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Current Comments®

Latin American Research. Part 2. Most-Cited Articles, Discipline Orientation, and Research Front Concentration

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In Part 1 data were provided on 3,100 Latin American articles found in the 1978 *Science Citation Index®* (*SCI®*). The average Latin American article received about three citations from 1978 through 1982. In comparison, the five-year impact of the average *SCI* article was five. Brazil, Argentina, Mexico, Chile, and Venezuela accounted for 92 percent of the Latin American articles indexed in the 1978 *SCI*. The same five countries dominated Latin American scientific output in the 1973 and 1982 *SCI*.

Our discussion of Latin American science continues with a list of most-cited articles and a discipline analysis—life sciences, physics, chemistry, etc. An analysis of the specific clusters of research cited by Latin American scientists in 1981 helps us identify the particular research fronts in which they are active.

Table 1 lists 24 1978 articles that received at least 30 citations from 1978 through 1982. Ten papers list first authors based in Mexico, five in Brazil, four in Chile, three in Argentina, and two in Venezuela. Of course, it's possible that some of the first authors on these high-impact papers listed different institutional affiliations outside of Latin America on other articles. That is, some may have been visiting researchers at institutions in Europe or North America. Or they may have been researchers from Europe or North America who worked at Latin American laboratories for a while. We checked ISI®'s *Current Bibliographic Directory of the Arts & Sciences®* (*CBD®*) to determine what addresses were listed for the first authors of the high-impact 1978 Latin American papers in later years. Six authors were found to have listed addresses at other institutions outside of Latin America—E.R. Abney, F. Bolivar, R. Bravo, D.E. Richards, J.L. Ochoa, and L.C. Vaz. In addition, five of the 24 highly cited articles were *co*authored with researchers from the US and UK.

We've also provided details on the "nationality" of the citations to these high-impact Latin American articles in Table 1. That is, we show the number of citations given by authors based in the same Latin American nation as the cited first author, those based in other Latin American nations, and those from non-Latin American countries. These 24 articles received about 1,200 citations from 1978 through 1982. Eighty-nine percent were from *non*-Latin American papers. Ten percent were "self-citations" from the cited author's own country. Only one percent were from other Latin American countries. Apparently, there is little inter-citation *between* Latin American scientists, at least as it is reflected in the international journals indexed in *SCI*. Thus, whether or not a Latin American article is highly cited depends on the recognition it gets from scientists *outside of* Central and South America.

This point is better illustrated when we identify the countries that most frequently cited the 1978 *SCI* Latin American articles. These articles received about 9,000 citations from 1978 to 1982.

Table 1: 1978 Latin American articles cited at least 30 times from 1978 to 1982. A = bibliographic data. B = total citations. C = citations from first author's own country. D = citations from other countries in Latin America. E = citations from all other countries.

