3. évfolyam • 3. szám • 1993. március

IMPAKT

TÉNYEK A TUDOMÁNYOS ALAPKUTATÁSRÓL

Szilárd: Csak a tényeket írom le – nem azért, hogy bárki is elolvassa,csakis a Jóisten számára.
Bethe: Nem gondolod, hogy a Jóisten ismeri a tényeket?
Szilárd: Lehet, hogy ismeri, de a tényeknek nem *ezt* a változatát.

[*Leo Szilard, His version of the Facts.* *S.R. Weart & Gertrud Weiss Szilard* (Eds), MIT Press, Cambridge, MA, 1978, p.149.]

A tartalomból:

ISSN 1215-3702

Szerkesztők:
Braun Tibor *(főszerkesztő)*
Schubert András *(szerkesztő)*
Toma Olga *(munkatárs)*
Zsindely Sándor *(főmunkatárs)*

Postacím:
MTA Könyvtára
1361 Budapest Pf. 7
Telefon: 111-5433
Telefax: 131-6954
Telex: 224132
E-mail: h1533bra@ella.hu

Megjelenik havonta
Évi előfizetési díj: 2400 Ft

Ésszerű tudománymetria

A cím óhatatlanul felveti az olvasóban az "ésszerűtlen tudománymetria" létezésének gondolatát. Sajnos nem alaptalanul, ugyanis bel- és külföldön egyaránt nem kevés példáját lelhetjük fel a tudománymetria nem igazán átgondolt, hevenyészett alkalmazásának. Számos okot lehetne felsorolni ennek magyarázására, értelmezésére. Ezekhez az a tévhit is hozzájárul, hogy a tudománymetria kizárólag egyének, csoportok, intézmények, országok, stb. értékelésével foglalkozik. Az ú.n. *értékelési tudománymetria* (evaluative scientometrics) természetesen létező, fontos alterülete a tudománymetriának, de csak az alterületek egyike. A tudománymetria jobb áttekintésére talán nem haszontalan itt egy néhány éve megjelent magyarnyelvű tanulmány [1] bevezetőjéből néhány gondolatot átvenni:

"*Derek De Solla Price* írja *Kis tudomány – nagy tudomány* [2] c. művének előszavában: «Célom nem az, hogy a tudomány tartalmi vagy bármely más vonatkozásait a társadalomtudomány szemszögéből elemezzem. Inkább a tudomány szokásos megközelítéseire kívánnék rávilágitani azáltal, hogy külön-külön bonckés alá veszem a tudományt taglaló összes tudományos igényű elemzést. Miért ne alkalmaznánk a tudomány saját vizsgálati eszközeit magára a tudományra? Semmi akadálya, hogy méréseket végezzünk, általánosítsunk, hipotéziseket állítsunk fel és következtetéseket vonjunk le!

Megközelítésünk módja abban áll, hogy statisztikai módszereket alkalmazunk a tudomány különböző dimenzióinak mérésére, a tudomány nagybani viselkedését és növekedését szabályozó törvények felkutatására. Nem arról lesz tehát szó, miként születtek a tudományos felfedezések, hogyan hasznosítják ezeket, egymással hogyan függnek össze. Nem lesz szó konkrét tudósokról sem. Mindezek helyett a tudományt mérhető szubsztanciának tekintve arra teszünk kísérletet, hogy nemzeti és nemzetközi síkon egyaránt használható számítási eljárást fejlesszünk ki a tudományos munkaerő, a tudományos szakirodalom, a tehetség, s a tudományra fordított kiadások vizsgálatára.»

Azért idéztük ilyen részletesen Price gondolatait, mert úgy véljük, hogy ezekben jut először világosan kifejezésre a tudomány mérésére, a tudomány "kvantifikálására" irányuló törekvés, amely a jelenleg tudománymetria néven ismert diszciplina kialakulásához vezetett."

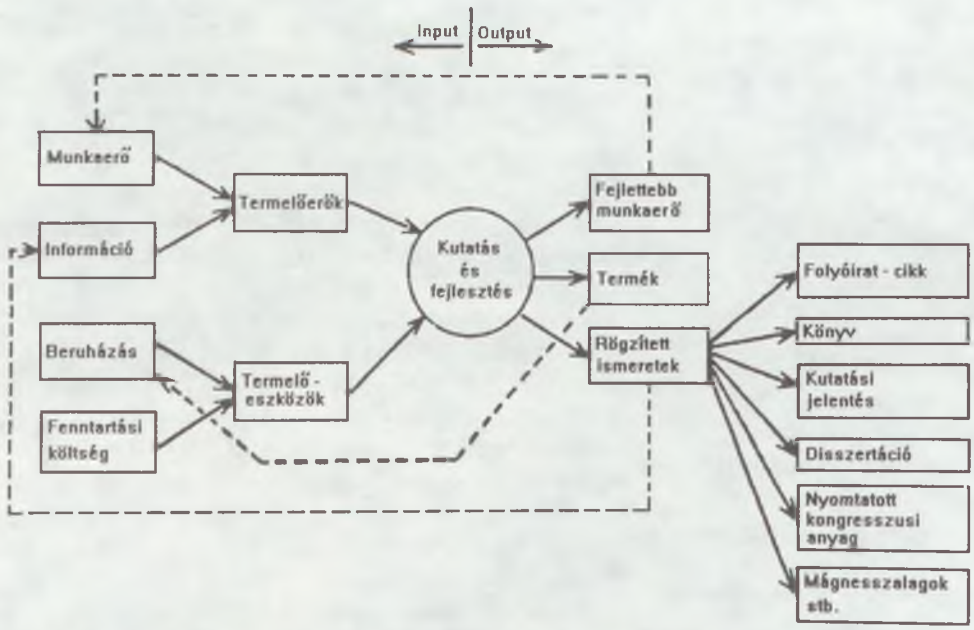
Melyek ezek a kvantitatíve is megragadható vonatkozások a tudományban? Sok tekintetben hasznos, ha a tudományos tevékenység folyamatát cserekapcsolati (input-output) jelenségként fogjuk fel (1. ábra – lásd a túloldalon), és ennek megfelelően törekszünk elemeinek "kvantifikálására". Az elsődleges elem a pénz és a munkaerő. E két tétel másodlagos, szintén mérhető elemekkel jár együtt. Végül pedig megjelenik az eredmény, a tudományos ismeret.

