4.1.3 *Nature*: Transition between map-based clusters and content-based clusters, in percents of content-based numbers

		Content-based clusters															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Map-based clusters																	
1	Science policy	62															36
2	Journal policies	2	93														
3	Drug development		7	100													
4	Space and physics				100					3							
5	Bio science					100											12
6	Bio policies						85				5						
7	Research climate						8	72		5			7				
8	Health						7		100		4						
9	Climate change	7								91							
10	Science organization	20						28			72						52
11	NIH											100					
12	Science and society	10									4		86				
13	Science publication										9		7	100			
14	Dev. c'tries, environ.										6				100		
15	Infectious dis., toxins															100	
	Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 4.2.1 *Science*: Transition between map-based clusters and content-based clusters, in absolute population numbers

		Content-based clusters																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Tot
Map-based clusters																		
1	Science policy	70															8	78
2	Journal policies		17					2						2				21
3	Drug development			18														18
4	Space and physics				9					1								10
5	Bio science	2				19					4							25
6	Bio policies						20						3		3	6		31
7	Research climate							19		2								21
8	Health						3		20		3							25
9	Climate change									38								38
10	Science organization.	4								4	33						4	45
11	NIH										1	6						7
12	Science and society	4											25	4			4	36
13	Science publication	3	8											16				26
14	Dev. c'tries, env.							5							49			54
15	Infectious dis., toxins												3			31		34
	Total	83	25	18	9	19	22	26	20	45	40	6	31	21	51	36	15	468

Table 4.2.2 *Science*: Transition between map-based clusters and content-based clusters, in percents of map-based numbers

		Content-based clusters																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Tot
Map-based clusters																		
1	Science policy	90															10	100
2	Journal policies		82					9						9				100
3	Drug development			100														100
4	Space and physics				90					10								100
5	Bio science	8				75					17							100
6	Bio policies						64						9		9	18		100
7	Research climate							90		10								100
8	Health						10		80		10							100
9	Climate change									100								100
10	Science organization	9								9	73						9	100
11	NIH										14	86						100
12	Science and society	10											70	10			10	100
13	Science publication	10	30											60				100
14	Dev. c'tries, environ.							9							91			100
15	Infectious dis., toxins												9			91		100

Table 4.2.3 *Science*: Transition between map-based clusters and content-based clusters, in percents of content-based numbers

		Content-based clusters															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Map-based clusters																	
1	Science policy	85															50
2	Journal policies		69					7						9			
3	Drug development			100													
4	Space and physics				100					2							
5	Bio science	3				100					10						
6	Bio policies						89						9		5	16	
7	Research climate							73		5							
8	Health						11		100	0	6						
9	Climate change									84							
10	Science organ.	5								9	81						26
11	NIH										2	100					
12	Science and society	4											81	17			23
13	Science publication	3	31											74			
14	Dev. c'tries, environ.							19							95		
15	Infectious dis., toxins												10			84	
	Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 4.3.1 *Nature* plus *Science*: Transition between map-based clusters and content-based clusters, in absolute population numbers

		Content-based clusters																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Tot
Map-based clusters																		
1	Science policy	171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	190
2	Journal policies	4	57	0	0	0	0	2	0	0	0	0	0	2	0	0	0	65
3	Drug development	0	3	52	0	0	0	0	0	0	0	0	0	0	0	0	0	55
4	Space and physics	0	0	0	72	0	0	0	0	4	0	0	0	0	0	0	0	76
5	Bio science	2	0	0	0	56	0	0	0	0	4	0	0	0	0	0	4	66
6	Bio policies	0	0	0	0	0	85	0	0	0	7	0	3	0	3	6	0	103
7	Research climate	0	0	0	0	0	6	60	0	8	0	0	6	0	0	0	0	79
8	Health	0	0	0	0	0	8	0	76	0	8	0	0	0	0	0	0	92
9	Climate change	11	0	0	0	0	0	0	0	134	0	0	0	0	0	0	0	145
10	Science organization	36	0	0	0	0	0	16	0	4	128	0	0	0	0	0	20	204
11	NIH	0	0	0	0	0	0	0	0	0	1	31	0	0	0	0	0	32
12	Science and society	19	0	0	0	0	0	0	0	0	5	0	98	4	0	0	4	130
13	Science publication	3	8	0	0	0	0	0	0	0	11	0	6	61	0	0	0	89
14	Dev. c'tries, environ.	0	0	0	0	0	0	5	0	0	8	0	0	0	122	0	0	136
15	Infectious dis., toxins	0	0	0	0	0	0	0	0	0	0	0	3	0	0	101	0	104
	Total	246	68	52	72	56	98	82	76	151	173	31	116	67	125	106	46	1565

Table 4.3.2 *Nature* plus *Science*: Transition between map-based clusters and content-based clusters, in percents of map-based numbers

		Content-based clusters																Tot
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	Map-based clusters																	
1	Science policy	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	100
2	Journal policies	6	88	0	0	0	0	3	0	0	0	0	0	3	0	0	0	100
3	Drug development	0	6	94	0	0	0	0	0	0	0	0	0	0	0	0	0	100
4	Space and physics	0	0	0	94	0	0	0	0	6	0	0	0	0	0	0	0	100
5	Bio science	3	0	0	0	85	0	0	0	0	6	0	0	0	0	0	6	100
6	Bio policies	0	0	0	0	0	82	0	0	0	7	0	3	0	3	5	0	100
7	Research climate	0	0	0	0	0	7	75	0	10	0	0	7	0	0	0	0	100
8	Health	0	0	0	0	0	9	0	82	0	9	0	0	0	0	0	0	100
9	Climate change	7	0	0	0	0	0	0	0	93	0	0	0	0	0	0	0	100
10	Science organization	18	0	0	0	0	0	8	0	2	63	0	0	0	0	0	10	100
11	NIH	0	0	0	0	0	0	0	0	0	3	97	0	0	0	0	0	100
12	Science and society	15	0	0	0	0	0	0	0	0	4	0	76	3	0	0	3	100
13	Science publication	3	9	0	0	0	0	0	0	0	13	0	6	69	0	0	0	100
14	Dev. c'tries, environ.	0	0	0	0	0	0	4	0	0	6	0	0	0	90	0	0	100
15	Infectious dis., toxins	0	0	0	0	0	0	0	0	0	0	0	3	0	0	97	0	100