A	B	C	D	E
Bolivar F. Construction and characterization of new cloning vehicles. III. Derivatives of plasmid pBR322 carrying unique *Eco* RI sites for selection of *Eco* RI generated recombinant DNA molecules. *Gene* 4:121-36, 1978. Natl. Autonomous Univ. Mexico (UNAM), Inst. Biomed. Res., Mexico City, Mexico.	162	5	2	155
Abney E R, Cooper M D, Kearney J F, Lawton A R & Parkhouse R M E. Sequential expression of immunoglobulin on developing mouse B lymphocytes: a systematic survey that suggests a model for the generation of immunoglobulin isotype diversity. *J. Immunol.* 120:2041-9, 1978. Natl. Autonomous Univ. Mexico (UNAM), Facult. Med.: Natl. Polytech. Inst. (IPN) Res. Ctr., Mexico City, Mexico; Univ. Alabama, Dept. Pediat., Microbiol. & Compr. Cancer Ctr., Birmingham, AL.	120	0	0	120
Borgono J M, McLean A A, Vella P P, Woodhour A F, Canepa I, Davidson W L & Hilleman M R. Vaccination and revaccination with polyvalent pneumococcal polysaccharide vaccines in adults and infants (40010). *Proc. Soc. Exp. Biol. Med.* 157:148-54, 1978. Natl. Hlth. Serv., Sect. Epidemiol., Santiago, Chile; Merck Inst. Ther. Res., Div. Virus Cell Biol. Res. & Corp. Med. Dept.-Occup. Hlth., West Point, PA.	67	0	0	67
Peimbert M, Torres-Peimbert S & Rayo J F. Abundance gradients in the galaxy derived from H_{II} regions. *Astrophys. J.* 220:516-24, 1978. Natl. Autonomous Univ. Mexico (UNAM), Inst. Astron., Mexico City, Mexico.	62	3	1	58
DiPolo R. Ca pump driven by ATP in squid axons. *Nature* 274:390-2, 1978. Sci. Res. Inst. (IVIC), Ctr. Biophys. Biochem., Caracas, Venezuela.	52	5	1	46
Alarcon-Segovia D & Ruiz-Arguelles A. Decreased circulating thymus-derived cells with receptors for the Fc portion of immunoglobulin G in systemic lupus erythematosus. *J. Clin. Invest.* 62:1390-4, 1978. Natl. Inst. Nutr., Dept. Immunol. Rheumatol., Mexico City, Mexico.	50	13	0	37
Alarcon-Segovia D, Ruiz-Arguelles A & Fishbein E. Antibody to nuclear ribonucleoprotein penetrates live human mononuclear cells through Fc receptors. *Nature* 271:67-9, 1978. Natl. Inst. Nutr., Dept. Immunol. Rheumatol., Mexico City, Mexico.	50	18	0	32
Didyk B M, Simoneit B R T, Brassell S C & Eglinton G. Organic geochemical indicators of palaeoenvironmental conditions of sedimentation. *Nature* 272:216-22, 1978. Natl. Petroleum Enterprise, Concon, Chile; Univ. California, Inst. Geophys. Planet. Phys., Los Angeles, CA; Univ. Bristol, Sch. Chem., Bristol, UK.	45	0	0	45
Hopp H E, Romero P A, Daleo G R & Pont Lezica R. Synthesis of cellulose precursors. *Eur. J. Biochem.* 84:561-71, 1978. Bariloche Fdn., Dept. Biol., San Carlos de Bariloche, Argentina.	43	3	0	40
Padial N, Csanak G, McKoy B V & Langhoff P W. Photoabsorption in carbon monoxide: Stieltjes-Tchebycheff calculations in the separated-channel static-exchange approximation. *J. Chem. Phys.* 69:2992-3004, 1978. State Univ. Campinas, Inst. Phys., Campinas, Brazil; Calif. Inst. Technol., Arthur Amos Noyes Lab. Chem. Phys., Pasadena, CA; Indiana Univ., Dept. Chem., Bloomington, IN.	43	3	0	40
Bravo R, Otero C, Allende C C & Allende J E. Amphibian oocyte maturation and protein synthesis: related inhibition by cyclic AMP, theophylline, and papaverine. *Proc. Nat. Acad. Sci. US* 75:1242-6, 1978. Univ. Chile, Facult. Med., Santiago, Chile.	40	8	0	32
Cuccovia I M, Schroter E H, Monteiro P M & Chaimovich H. Effect of hexadecyltrimethylammonium bromide on the thiolysis of *p*-nitrophenyl acetate. *J. Org. Chem.* 43:2248-52, 1978. Univ. Sao Paulo, Inst. Chem., Sao Paulo, Brazil.	38	4	0	34
Llados F & Zapata P. Effects of dopamine analogues and antagonists on carotid body chemosensors *in situ*. *J. Physiol.* 274:487-99, 1978. Catholic Univ. Chile, Dept. Neurobiol., Santiago, Chile.	38	6	0	32
Sanchez J A & Stefani E. Inward calcium current in twitch muscle fibres of the frog. *J. Physiol.* 283:197-209, 1978. Natl. Polytech. Inst. (IPN) Res. Ctr., Mexico City, Mexico.	38	6	1	31
Staneloni R J & Leloir L F. Oligosaccharides containing glucose and mannose in glycoproteins of the thyroid gland. *Proc. Nat. Acad. Sci. US* 75:1162-6, 1978. Inst. Biochem. Res. "Fundacion Campomar"; Coll. Exact Natur. Sci., Buenos Aires, Argentina.	38	11	0	27
Mortara R A, Quina F H & Chaimovich H. Formation of closed vesicles from a simple phosphate diester. Preparation and some properties of vesicles of dihexadecyl phosphate. *Biochem. Biophys. Res. Commun.* 81:1080-6, 1978. Univ. Sao Paulo, Inst. Chem., Sao Paulo, Brazil.	36	3	0	33
Ferreira S H, Nakamura M & Castro M S A. The hyperalgesic effects of prostacyclin and prostaglandin E_2. *Prostaglandins* 16:31-7, 1978. Ribeirao Preto Facult. Med., Dept. Pharmacol., Sao Paulo, Brazil.	35	10	0	25
Zepeda A. Mass of the up quark. *Phys. Rev. Lett.* 41:139-41, 1978. Natl. Polytech. Inst. (IPN) Res. Ctr., Mexico City, Mexico.	35	1	0	34
Carrasco H A, Fuenmayor A, Barboza J S & Gonzalez G. Effect of verapamil on normal sinoatrial node function and on sick sinus syndrome. *Amer. Heart J.* 96:760-71, 1978. Los Andes Univ. Hosp., Cardiovasc. Ctr., Merida, Venezuela.	34	0	0	34