Az 1. ábrán a tudományos ismeret rögzített, írott ismeretanyagként jelenik meg, s ez valójában nem más, mint a tudományos szakirodalom. A szakirodalom, vagyis az adott témájú írások összessége bármely témakörben a kommunikáció elsődleges eszköze, a témakörrel kapcsolatos ismeretek és tevékenységek tára. Így tehát egy szakterület szakirodalmának kvantitatív, statisztikai szempontok szerinti elemzése hozzásegít a kérdéses terület és az azon folytatott alapkutatási tevékenység jobb megértéséhez, áttekintéséhez.

A tudománymetria kifejezést Vaszilij Nalimov [3] vezette be, és ő körvonalazta első ízben e diszciplina tárgykörét. Price-szal egyetértésben vázolta, hogy a tudomány időben előrehaladó folyamat, s mint ilyen, kvantitatív jellegű vizsgálatnak vethető alá éppen úgy, mint a biológia, a kémia vagy a fizika időtől függő folyamatai.

Fenomenológiai szempontból – mondja Nalimov – a tudomány alapvetően új információk felkutatását célozza. E folyamat kumulatív és kollektív jellegű: minden tudományos eredmény bizonyos mértékig a már korábban lefektetett – hivatkozandó – elvekre épül. Új tudományos eredmények a korábbiak újraelemzése, s továbbfejlesztése révén keletkeznek.

A tudomány önszervező rendszer, melynek fejlődését információáramlásai vezérlik. Nalimov szerint tudománymetrián mindazok a kvantitatív módszerek értendők, amelyekkel az információs folyamatként értelmezett tudomány vizsgálható. E megközelítés kibernetikai jellegű. Ismeretes, hogy bonyolult rendszerek a rendszert vezérlő információáramlások megfigyelése révén tanulmányozhatók és jellemezhetők.



1. ábra. A tudományos kutatás mechanizmusának egyszerűsített folyamatábrája

Amennyiben a fenti definíciót a természettudományi alapkutatás vonatkozásában elfogadjuk, akkor a következő megválaszolandó kérdés az, hogy melyik az a szakirodalmi információs forrás, amit a tudományos alapkutatás legtorzításmentesebb tükreként elfogadhatunk. Bár erre a célra ma már számos szakosított számítógépes szakirodalmi adatbázis áll rendelkezésre, világszerte, így hazánkban is elsősorban a *Science Citation Index* (*SCI*) használata a legelterjedtebb. Ennek számos oka közül kerüljön itt említésre, hogy:

– az *SCI* a világon fellelhető kevés *interdiszciplináris* szakirodalmi adatbázisok egyike,
– az *SCI* az egyetlen olyan adatbázis, amelyik a *hivatkozásokat* (ill. idézeteket) is feldolgozza,
– az *SCI* nem a monografikus teljességre törekszik, hanem a *minőséget* helyezi előtérbe.

Az *SCI* csaknem kizárólagos alkalmazásának, ill. ennek ésszerűségének taglalása a fentieknél részletesebb érvelést is érdemel, ezért az *Impakt* csaknem teljes márciusi számát e témának szenteljük.

A kérdés bőséges szakirodalmából nem volt könnyű a válogatás, de merjük remélni, hogy az összegyűjtött – részben rövidített – tanulmányok sokak számára tartalmaznak hasznos tényeket.

Braun Tibor
MTA Könyvtára

[1] **Braun Tibor, Bujdosó Ernő**: Analitikai kémia a tudománymetria tükrében, Akadémiai Kiadó, 1982.
[2] **J.D. de Solla Price**: Kis tudomány, nagy tudomány, Akadémiai Kiadó, 1979.
[3] **V.V. Nalimov, Z.M. Mulcsenko**: Tudománymetria, Akadémiai Kiadó, 1980.

A method for determining the impact factor of a non-SCI journal

With the advent of *Journal Citation Reports* (*JCR*) [1], a companion volume to *Science Citation Index* (*SCI*) in 1975, it has become possible to know the world standing of a journal through its impact factor. "The impact factor is a measure of the frequency with which the 'average article' in a journal has been cited in a particular year. The *JCR* impact factor is basically a ratio between citations and citable items published. Thus, the 1986 impact factor of journal X would be calculated by dividing the number of all the *SCI*, *SSCI* and *A&HCI* source journals' 1986 citations of articles journal X published in 1984 and 1985" [1].

For example, *Nature* published 1,192 and 1,176 citable items in 1984 and 1985 respectively and these items were cited 20,173 and 15,943 times respectively in 1986. Therefore the 1986 impact factor (I_f) of *Nature* is given by

$$
\begin{aligned}
I_f &= (20{,}173 + 15{,}943) / (1{,}192 + 1{,}176) \\
&= 36{,}116 / 2{,}368 \\
&= 15.252
\end{aligned}
$$

The arrangement of journals by impact factor is a guide to their international standing.

About 53,000 scientific and technical journals are published throughout the world, of which some 3,800 are covered by *SCI* [2]. Impact factors are available in *JCR* for these titles only, leaving some 49,000 scientific and technical journals for which impact factors are not available.

A glance at the impact factors of the journals covered by *SCI* reveals that some have impact factors of 0.001 or less. We wondered if the impact factors of those titles not covered by *SCI* were less than this. Surprisingly, the answer is 'No'.

A need was therefore felt for developing a method for determining the impact factors of Indian scientific and technical journals not covered by *SCI* in order to determine their international standing. The method described below is universally applicable, is simple, can be applied manually, and is not very laborious. The impact factors derived by this method are more or less consistent with those published in *JCR* since each journal is considered as if it were covered by *SCI*, but is should be noted that we have not extended the method to include searches for citations in *SSCI* and *A&HCI*.

The method is based on the simple logic that is a journal X is covered by *SCI* its impact factor depends on three factors:

1. the number of citable items published in the journal during years (Y - 1) and (Y - 2), say y_1 and y_2 respectively;
2. the number of times those items are cited in year Y in *SCI* journals, say x_1;
3. the number of times those items are cited in year Y in the journal X itself, say x_2.

Factors 1 and 3 are available from the journal itself and factor 2 can be determined by using *SCI*. Knowing all three factors, we can easily calculate the impact factor of journal X from the equation

$$I_f = (x_1 + x_2) / (y_1 + y_2)$$

We started with the *Indian Journal of Malariology* (*IJM*), a prestigious journal of the Indian Council of Medical Research and calculated its impact factor in the following way.

Firstly, we prepared slips for all the citable items – editorials, research papers, short communications, etc., noting full bibliographic details following the *SCI* pattern scanning all the 1984 and 1985 issues. In all, thirty-six slips were prepared, eighteen each for the years 1984 and 1985.

Secondly, all the slips were arranged by author and compared with the 1986 annual volumes of *SCI*. It was observed that five items from *IJM* were cited in the 1986 *SCI*. Obviously this is the value of x_1.

