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THE NEWEST VERSION OF THE FACTS AND FIGURES ON PUBLICATION OUTPUT AND RELATIVE CITATION IMPACT. A COLLECTION OF RELATIONAL CHARTS, 1981–1985

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Szilard: I am going to write down all that is going on these days in the project. I am just going to write down the facts – not for anyone to read, just for God.
Bethe: Don't you think God knows the facts?
Szilard: Maybe he does, but not *this* version of the facts.
(Leo SZILARD, His version of the Facts. Selected Recollections and Correspondence, Ed.: Spencer R. WEART & Gertrud Weiss SZILARD, MIT Press, Cambridge, Ma., 1978, p. 149.)

Comments to Figures 1–7

The figures presented in this flash are the "relational chart" forms of the data published in tabular form in the three previous flashes:

1. T. BRAUN, W. GLÄNZEL, A. SCHUBERT, The newest version of the facts and figures on publication output and relative citation impact of 100 countries, 1981–1985,
   Scientometrics, 13 (1988) 181–185
2. T. BRAUN, W. GLÄNZEL, A. SCHUBERT, The newest version of the facts and figures on publication output and relative citation impact in the life science and chemistry, 1981–1985,
   Scientometrics, 14 (1988) 3–16
3. T. BRAUN, W. GLÄNZEL, A. SCHUBERT, The newest version of the facts and figures on publication output and relative citation impact in physics, engineering and mathematics, 1981–1985,
   Scientometrics, 14 (1988) 365

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Details and additional information on relative indicators and relational charts can be found in the following publications:

4. T. BRAUN, W. GLÄNZEL, A. SCHUBERT, Scientometric Indicators. A 32-Country Comparative Evaluation of Publishing Performance and Citation Impact, World Scientific Publ. Co., Singapore, Philadelphia, 1985.
5. A. SCHUBERT, T. BRAUN, Relative indicators and relational charts for comparative assessment of publication output and citation impact, Scientometrics, 9 (1986) 281.
6. T. BRAUN, E. BUJDOSÓ, A. SCHUBERT, Literature of Analytical Chemistry. A Scientometric Evaluation, CRC Press, Boca Raton, 1987.
7. A. SCHUBERT, W. GLÄNZEL, T. BRAUN, Against Absolute Methods. Relative Scientometric Indicators and Relational Charts as Evaluation Tools. In: A. F. J. VAN RAAN (Ed.), Handbook of Quantitative Studies of Science and Technology, Elsevier, Amsterdam, 1988.

Facts and figures referring to the 1978–1980 period has been published in 1987:

8. T. BRAUN, W. GLÄNZEL, A. SCHUBERT, One more version of the facts and figures on publication output and relative citation impact of 107 countries, 1978–1980, Scientometrics, 11 (1987) 9–15.
9. T. BRAUN, W. GLÄNZEL, A. SCHUBERT, One more version of the facts and figures on publication output and relative citation impact in the life sciences and chemistry, 1978–1980, Scientometrics, 11 (1987) 127–140.
10. T. BRAUN, W. GLÄNZEL, A. SCHUBERT, One more version of the facts and figures on publication output and relative citation impact in physics and mathematics, 1978–1980, Scientometrics, 12 (1987) 3–16.

Data sources: as main data sources, annual cumulations of the magnetic tapes of the Science Citation Index (SCI) database of the Institute for Scientific Information (ISI, Philadelphia, PA, USA) were used.

Science fields: papers were classified into science fields according to the field of the journal in which they were published. Journal field classification was based on the system of PINSKI and NARIN (see, e. g., F. NARIN, Evaluative Bibliometrics, Computer Horizons, Inc., Cherry Hill, N. J., 1976). The journal classification was updated and the fields has been regrouped into 5 major fields:

Life sciences: Clinical Medicine, Biomedical Research, Biology

Chemistry

Physics: Physics, Earth & Space Science
Engineering
Mathematics

Source and citation periods: original papers, review papers, notes and letters published in the SCI source journals in 1981–1985 were considered source items, and citations to them in the same five years period were counted.

Selection and classification of countries: all countries, which produced at least 100 first authored papers in the field in question during the period under study were included. (Papers were assigned to cuntries according to the corporate address of the first author as indicated in the byline of the publication.)