Vaz L C & Alexander J M. Systematics of fusion barriers obtained with a modified proximity potential. *Phys. Rev. C—Nucl. Phys.* 18:2152-61, 1978. IFUFRJ Cidade Univ., Dept. Nucl. Phys., Rio de Janeiro, Brazil; SUNY, Dept. Chem., Stony Brook, NY.	34	0	0	34
Perez-Tamayo R. Pathology of collagen degradation. *Amer. J. Pathol.* 92:509-66, 1978. Natl. Inst. Nutr., Dept. Pathol., Mexico City, Mexico.	32	6	1	25
Ochoa J-L. Hydrophobic (interaction) chromatography. *Biochimie* 60:1-15, 1978. Natl. Autonomous Univ. Mexico (UNAM), Inst. Chem., Mexico City, Mexico.	31	2	0	29
Ramos C, Lamoyi E, Feoli M, Rodriguez M, Perez M & Ortiz-Ortiz L. *Trypanosoma cruzi*: immunosuppressed response to different antigens in the infected mouse. *Exp. Parasitol.* 45:190-9, 1978. Natl. Autonomous Univ. Mexico (UNAM), Inst. Biomed. Res., Mexico City, Mexico.	31	2	9	20
Richards D E, Rega A F & Garrahan P J. Two classes of site for ATP in the Ca^{2+}-ATPase from human red cell membranes. *Biochim. Biophys. Acta* 511:194-201, 1978. Univ. Buenos Aires, Facult. Pharmacol. Biochem., Buenos Aires, Argentina.	30	7	0	23
Totals	1184	116	15	1053

Source of data on articles: 1978 *SCI*®.
Source of data on citations: 1978-1982 *SCI*.

Table 2 shows 21 countries that account for at least one percent of citations to Latin American research. Twenty-nine percent were from US citing papers. West European articles account for 14 percent. The UK accounts for eight percent. All Latin American countries combined account for 32 percent.

Table 3 provides details on these Latin American citations to Latin American research. A pattern of high national "self-citation" is obvious. For example, 971 of the citations to Latin American research came from Brazilian papers. Yet 917 of these were "self-citations" to Brazilian research. In this study, "self-citation" refers to citations by any author from one country to the work of any authors in that same *nation*. It should not be confused with the usual meaning of self-citation as an *author* citing his or her own work. Thus, national self-citations indicate a form of "provinciality" or "insularity," even though the authors in question may not be known to each other.

This high level of "insularity" is observed in other Latin American nations. Ninety-one percent of Argentina's citations to Latin American research cited Argentinean papers; Mexico, 98 percent; Chile, 93 percent; Venezuela, 91 percent, and so on. These data indicate that Latin American researchers are not aware of, or choose not to cite, papers from neighboring countries in Central and South America. Keep in mind that this statement is based on the international journals covered in *SCI*. A citation analysis of regional journals might reveal a different pattern.

Table 2: Countries that most frequently cited 1978 *SCI*® Latin American articles. Asterisks (*) indicate Latin American countries. A=citing country. B=citations to Latin American articles. C=percent of all citations to Latin American articles. D=citations to all articles.

A	B	C	D
US	2605	29	833,933
*Brazil	971	11	3960
*Argentina	787	9	3302
UK	700	8	188,323
*Mexico	436	5	2289
FRG	374	4	117,817
France	334	4	94,919
*Chile	290	3	1696
*Venezuela	259	3	1120
Canada	243	3	80,894
Japan	219	3	94,149
Australia	177	2	38,099
Italy	153	2	36,509
USSR	145	2	48,459
Switzerland	111	1	30,873
Netherlands	100	1	35,180
Sweden	85	1	34,336
India	80	1	20,312
Belgium	78	1	18,102
Israel	69	1	18,040
Denmark	66	1	17,139
All Others	653	7	137,385
Total	8935		

The finding that there is little inter-citation between Latin American scientists raises important science policy questions. Much has been done to increase contacts between Latin American scientists and those in the US and Europe. As a result, scientific information from the US and Europe is more accessible to Latin American scientists, and vice versa. Similar programs should be

Table 3: Inter-Latin American self-citations. Self-citation is defined as the number of references in a nation's literature that cited that same nation's papers divided by the number of references to all Latin American papers. A = citing country. B = Latin American citations. C = self-citations. D = percent of self-citations.