Thirdly, references appended to the citing items of the 1986 issues of *IJM* itself were checked one by one, and it was found that fourteen items from the 1984 and 1985 issues of *IJM* were cited in the 1986 *IJM*. This gave us the value of x_2.

Using these values of x_1, x_2, y_1, and y_2, the impact factor of *IJM* for 1986 was calculated.

$$
\begin{aligned}
I_f &= (x_1+x_2) / (y_1+y_2) \\
&= (5+14) / (18+18) = 19 / 36 = 0.528
\end{aligned}
$$

Applying the same method, we computed impact factors for a number of Indian journals for the year 1986 and found that the values of some of them were higher than those covered by *SCI* in 1986. (It should be noted that we have only considered *SCI* citation data for the simple reason that it is readily available in scientific libraries. Moreover, the inclusion of the other two databases (*SSCI* and *A&HCI*) would treble the labour with little or no increase in the number of citations recorded.)

This method enables us to determine the impact factors of all non-*SCI* journals. Countries, especially in the third world and the former communist block, can calculate the impact factors of their own journals and ascertain their international standing. This would enable them to undertake appropriate measures for improving the quality of the journals. The Institute for Scientific Information, publisher of *SCI*, can also be informed of the impact factors of non-*SCI* journals, which may help them to select the most suitable journals from these countries for inclusion in their publication.

B. K. Sen, A. Karanjai, U. M. Munshi,
Journal of Documentation, 45(1990) (2) 139-141

[1] *Journal Citation Reports*, Philadelphia, PA: Institute for Scientific Information, 1975-.
[2] *Current Serials Received*, British Library, 1986

How ISI Selects Journals for Coverage in the Science Citation Index? Quantitative and qualitative considerations

ISI takes into account many factors when making journal coverage decisions. Three types of information are discussed and illustrated: citation data, journal standards, and expert judgement. The essay is based on a lecture presented at the Symposium on Science Journal Evaluation, the National Science Council of Taiwan, Science and Technology Information Center, Taipei, on March 21 and 22, 1990.

Three broad criteria

Basically, three types of information are taken into account when evaluating journals for coverage, ranging from the quantitative to the qualitative: citation data, journal standards, and expert judgement. ISI is unique among the world's leading information services for indexing all cited references as well as complete bibliographic information on all items published in a journal – not just articles and reviews but letters, editorials, errata and retractions, book reviews, and other items. ISI's consolidated database for the *Science Citation Index* (*SCI*), *Social Sciences Citation Index*, and *Arts & Humanities Citation Index* now includes about 18,000,000 source items published from 1945 until today in thousands of journals, and more than 217,000,000 cited references.

These citation data are source of quantitative indicators that can be used to evaluate existing journals with established track records, as is discussed later. But selection of new journals often relies on other, more qualitative considerations. Journal standards are an example. A journal's ability to meet its declared schedule and frequency is perhaps the most basic expectation. Standards can also include editorial requirements for abstracts, titles, and references set by professional associations of publishers and editors [1,2]. Peer review of submissions, editorial board membership, and the reputation of the publisher or sponsoring society are other indicators of journal quality.

Finally, journal selection also relies on the subjective judgment of experts in a particular field – subscribers, editors and publishers, and ISI's many editorial advisory board members and staff specialists.

Why be selective at all?

ISI's objective as secondary information service is to provide comprehensive coverage of the world's *most important journals* for our subscribers' current awareness and information retrieval needs. But comprehensive does not necessarily mean all-inclusive. The success of *Current Contents* (*CC*) is partly due to the fact that most of its readers already find more than they need in it. In fact, many readers feel ISI should do whatever possible to contain the proliferation of journals – not to encourage it.

Of course, this does not mean we urge publishers to limit the number of journals in the marketplace. As I've stated before, there is nothing we can or should do to prevent the legitimate "proliferation" or "twigging" of journals [3,4]. Curtis G. Benjamin, former president, McGraw-Hill Book Company, New York, coined the world "twigging" to describe the relentless specialization of scientific knowledge and, as a result, the burgeoning number of and markets for scientific publications [5]. But, as many critics have pointed out, the problem is that publishers sometimes launch journals prematurely before an adequate market develops.

The fact is, no matter how many journals are in the market, only small fractions account for most of the articles that are published and cited in an given year. This is illustrated in Figure 1, which shows the distribution of journal articles and citations in the 1988 *SCI* database.

In a recent *New Scientist* "Forum" feature on scientific journals, British research chemist Susan Aldridge discussed the "80/20 rule" for time management – that is, that 80 percent of results come from doing 20 percent of tasks [6]. While the rule is typically intended as a useful reminder to business executives who face mounds of paperwork, Aldridge suggested it applies as well to researchers trying to gain control over the flood of literature. She speculated that the *SCI* database would provide "a fine example of the 80/20 rule."

The graph shows that Aldridge's hunch is indeed true for citations but not for articles. The solid line indicates that 900 (21 percent) of the 4400 journals indexed in the 1988 *SCI* received 83 percent of the 8,000,000 citations processed for the *Journal Citation Reports* (*JCR*) that year. But the dotted line shows that it took 2000 journals (46 percent) to publish 86 percent of the 435,000 original research or review articles and technical notes included in the 1988 *JCR*.

The graph, of course, is merely another illustration of the well-known Bradford and Zipf distributions and various other statistical patterns. The literature on these subjects is too voluminous to cite here but was reviewed previously [7]. Recently, a "Bibliometrics Toolbox" software package was created that can generate such graphs from the *SCI* and other data [8].

These data illustrate the fact that ISI could conceivably limit itself for the top 500 journals and still provide comprehensive coverage of the most important publications. Thus, *SCI*'s coverage over 4000 journals goes well beyond what the average subscribers need or perhaps even want to know about the research literature. In the past I have referred to this as Garfield's law of concentration [9].