To assure the clarity of the charts, however, only a limited number of countries has been marked by their identification label in each figure. The limits were set by the following productivity thresholds for the single fields:

Life science	5000 papers published in the 1981–1985 period
Chemistry	1000 papers published in the 1981–1985 period
Physics	1000 papers published in the 1981–1985 period
Engineering	1000 papers published in the 1981–1985 period
Mathematics	250 papers published in the 1981–1985 period

All fields combined 10000 papers published in the 1981–1985 period.

Countries, with a publication productivity over these limits were labelled in the charts by their three-latter codes:

ARG	Argentina	GRC	Greece
AUS	Australia	HUN	Hungary
AUT	Austria	IND	India
BEL	Belgium	ISR	Israel
BRA	Brazil	ITA	Italy
CAN	Canada	JPN	Japan
CHE	Switzerland	NLD	Netherlands
CSK	Czechoslovakia	NOR	Norway
DDR	German DR	NZL	New Zealand
DEU	FR Germany	POL	Poland
DNK	Denmark	PRC	PR China
EGY	Egypt	SUN	USSR
ESP	Spain	SWE	Sweden
FIN	Finland	UKD	UK
FRA	France	USA	USA

The black points with no label can be identified by using the numerical data in the previous flashes (1–3).

Indicator definitions: Indicators of the type "Citation rate per publication" are to be interpreted as mentioned above, i. e., considering the same five years both as source and citation periods. Thus, the effective citation period varies from 0 to 5 years. The indicators so obtained provide a complex measure of medium range citation impact and citation immediacy for a considerably large population of papers even for small countries. Expected citation rates were calculated from the average citation rates of the journals involved. Actual citation rates were the results of direct citation counts. Relative citation rate (RCR) means the ratio of actual to expected citation rates.

Interpretation of the relational charts: Figures 2–7 display Mean Observed Citation Rate (MOCR – an indicator of citation eminence) against Mean Expected Citation Rate (MECR – an indicator of publication strategy) in five science fields and in all science. The "main diagonal" (the straight line MOCR = MECR i. e. RCR = 1.0), represents a kind of "balanced" situtation between expected and observed values. Countries represented by points above this diagonal are highly cited, those below the diagonal are lowly cited in the norms of the publishing journals. Whether these norms represent a high or a low standard in the international scale of the given field can be assessed by comparing it to the field average indicated in the diagrams by a scattered line. This line and the main diagonal divides the chart into four zones denoted by the letters A–D in Fig. 1. This sample chart gives hint to the interpretation of the position position of the countries in Figs 2–7.

Example of assessment: Let consider that we would like to assess comparatively the national performance of five countries (FR Germany, USA, UK, France and Japan) in all sciences. The liniar RCR ranking published in a previous flash (Scientometrics, 13 (1988) 181–188) shows the leading position of the FR Germany followed by the USA the UK, France and Japan in that order. The picture becomes considerably more diversified when the two-dimensional approach of fig. 2 is taken into account. By merging namely the liniar ranking and the relational chart approach it becames immediately visible that although the papers published by authors from the FR Germany are outstandingly cited when related to the expected citation rate of papers in the journals in which they are published, these journals belong however to a lower impact (below world expected citation rate of 2.97) journal group (zone C). It is interesting to note that the expected citation rate of the papers from France and Japan is very near to that of those from the FR Germany, although their observed citation rate situates them in the (D) zone. On the other hand fig. 2 also shows clearly the USA and the UK in the highest impact zone (A) with the USA in a better position. In other words, taking into account the assessed group of five countries, West German scientists publish high average impact papers in lower average impact journals while British authors' papers appear in high average quality journals and have there a high average impact. On their turn the papers from USA authors show the most privileged position in the assessed group of the five countries on Fig. 2.