A	B	C	D
Brazil	971	917	94
Argentina	787	716	91
Mexico	436	425	98
Chile	290	269	93
Venezuela	259	235	91
Colombia	46	40	87
Costa Rica	22	15	68
Guatemala	13	7	54
Cuba	11	11	100
Uruguay	9	9	100
Peru	8	6	75
Ecuador	3	3	100
Bolivia	1	0	0
El Salvador	1	1	100
Honduras	1	1	100
Panama	1	0	0
Total	2859	2655	93

Table 4: Distribution of 1973 *SCI*® articles from Brazil and Mexico by field. A = Brazilian articles. B = percent of all Brazilian articles. C = impact of Brazilian articles. D = Mexican articles. E = percent of all Mexican articles. F = impact of Mexican articles.

Field	A	B	C	D	E	F
Life Sciences	449	55	2.5	390	73	2.6
Physics*	137	17	3.2	58	11	2.1
Chemistry	58	7	4.4	41	8	2.1
Engineering/Technology	55	7	.9	12	2	1.5
Mathematics	31	4	.9	8	1	4.1
All Others**	82	10	.8	26	5	4.2

* Includes Geophysics and Astrophysics.
** Includes articles from multidisciplinary journals.

designed to intensify contacts between scientists in Central and South America—travel grants, exchange programs, cooperative research projects, regional laboratories and journals, etc. This could lead to a greater awareness among Latin American nations of each other's useful scientific contributions.

By examining the journals that published Latin American research, we can get a rough idea of the fields of science they concentrate in. Several studies have indicated that Latin American science in general is concentrated in the life sciences.[16] In comparison to the distribution of the world's literature, Latin American science is underrepresented in physics and chemistry.

J. Davidson Frame, Department of Management Science, George Washington University, Washington, DC, combined 1973-1975 *SCI* data for a study of Latin American and world science.[16] He found that 60 percent of the world literature was in the life sciences, compared to 73 percent for Latin American publications. Nineteen percent was in chemistry—for Latin America, this figure was 11 percent. Physics, including geophysics and astrophysics, accounted for 21 percent of the world literature but only 16 percent of Latin American articles. Frame concluded that Latin American research is "peripheral" to world or "mainstream" scientific output.

But when we examine individual Latin American nations, we see that some are more "mainstream" than others. Table 4 shows the distribution of 1973 *SCI* articles from Brazil and Mexico by broad discipline, and their five-year impacts. About 52 percent of the world literature covered in *SCI* that year was in the life sciences. For Brazil, this figure is 55 percent, very close to the world average. A much larger proportion of Mexican publications—73 percent—is in the life sciences.

Brazilian publications in physics are also roughly proportional to the world output—18 percent in 1973. Four percent of Brazil's articles were in mathematics, compared to three percent for the world literature. Mexico is underrepresented in both physics and mathematics—11 and one percent, respectively. (Both Brazil and Mexico published much smaller proportions of articles in chemistry and engineering than the world as a whole. In 1973, 17 percent of the world's literature was in chemistry, and 11 percent in engineering.)

Table 5 shows how Brazilian and Mexican articles in the 1978 *SCI* are distributed by discipline. The Brazilian proportion of articles in the life sciences declined to 46 percent in 1978, *lower* than the world average of 55 percent that year. But the impact of Brazilian life sciences articles increased from 2.5 in

Table 5: Distribution of 1978 *SCI*® articles from Brazil and Mexico by field. A = Brazilian articles. B = percent of all Brazilian articles. C = impact of Brazilian articles. D = Mexican articles. E = percent of all Mexican articles. F = impact of Mexican articles.

Field	A	B	C	D	E	F
Life Sciences	483	46	2.9	410	67	3.1
Physics*	229	22	3.0	87	14	4.8
Chemistry	96	9	3.6	30	5	1.3
Engineering/Technology	76	7	1.3	51	8	.7
Mathematics	38	4	1.4	9	1	2.9
All Others**	138	13	.9	24	4	3.6

* Includes Geophysics and Astrophysics.
** Includes articles from multidisciplinary journals.