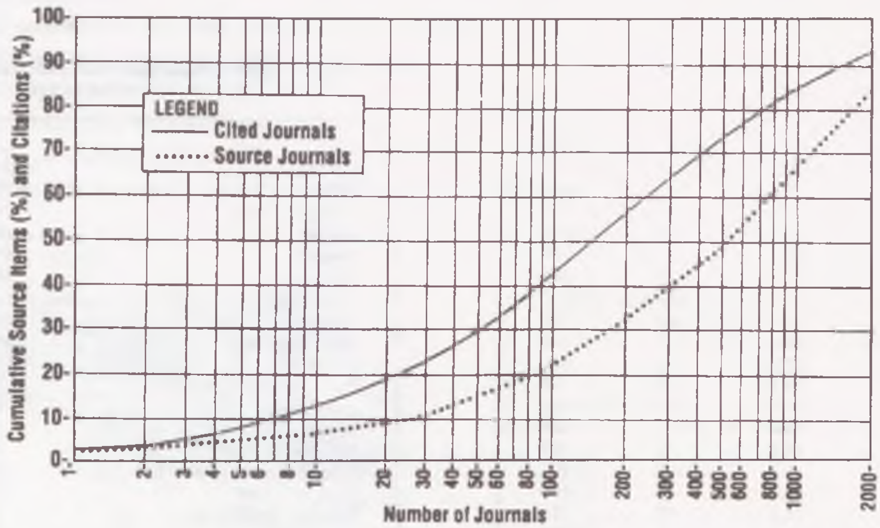


Figure 1 Distribution of published items and citations among science journals, SCI 1988

Citation Data for Journal Evaluation

Several types of journal citation data covering a particular year of period of time can be derived from the ISI database. Librarians, information researchers, editors, and others who regularly use ISI's *JCR* for evaluation and analysis already are familiar with most of these: total citations, impact, what a particular journal cites most frequently, what journals cite it, and so on [10].

It should always be stressed that *citation data must be carefully interpreted – and their limitation clearly understood – when they are used for evaluating anything*. This subject has been extremely and repeatedly discussed in *CC* and needs only brief mention here [11-13]. For example, the number of authors and journals varies greatly between and within disciplines, as do their citation levels and rates. Smaller fields like botany or mathematics do not generate as many articles or citations as, say, biotechnology or genetics. Also, in certain fields it may take 10 or more years for an article to attract a meaningful number of citations, while in other research areas citations can typically peak after only a few years. These points should be kept in mind as we consider the following examples.

Journal Ranking by Impact

In Table 1 impact is calculated as follows: the number of articles published by a journal in 1986 and 1987 is divided into the number of citations they received in 1988. For example, the *Annual Review of Biochemistry* published 67 articles in 1986 and 1987. They received a total of 3237 citation from ISI-covered journals in 1988. Thus, its impact factor is 48.3.

The list is obviously dominated by review journals, which tend to publish fewer contributions than original research journals, but these are cited much more frequently. Table 2 presents another impact ranking, showing only journals that published at least 100 articles, which effectively excludes most review journals.

Eighteen life-science journals are listed, compared to two each for chemistry and physics. Again, while impact compensates somewhat for the size of a journal or literature, it tends to favor research published in the last two years. As we found several years ago, the average number of references cited per article is perhaps the most significant contributing factor. This may or may not be a reflection of the field size [14].

Calculating the impact of journals not covered by ISI

There seems to be a widespread misconception that the *JCR* gives citation data only for those journals indexed in the ISI databases. In fact, any publication that is cited by ISI-covered journals will be included in the *JCR*'s ranking of journals by total citations received and in the cited journal listing. While data on the number and type of source items published is not provided for a non-source journal, the number of times it was cited is shown.

This makes it possible to calculate impact factors of journals not included in ISI's databases. A simple and effective method for doing so was described in a recent letter in the *Journal of Documentation* by B.K. Sen, A. Karanjai and U.M. Munshi, Bibliometrics Section, INSDOC, New Delhi, India [15]. Also, S. Maricic, Association of Scientific Unions of Yugoslavia, Zagreb, and colleagues have used the same method for some 10 years [16].

Many Third Word editors have already asked us why their publication is not covered by ISI when its impact, although low, is comparable to other journals we do index. This reflects another common misconception – that impact factors are the sole or single most important criterion for coverage. In fact, journal impact is only one of several quantitative and qualitative factor described in this essay that we take into account.

Table 1.

The 25 highest impact journals
1988 SCI JCR

Journal	Impact	1986-87 Articles	1988 Citations
Annu. Rev. Biochem.	48.3	67	3237
Pharmacol. Rev.	29.4	17	500
Annu. Rev. Immunol.	25.4	49	1245
Annu. Rev. Cell Biol.	24.2	33	799
Advan. Chem. Phys.	24.0	11	264
Cell	23.9	863	20637
N. Engl. J. Med.	21.1	716	15142
Advan. Cyclic Nucl. Prot.	18.2	6	109
Annu. Rev. Neurosci.	17.0	36	611
Advan. Prot. Chem.	16.5	4	66
Science	16.5	1616	26596
Advan. Immunol.	16.4	20	328
Microbiol. Rev.	16.3	49	797
Nature	15.8	2375	37425
Annu. Rev. Genet.	15.1	43	650
Rev. Mol. Phys.	15.1	47	711
Lancet	14.5	955	13828
Annu. Rev. Plant Physiol.	13.4	39	521
Electroanal. Chem.	12.3	4	49
Physiol. Rev.	12.2	47	575
Advan. Nucl. Phys.	11.9	10	119
J. Exp. Med.	11.8	623	7369
EMBO J.	10.9	1055	11538
Immunol. Today	10.7	164	1747
Endocrine Rev.	10.6	54	570

Table 2.

The 25 highest impact journals publishing at least 100 articles
1988 SCI JCR

Journal	Impact	1986-87 Art.	1988 Citations
Cell	23.9	863	20637
N. Engl. J. Med.	21.1	716	15142
Science	16.5	1616	26596
Nature	15.8	2375	37425
Lancet	14.5	955	13828
J. Exp. Med.	11.8	623	7369
EMBO J.	10.9	1055	11538
Immunol. Today	10.7	164	1747
Chem. rev.	10.4	100	1040
Proc. Natl. Acad. Sci. USA	10.0	3968	39805
J. Cell Biol.	9.7	983	9582
Trends Neurosci.	9.2	186	1702
Ann. Intern. Med.	8.5	538	4555
Phys. Rep. – Rev. Sect. Phys. Lett.	8.2	145	1194
Phys. Rev. Lett.	8.2	3022	24821
Trends. Biochem.Sci.	7.9	252	1984
Mol. Cell Biol.	7.7	1187	9170
J. Clin. Invest.	7.6	1013	7690
J. Immunol.	6.9	2666	18409
Arch. Gen. Psychiat.	6.8	251	1708
Blood	6.8	1087	7445
Account. Chem. Res.	6.7	124	826
Circulation	6.7	994	6636
J. Mol. Biol.	6.6	665	4359
J. Biol. Chem.	6.5	5335	34632

Internationality

The geographic representation of a journal is another consideration. Unless a journal of interest to only a small region of the world is exceptional in some way, we are less likely to cover it.