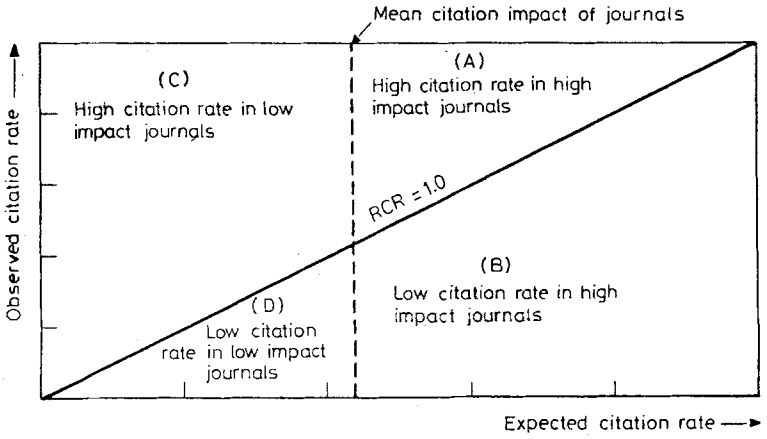

Fig. 1. Relational chart of relative citation rate (RCR) zoning

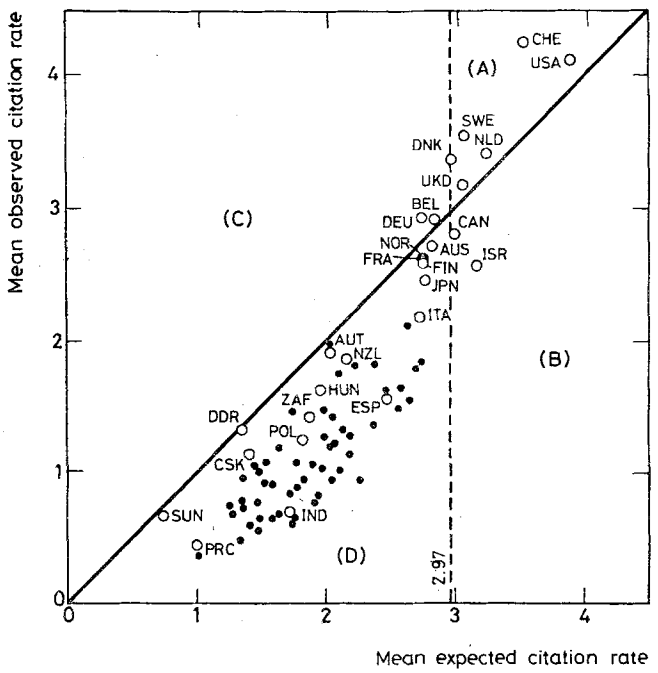

Fig. 2. Relational chart. All science, 1981–1985.