Table 4.3.3 *Nature* plus *Science*: Transition between map-based clusters and content-based clusters, in percents of content-based numbers

		Content-based clusters															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Map-based clusters																	
1	Science policy	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41
2	Journal policies	2	84	0	0	0	0	2	0	0	0	0	0	3	0	0	0
3	Drug development	0	5	100	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Space and physics	0	0	0	100	0	0	0	0	3	0	0	0	0	0	0	0
5	Bio science	1	0	0	0	100	0	0	0	0	2	0	0	0	0	0	8
6	Bio policies	0	0	0	0	0	86	0	0	0	4	0	2	0	2	5	0
7	Research climate	0	0	0	0	0	6	72	0	5	0	0	5	0	0	0	0
8	Health	0	0	0	0	0	8	0	100	0	5	0	0	0	0	0	0
9	Climate change	4	0	0	0	0	0	0	0	89	0	0	0	0	0	0	0
10	Science organization	15	0	0	0	0	0	19	0	3	74	0	0	0	0	0	43
11	NIH	0	0	0	0	0	0	0	0	0	1	100	0	0	0	0	0
12	Science and society	8	0	0	0	0	0	0	0	0	3	0	85	5	0	0	8
13	Science publication	1	11	0	0	0	0	0	0	0	7	0	5	92	0	0	0
14	Dev. c'tries, environ.	0	0	0	0	0	0	6	0	0	5	0	0	0	98	0	0
15	Infectious dis., toxins	0	0	0	0	0	0	0	0	0	0	0	3	0	0	95	0
	Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Lexicon NPtool

Noun phrases containing preposition

American Association for the Advancement of Science	N; Prop
Association of American Medical Colleges	N; Prop
Centers for Disease Control	N; Prop
Chinese Academy of Sciences	N; Prop
Council on Environmental Quality	N; Prop
Council on Ocean Policy	N; Prop
Department for Environment, Food and Rural Affairs	N; Prop
Department of Defense	N; Prop
Department of Health and Human Services	N; Prop
Department of Homeland Security	N; Prop
European Centre for Disease Prevention and Control	N; Prop
Federation of American Societies for Experimental Biology	N; Prop
Food and Drug Administration	N
Human Fertilisation and Embryology Act	N; Prop
Human Fertilisation and Embryology Authority	N; Prop
Intergovernmental Panel on Climate Change	N; Prop
Massachusetts Institute of Technology	N; Prop
Ministry of Agriculture, Fisheries and Food	N; Prop
Ministry of Agriculture, Forestry and Fisheries	N; Prop
National Academy of Sciences	N
National Institute on Drug Abuse	N; Prop
National Institutes of Health	N
National Institutes of Health	
National Institute of Health	
National Oceanic and Atmospheric Administration	N; Prop
National Science Advisory Board for Biosecurity	N; Prop
New England Journal of Medicine	N; Prop
Office of Technology Assessment	N; Prop
Organisation for Economic Co-operation and Development	N; Prop
Organisation for Economic Co-operation and Development	
Organization for Economic Cooperation and Development	
Senate Committee on Commerce, Science and Transportation	N; Prop
Senate Committee on Commerce, Science and Transportation	
Senate Committee on Commerce Science and Transportation	
Society for Developmental Biology	N; Prop
Union of Concerned Scientists	N; Prop
United States	N; Prop
United States of America	N; Prop
U.S. Food and Drug Administration	N; Prop
U.S. Food and Drug Administration	
US Food and Drug Administration	
U.S. National Academy of Sciences	N; Prop
U.S. National Academy of Sciences	
US National Academy of Sciences	
U.S. National Academy of Science	
US National Academy of Science	
U.S. National Institutes of Health	N; Prop
U.S. National Institutes of Health	
US National Institutes of Health	
US National Institute of Health	

	U.S. National Institute of Health		
World Summit on the Information Society			N; Prop

Abbreviations

(c)		(c)	N; Abbr
	(C)		
B.V.			N; Abbr
DNA			N; Abbr
GmbH		GmbH	N; Abbr
	Gmbh		
HIV		HIV	N; Abbr
	Hiv		
	H.i.v.		
	H.I.V.		
HIV AIDS		HIV AIDS	N; Prop
	Hiv Aids		
Inc		Inc	N; Abbr
	inc		
	inc.		
	Inc.		
Ltd		Ltd	N; Abbr
	ltd		
	Ltd.		
	ltd.		
N.V.			N; Abbr
USA		USA	N; Abbr
	U.S.A.		

Latin expressions

in vivo		A
	in vivo	
	In vivo	
ex vivo		A
	ex vivo	
	Ex vivo	
in utero		A
	in utero	
	In utero	
in situ		A
	in situ	
	In situ	
in vitro		A
	in vitro	
	In vitro	
in silico		A
	in silico	
	In silico	
in toto		A
	in toto	
	In toto	
in corpore		A
	in corpore	
	In corpore	

in memoriam	N
in memoriam	
In memoriam	

Explanation abbreviations: ‘N’: noun; ‘N; Prop’: proper noun; ‘N; Abbr’: abbreviated noun; ‘A’: adjective.