ISI' data can be used to indicate a journal's "internationality," in two senses: the nationality of items it publishes and the nationality of the articles that cite it. Table 3 shows the nationality of 1984 articles from the *International Journal of Cancer*, defined by the address of the *first* author. That is, if a US institution was listed, the article was credited to the US even though the author may be visiting researcher from the UK, France, or India, or the coauthors may be based in other countries. The number of such international collaboration is small, however, typically accounting for less than 5 percent of all *SCI*-indexed source items per year.

Of the 251 articles published by this journal in 1984, 60, or 24 percent were from the US. The UK is second with 29 articles (12 percent), followed by Japan with 22, France (20) and Italy (19). In total 32 nations were represented by the first authors of 1984 articles in the *International Journal of Cancer*, and the top five countries identified above accounted for 60 percent.

Table 4 shows the nationality of the 1984-1988 articles that cited this journal's 1984 publications at least 24 times. Again, US articles top the list with 1091 citations, or 31 percent of all citations received by the *International Journal of Cancer*. Japan is second with 399 citations (11 percent), followed by the UK (360, 10 percent), Italy (226, 6 percent), and France (223, 6 percent).

All of these examples show that citation data can provide a wide range of information of journals. As stated at the outset, citation data are one category of information ISI considers in evaluating journals for coverage. Another key consideration is that of basic journal standards.

Basic Journal Standards: Timeliness Above All

One of the most basic obligations a journal owes its subscribers is timeliness or regularity. It is unethical and unacceptable for publishers to allow journals to appear chronically late, weeks or months after their cover date. Of course, temporary production problems or other factors may sometimes cause journals to be delayed. But if the journal cannot maintain or manage an adequate backlog of manuscripts, the publisher should merge it or throw the towel. And if a publisher is unresponsive, then subscribers should refuse to accept false publication dates and other rip-offs [17].

Whether or not a journal follows international editorial conventions may also influence ISI's decision to cover it. ISI has advocated a variety of editorial practices and standards that apply equally to established and new journals. More informative journal titles, fully descriptive article titles and abstracts, complete bibliographic information for all cited references, full addresses including telephone and fax numbers for every author of all published items, and contents page formats are several examples [2,18,19].

Editorial policy on language is another consideration. We do cover a large number of foreign-language journals, but the presence of informative abstracts in English is essential. If editors truly want wider notice of their journals by the international research community, they ought to publish article titles, abstracts, and cited references in English. If the English title and abstract seem especially interesting, more scientists might be encouraged to go to the trouble of reading the foreign-language article.

Other indicators of quality are also important – such as whether a journal relies on peer review to assess the relevance of a submitted manuscript, the reliability of its methods, the originality of findings, the completeness of references, etc. [20].

We also look at the recent track record, that is, the previously published works of the editorial board members and contributing authors. For example, we examine how often they have published; in which journal their articles appear; and if their works have been cited. We also check their reference lists to make sure the authors are citing a broad range of important journals. This ensures that the authors have consulted the literature and are members of a broad scientific community.

Table 3.

The nationality of first authors of articles published in the *International Journal of Cancer*, ranked by total 1984 articles and showing total 1984-1988 *SCI* citations and five year impact factors. Only those nations with at least five articles are listed.

Country	1984 Items	1984-88 Citations	Five-Year Impact
US	60	707	11.8
UK	29	398	13.7
Japan	22	474	21.6
France	20	260	13.0
Italy	19	324	17.1
Sweden	13	160	12.3
Israel	11	110	10.0
Canada	10	78	7.8
FRG	9	120	13.3
Australia	6	38	6.3
The Netherlands	6	168	28.0
Norway	5	126	25.2
All Others (19)	36	453	12.6
TOTAL	251	3510	14.0

Table 4.

The nationality of first authors of 1984-1988 *SCI* papers that cited 1984 items in the *International Journal of Cancer*. Only those nations with at least 20 citations are listed.

Citing Country	1984-1988 Citations
US	1091
JAPAN	399
UK	360
Italy	226
France	223
FRG	182
Sweden	132
The Netherlands	128
Canada	116
Australia	74
Switzerland	55
Norway	54
Israel	52
Belgium	49
Finland	49
Denmark	47
Austria	46
USSR	39
South Africa	30
Czechoslovakia	20
All Others (25)	
TOTAL	3510

The reputation of a particular publisher or professional society is of some help in evaluating new journals. Of course, a good track record on old journals does not necessarily guarantee the performance of new journals. Publishers have been known to launch journals prematurely, often at the prodding of special-interest groups. Also, some government-sponsored or professional dues-subsidized journals may occasionally be adversely affected by annual fluctuations in budgets and membership renewals.

By considering a combination of citation data and these basic editorial standards, it is possible to make an informed journal-coverage decision in most cases. However, ISI does rely also on the subjective judgement of experts in the field.

Expert judgement

Since its beginning in the early 1960s, ISI has benefited from the expert consultations provided by the editorial advisory board for our various products and services. The members are distinguished researchers whose collective multidisciplinary expertise gives ISI valuable input about important new and existing publications.

For many new journals, we also solicit critiques from people working in the disciplines covered by the journals. Of course, this has its drawbacks. If a new journal covers a specialized topic, the experts in that field are probably the most likely to put the highest value on greater coverage of that topic. This self-interest is weighed when we evaluate critiques and recommendations solicited from outside experts.

Of course, ISI's staff of subject specialists also considers the invited and uninvited advise of subscribers, editors, publishers, and others about journals we ought to cover or not drop. ISI welcomes all informed opinions about the value of a particular new or established journal. In fact, we are planning a new large-scale survey of ISI subscribers later this year that will give us essential feedback on journal coverage.

E. Garfield,
Current Contents (28 May 1990), 5-13

[1] International Committee of Medical Journal Editors. Uniform requirement for manuscripts submitted to biomedical journals, *Ann. Intern. Med.*, 108:258-65, 1988

[2] Garfield, E., Idiosyncrasies and errors, or the terrible things journals do to us, *Essays of an information scientist: ghostwriting and other essays*, Philadelphia, 1984, Vol. 6, p.6-12

[3] Garfield, E., Letter to editor. (More on scientific journals.) *N. Engl. J. Med.*, 307:506, 1982

[4] Garfield, E., Too many journals? Nonsense! *The Scientist* 2(5):11, 7 March 1988

[5] Benjamin, C., Soaring prices and sinking sales of science monographs, *Science* 183:282-4, 1974