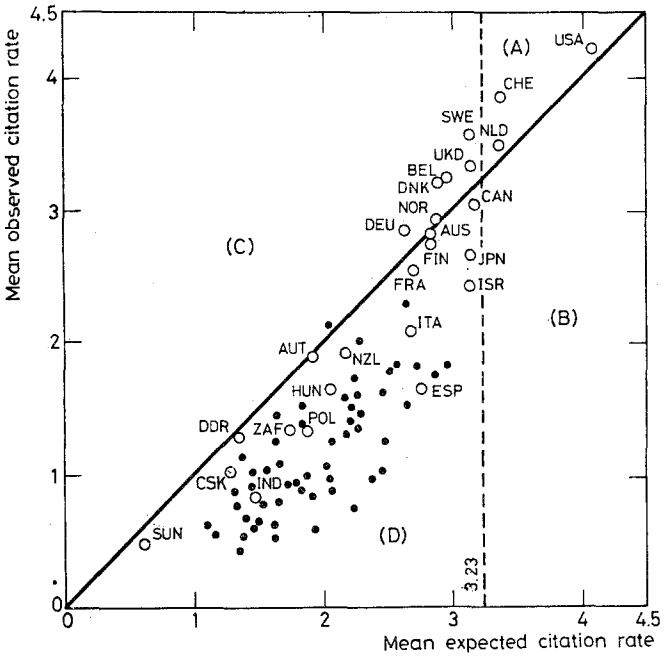

Fig. 3. Relational chart. Life sciences, 1981–1985

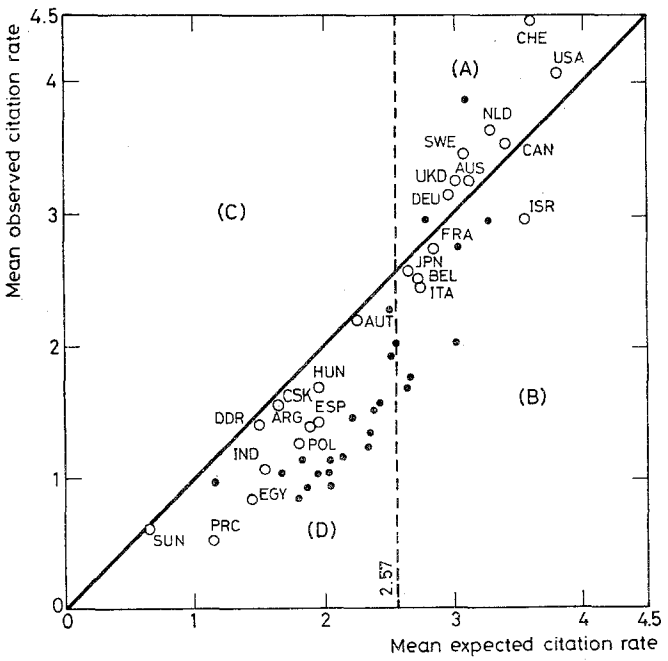

Fig. 4. Relational chart. Chemistry, 1981–1985

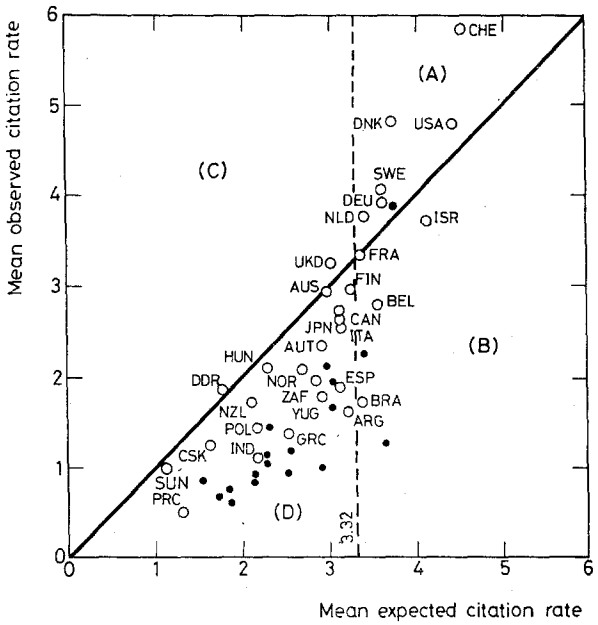

Fig. 5. Relational chart. Physics, 1981–1985

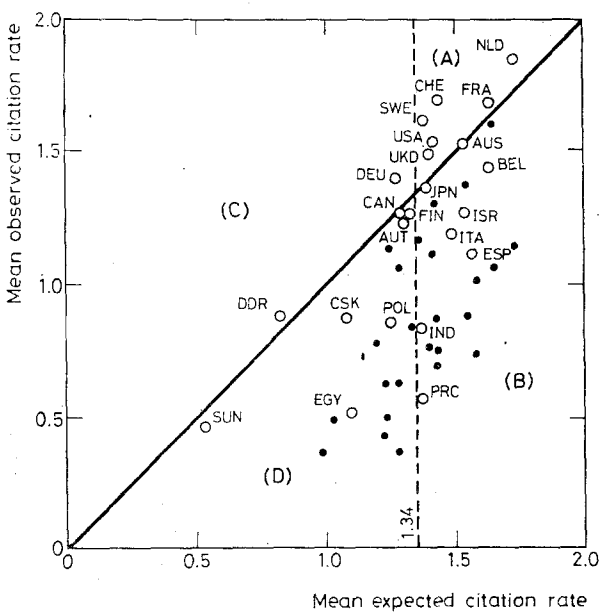

Fig. 6. Relational chart. Engineering, 1981–1985

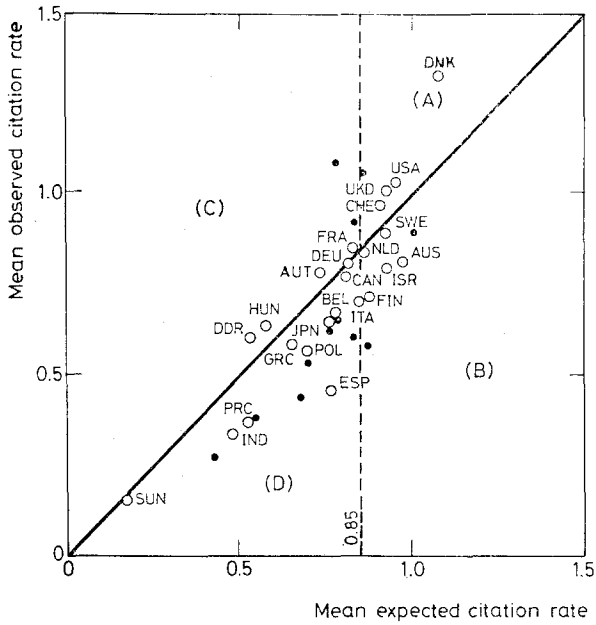

Fig. 7. Relational chart. Mathematics, 1981–1985