[6] **Aldridge, S.**, How to cut a swathe through the literature. *New. Sci.*, **125** (1707):69, 10 March 1990
[7] **Garfield, E.**, Bradford's law and related statistical patterns, *Essays of an Information Scientist.* Philadelphia, ISI Press, 1981. **Vol. 4.** p. 476-83
[8] **McLain, J.P.**, Review of "Bibliometrics Toolbox", by T.A. Brooks, *J. Amer. Soc. Inform. Sci.*, **41**(1):70-1, January 1990
[9] **Garfield, E.**, The mystery of the transposed journal lists – wherein Bradford's law of scattering is generalized according to Garfield's law of concentration, *Essays of an Information Scientist.* Philadelphia, ISI Press, 1977. **Vol. 1.**, p. 222-3
[10] **Garfield, E.**, How to use *Journal Citation Reports*, including a special salute to the *John Hopkins Medical Journal*, *Essays of an Information Scientist.* Philadelphia, ISI Press, 1984. **Vol. 6.**, p. 131-8
[11] **Garfield, E.**, The impact of citation counts, *Times High. Educ. Suppl.*, 15 July 1988, p. 12 (Reprinted in *Current Contents*, (37):3-5, 12 September 1988)
[12] **Garfield, E.**, Uses and misuses of citation frequency, *Essays of an information scientist: ghostwriting and other essays*, Philadelphia, 1986, **Vol. 8.**, p. 403-9
[13] **Garfield, E.**, How to use citation analysis for faculty evaluations, and when is it relevant? Parts 1 & 2. *Essays of an information scientist: ghostwriting and other essays*, Philadelphia, 1984, **Vol. 6.**, p. 354-72
[14] **Garfield, E.**, The number of biochemical articles is growing, but why also the number of references per article? *Essays of an information scientist: ghostwriting and other essays*, Philadelphia, 1981, **Vol. 4.** p 414-25
[15] **Sen, B.K., Karanjai, A. Munshi, U.M.**, A method for determining the impact factor of non-SCI journal, *J. Doc.*, **45**:139-41, 1989
Lásd: Impakt, e szám 3. old.
[16] **Maricic, S.**, Impact factors of peripheral journals, *J. Doc.*, **45**:330-1, 1989
[17] **Garfield, E.**, False publication dates and other rip-offs. *Essays of an Information Scientist.* Philadelphia, ISI Press, 1980. **Vol. 3.** p. 488-91
[18] **Garfield, E.**, What a difference an "A" makes, *Essays of an Information Scientist.* Philadelphia, ISI Press, 1981. Vol. 4. p. 205-8
[19] **Garfield, E.**, To indent or not to indent? How to improve journal contents page formats. *Essays of an Information Scientist.* Philadelphia, ISI Press, 1980. **Vol. 3.** p. 267-270
[20] **Rudolph, J., Brackstone, D.**, Too many scholars ignore the basic rules of documentation, *Chron. High. Educ.*, 11 April 1990, p. A56.

The New Journals of 1992: Euro, Eco, Nano, and Neuro

Fields Ranked by Number of STM Journals Introduced in 1992

Rank	Field	Number of Journals	Percent
1	Clinical Medicine	104	28.6
2	Biology	68	18.7
3	Agricultural & Environmental Sciences	63	17.3
4	Technology & Applied Sciences	39	10.7
5	Computer Sciences	33	9.1
6	Chemistry	16	4.4
6	Engineering	16	4.4
7	Mathematics	14	3.8
8	Physics	11	3.0

SOURCE: Institute for Scientific Information; *Ulrich's Plus CD* (Fall 1992); *Nature*, 359(6394), 1 October 1992 (new journals issue).

Infinite In All Directions, the title of a relatively recent book by the physicist Freeman Dyson, neatly summarizes the depth, breadth, and diversity of the scientific journal literature today.

The new journals of 1992 can be likened to newly formed planets in a vast universe. Each journal is formed from bits and pieces which were formerly floating freely but have now accumulated into a solid mass. Around each orbits a growing number of researchers seeking to observe, to probe, and to describe these new worlds. If we fly a little further out, however, we can see that these new planets seem to cluster into groups, and the groups into regions, and regions into large structures, and so on. Such a wide-angle perspective can often show structures that a more narrow view would otherwise fail to reveal.

By analyzing the new scientific, technical, and medical (STM) journals in 1992, *Science Watch* aimed to map the scope and shape of current trends in research. There is little consensus on what constitutes a journal, and there is no single comprehensive source on the serial literature. So, *Science Watch* used its own judgment in defining a journal and turned to several different sources to compile a list of the new titles in 1992. The in-house files of ISI were consulted (a listing of the journals which were sent to ISI to be evaluated for coverage in one of its products); R.R. Bowker's *Ulrich s Plus CD* (Fall 1992 edition); and a recent issue of *Nature* – the "new journals" issue-which features abundant advertisements by journal publishers for their new offerings. *Science Watch* identified a total of 364 STM journals that published a volume one in 1992.

The table above lists the fields of research represented by these 364 new titles. Since no title was double counted, some difficult decisions were required to assign a journal to one area rather than another. The most populated areas in research are biological and medical, so it is of little surprise to see that, among the 1992 group, clinical medicine and biology ranked first and second, respectively. But the fields ranked third, fourth, and fifth provide something of a revelation: agricultural and environmental sciences, technology and applied sciences, and computer sciences. These three seem to exhibit more growth and innovation at present than the traditional areas of the physical sciences – in particular, mathematics and physics – which appear in ranks seven and eight. This finding recalls the results of an earlier study (see *Science Watch*, 2[9]:1-2, October 1991), which detected a slow-to-moderate growth in the number of articles published during the last decade in mathematics and general physics.

Key Terms, Key Trends

To view these data in another way, *Science Watch* indexed the key words and word-stems in the titles of the new journals and then ranked these terms by their frequency within the set. Some of the words that appeared five times or more seem to reflect publishers' efforts at marketing or positioning their new products ("international", "European", "Russian", for example). Others indicate trends in the substance of scientific research itself(such as "comput-", "eco-/ecol-/ environment-", "micro-/nano-", and "-image-"). The two categories are, of course, not mutually exclusive, since fads exist in science as they do in other spheres of life.

World and Word-Stem Frequencies of Key Terms in Titles of STM Journals New in 1992

Rank	Word or Word-System	Frequency
1	international	25
2	bio-/biol-	21
3	comput-	17
4	eco-/ecol-/environment-	16
5	European	15
6	system-	13
7	applied	12
	clinic-	12
8	cancer/onco-	11
9	material-	10
	micro-/nano-	10
10	agri-/agro-/hort-	9
	drug-/pharm-	9
	food-/nutrition	9
	molecular	9
11	development-	8
	health	8
12	-image-	8
	information	8
	Russian	8
13	medic-	7
14	neuro-	6
15	-electro-	5
	evolution-	5
	intelligen-	5
	natural	5
	programming	5
	psycho-	5
	surg-	5
	toxi-	5

SOURCE: Institute for Scientific Information; *Ulrich's Plus CD* (Fall 1992); *Nature*, 359(6394), 1 October 1992.

There is certainly a "green" look to the journals new in 1992. Frequent key terms in their titles include "eco- /ecol- / environment-" and "agri-/agro-/hort-". Some of the titles represented in this group include: *Molecular Ecology, Environmental Testing and Analysis, Ecotoxicology, Restoration Ecology, the Journal of Aquatic Ecosystem Health, European Journal of Agronomy, and Horttechnology.*

The area of computer sciences is reflected in the frequently appearing key terms "comput-", "system-", "intelligent-", and "programming-". Computer modeling and simulation is clearly a hot topic currently (for example, *Computer Simulation and Modeling* and *ACM Transactions on Modeling and Computer Simulation)*.

The Very Small seems a subject of growing interest as well, reflected in new journals with "micro-" or "nano-" in their titles. Some of these include *Microlithography World, Nanobiology*, the *Journal of Microelectromechanical Systems*, and *Nanostructured Materials*.

Imaging made a clear mark in 1992, as well. New titles in this realm of research include *Image Systems, NeuroImage*, the *Journal of Imaging Science and Technology, IEEE Transactions on Image Processing, Journal of Electronic Imaging*, and the *Journal of Mathematical Imaging and Vision*, among others.

Materials research figured prominently in the new group (*Smart Materials and Structures, Optical Materials, and the Journal of Materials Engineering and Performance*), and some of the new titles exhibit more than one of the frequently occurring key terms identified here (*Computational Materials Science* and *Nanostructured Materials*, mentioned previously).

Medicine, as is plain from the table on page 1, accounted for the greatest number of new titles in 1992. Among the frequently occurring key terms with a medical slant are "clinic-", "cancer/ onco-", "health", "medic-", and "surg-", which taken together represent nearly 40 new journals.

Themes prominent among the medical and clinical group are health care quality and economics; laparoscopic surgery; cancer care and prevention; and women's health, the latter reflected in such titles as the *Journal of Women's Health, Breast*, and *Mammary Gland*.

A New Pragmatism?

It is worth noting the frequency of the term "applied" and the absence of the words "basic" or "fundamental" in the table above. Perhaps this is a reflection of a new pragmatism in research and of the demand, increasingly heard, for research that can contribute to national needs.

Recent geopolitical events certainly seem to be reflected in the use of the terms "European" and "Russian" (in place of "Soviet") in so many titles. Presumably, publishers believe that the European Community movement and the newly independent Russian state have created new and distinct markets for their journals. In our more global world market, "international" seems to be a favorite designation, as well. Whether science segments itself along geopolitical lines seems doubtful, but the market for journals with a geographic perspective or flavor may indeed prove viable.

A Prize: Most Unusual Journal

Among the new journals in contention for the prize for most unusual or amusing title are: *European Spine Journal*, which begs the question of whether Asian or North American spines deserve their own journals, the arcane *Transactions of the Metal Finishers Association of India*, and the *International Journal of Intelligent Systems in Accounting Finance and Management*, which bank customers around the world will recognize as oxymoronic.

Science Watch's award, however, goes to *Presence: Teleoperators and Virtual Environments*. This journal is sure to be a success since an overwhelming demand for this title can be simulated by its publisher.

Science Watch 3(October 1992) (8) 1-2

	1980	1981	1982	1983
• **Source Publications**				
Source Publications	3,067	3,068	3,246	3,327
Source Issues	25,480	26,391	26,041	26,431
• **Source Items**				
Anonymous Source Items	4,580	4,242	3,951	5,176
Authored Source Items	514,493	534,019	544,424	561,495
Total Source Items	519,073	538,261	548,375	566,671
Analysis of source items				
– Articles	341,964	349,650	354,369	359,594
– Meeting Abstracts	89,182	97,824	99,209	102,283
– Notes	36,670	37,970	38,172	39,596
– Letters	23,567	25,494	26,427	28,470
– Editorials	11,686	12,307	13,843	16,954
– Reviews	10,768	10,076	10,018	11,550
– Corrections	3,586	3,411	4,525	4,688
– Discussions	1,483	1,277	1,473	1,734
– Book Reviews (from *The Scientists*, *Science*, *Nature* only)				455
– Biographical Items	163	241	329	341
– Chronologies	4	11	10	6
– Bibliographies				
– Reprints				
Computer reviews				
– Software Reviews				
– Hardware Reviews				
– Database Reviews				
Number of Unique Source Authors	556,187	581,111	601,156	627,722
Total Number of Source Authors	1,331,099	1,408,866	1,477,717	1,561,971
Average Number of Authors per Source Item	2.56	2.62	2.69	2.76
Average Citations per Article with References	19.85	20.29	19.34	19.47
• **Citations**				
Citations to Authored Items	8,136,733	8,535,973	8,361,678	8,602,369
Citations to Anonymous Items	99,406	105,092	102,312	110,554
Citations to Patent Items	24,404	26,671	26,059	24,719
Total Number of Citations	8,260,543	8,667,736	8,490,049	8,737,642
Unique Cited Authors	982,724	1,021,715	1,018,082	1,048,061
Average Number of Citations to Cited Authors	8.28	8.36	8.21	8.21
Unique Authored Items Cited	4,142,439	4,294,809	4,231,512	4,356,548
Average Number of Citations to Authored Cited Items	1.96	1.99	1.98	1.97
Number of Corporate Addresses	674,368	707,835	738,515	766,163

Comparative Statistical Summary

1984	1985	1986	1987	1988	1989	1990	1991
3,281	3,367	3,322	3,167	3,160	3,170	3,192	3,213
26,248	27,859	27,588	26,745	26,869	27,662	28,499	28,340
5,059	5,156	5,513	4,849	4,522	4,728	4,275	4,391
564,218	615,292	619,919	616,459	609,688	554,671	586,566	585,915
569,277	620,448	625,432	621,308	614,210	559,399	590,841	590,306
361,989	387,650	386,919	380,286	395,289	411,176	424,783	434,183
102,686	124,824	131,912	135,049	109,019	37,306	52,903	43,871
39,465	39,671	38,682	37,517	38,849	39,118	39,024	37,191
29,529	30,138	30,723	30,770	31,659	32,152	32,429	32,696
17,462	17,244	17,254	17,690	18,370	19,045	20,242	20,713
10,670	12,039	11,616	11,066	12,498	11,928	12,705	12,218
4,638	4,735	4,519	4,277	4,339	4,505	4,721	4,972
1,762	1,570	1,231	1,873	1,456	1,438	1,329	1,365
763	705	658	802	640	583	533	500
307	1,699	1,685	1,656	1,643	1,544	1,575	1,788
6	6	9	5	7	4	5	5
					122	137	135
							229
	110	191	248	331	356	348	302
	50	32	56	92	113	103	103
	1	1	13	18	9	4	35
639,921	685,918	702,250	713,658	722,856	700,424	733,550	744,999
1,661,898	1,775,962	1,848,900	1,875,270	1,891,756	1,745,156	1,875,997	1,882,900
2.92	2.86	2.96	3.02	3.08	3.12	3.18	3.19
19.39	19.85	20.35	20.85	21.25	22.2	22.68	23.43
8,777,020	9,576,987	9,858,955	9,953,425	10,485,832	10,971,959	11,581,668	12,051,729
110,031	116,981	120,463	122,838	126,668	130,933	140,318	147,336
24,625	26,018	27,665	24,557	27,713	28,370	26,004	30,225
8,911,676	9,719,986	10,007,083	10,100,820	10,640,213	11,131,262	11,747,990	12,229,290
1,069,830	1,124,623	1,139,946	1,155,776	1,190,715	1,256,307	1,300,086	1,369,482
8.20	8.52	8.65	8.61	8.81	8.73	8.91	8.80
4,450,188	4,759,627	4,850,183	4,907,383	5,085,984	5,300,046	5,528,644	5,845,029
1.97	2.01	2.03	2.03	2.06	2.07	2.09	2.06
779,287	857,205	881,472	895,952	902,741	848,625	909,425	931,088

Reply to Menger and Haim

In the 10 years or so I have done editorial work for the *Journal of the American Chemical Society* (*JACS*), I have from time to time incurred the anger of authors whose papers I felt it my duty to reject, both with and without advice from referees. One colleague threatened a lawsuit, one accused me of forging a referee report, and I was once or twice treated to a selection of telephoned obscenities. The Commentary by F. M. Menger and A. Haim (*Nature* **359** (1992) 666) [1] represents the first case I know of in which the authors published a paper about not being able to publish their papers in *JACS* with sufficient ease.

Menger and Haim's article breaks new ground in other ways and introduces a new genre of scientific writing. This new genre can be called "post-modern scientific writing", as distinct from "naive scientific writing", with which readers of other scientific journals and other authors are more familiar. In one example of this innovative mode, Menger and Haim present the following. "Schowen wrote: 'I don't think this paper is any good. Breslow and Huang never said they measured a negative rate'. It was difficult to understand the reply as Breslow and Huang had published an entire list of negative rate constants."

The naïve reader envisions Schowen aggressively rejecting a paper on a subject with which he is unfamiliar, perhaps leading to "considerable anguish" on the part of its author. Now I extend the Menger–Haim quotation from my letter by 14 words: "I don't think this paper is any good. Breslow and Huang never said they measured a negative rate, only that the rate decreased with imidazole concentration. They calculated a negative rate constant." With this new information, the author's anguish becomes itself "difficult to understand". Indeed, in the normative genre of scientific writing and reading, the attenuation of this quotation by Menger and Haim, combined with their interpretative sentence, might be taken as a "truly gross" misrepresentation. But this view fails to take account of Menger and Haim's post-modern style. Their quotation of my letter places the word *rate* directly before the quotation mark with no intervening punctuation. Under post-modern close analysis, the reader is alerted that the authors may have information that would reverse the reader's understanding if it should ever come to light.

With the post-modern scientific style, the reader must be deeply cautious about the surface text, and must probe analytically the grammar, syntax, punctuation and every other aspect of form, always considering that other, deep readings may correspond to what the naïve reader would crudely describe as the 'truth'. Most important, much vital information may not be made available to the reader. For example, consider as a deep text that *JACS* rejected papers by Menger and Haim not merely because I was "defensive and evasive", but because the papers by Menger and Haim were frivolous, erroneous or so turgid as to cause more confusion than enlightenment. A naïve text might describe the laborious and public-spirited efforts of good-willed referees to help Menger and Haim formulate logical, honest arguments. These referees now find their confidential reports parodied by appallingly selective quotation in high post-modern style. A disadvantage of the naïve mode for Menger and Haim would have been a loss of self-serving ethical pretence, low drama, a sense of intrigue and entertainment value.

Naïve readers should note that Menger and Haim make much of my request that the *Journal of Organic Chemistry* (*JOC*) retract Menger's publication (**56** (1991) 6251). I now see my action as arising from my own failure to appreciate the post-modern approach. I objected (making clear to the *JOC* editors that I was writing as a reader of *JOC* and not as an editor of *JACS*) to several aspects of the paper, but chiefly to Menger's Fig. 1 and the associated text. The caption of this figure reads (I naïvely cite its entirety): "Figure 1. The Anslyn-Breslow mechanism utilizing the five rate constants in eq 1 of their article[2] (and given in eq 1 of the present article). A steady-state treatment of intermediate I generates these equations." (The superscript '2' refers to E. Anslyn and R. Breslow, *J. Am. Chem. Soc.* **111** (1989) 4473.)

The mechanism in the figure violates the principle of microscopic reversibility, and Menger's paper attributes the violation to Anslyn and Breslow. Because the contents of the figure do not appear in Anslyn and Breslow and the verbal discussion in Anslyn and Breslow's paper explicitly excludes such a mechanism, naïve readers tend to see the figure and text as a misrepresentation of the content of the Anslyn-Breslow paper. This would be wrong: the close textual analysis required by the post-modern mode shows that the superscript '2' of the caption is not attached to the names "Anslyn-Breslow" nor to the word "mechanism" but rather to the word "article". Only a naïve reader will thus proceed incautiously and incorrectly to the conclusion that the material shown in the figure is claimed actually to be present in the cited article.

Nature's launching of the post-modern genre of scientific writing is probably irreversible, so the attendant requirement for close analysis by scientific readers is of some concern. Chemists must already try to maintain currency in fields from materials science to molecular biology, and will now have to add to their obligations developments in the theory of literary criticism. Still worse will be the problem, for those journals that adhere to the naïve mode, of trying to ascertain the accuracy of submissions. Naïve 'accuracy' poses no problem for *Nature*, as the Menger-Haim publication illustrates. For the benefit of other journals, however, it might be hoped that *Nature*, which I believe has experience in the use of magicians to validate its papers, could make services in this category broadly available.

R L Schowen,
Nature, 360 (1992) 506

[1] lásd: *Impakt* 3(1)(1993) 1-5

Készült az MTAK házi sokszorosító részlegében

Felelős kiadó: az MTAK főigazgatója