1973 to 2.9 in 1978. The percentage of Brazil's output in physics increased from 17 percent in 1973 to 22 percent in 1978, which is *higher* than the world average of 17 percent. The impact of Brazilian physics articles was stable at about three in 1973 and 1978. The proportion of Brazilian articles in chemistry also grew, from seven percent in 1973 to nine percent in 1978. This is still lower than the world average—16 percent of the world's literature was in chemistry in 1978. Brazil's proportionate productivity in chemistry increased, but its average impact declined from 4.4 in 1973 to 3.6 in 1978.

Mexico's emphasis on the life sciences in 1978 is still strong, accounting for 67 percent of Mexico's publications—down from 73 percent in 1973. The impact of Mexico's life sciences publications increased from 2.6 in 1973 to 3.1 in 1978. The percentage of Mexico's output in physics grew from 11 percent in 1973 to 14 percent in 1978, closer to the world average of 17 percent. Significantly, the impact of Mexican physics articles more than doubled, from 2.1 in 1973 to 4.8 in 1978. Only five percent of 1978 Mexican articles were in chemistry, lower than its 1973 proportion of eight percent and far lower than the 1978 world average of 16 percent. The impact of Mexico's chemistry articles also declined, from 2.1 in 1973 to 1.3 in 1978.

Of course, analyses of field distributions are too broad to give us an idea of the *specific* subjects of research a nation's scientists specialize in. It is useful to know how much of a nation's literature is devoted to life sciences, but it is more relevant to know what disciplines within this field are stressed—biomedicine, biochemistry, clinical medicine, botany, etc. It is even more interesting to know what specific research problems are addressed within these disciplines—erythrocyte membrane proteins, cell-mediated cytotoxicity, T-cell responses to tuberculosis, etc.

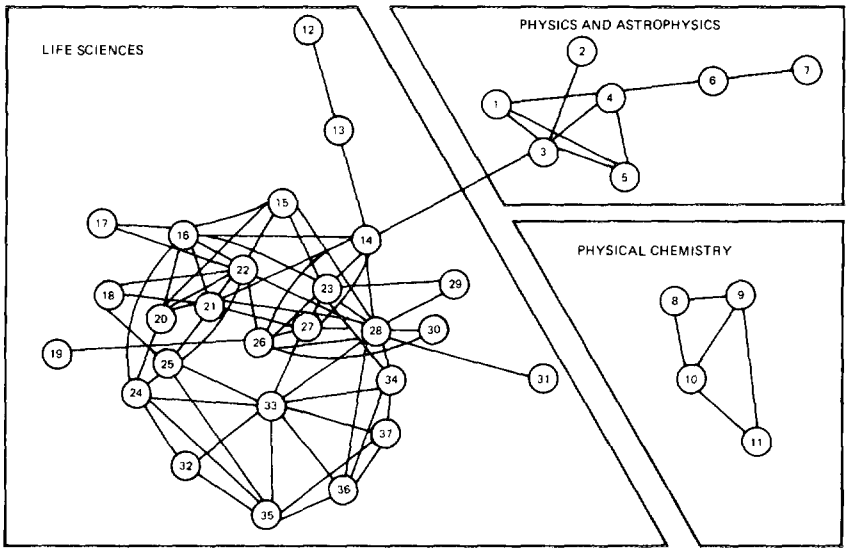
ISI has developed a method to automatically classify the scientific literature into thousands of discrete, highly specific "clusters" of research. The method relies on co-citation analysis to identify "core" documents in these clusters, and the current "research front" papers that cite them. This method has been described previously.[17]

For this study, we used the 1981 *SCI* file to see what clusters of research were cited by Latin American articles. This helps us identify the *current* areas of Latin American research. In brief, we examined more than 2,300 research fronts that included at least one Latin American paper. Obviously, we can't discuss all of them here. So we set a threshold to obtain a manageable number for analysis.

Figure 1 shows a map of 37 clusters of research cited by at least eight Latin American articles in the 1981 *SCI*. Each circle represents a single cluster of research. The connecting lines indicate co-citation links between research specialties. Each cluster is identified by a number. The full name for each research front is provided in the table and corresponds to the number on the map. We have explained previously how the research fronts are named.[17] After each research front name, the number of 1981 citing papers is shown, as well as the percentage from Latin America.

Before we discuss Latin American research specialization, a few comments about the map itself are needed. The map does not show the relative "sizes" of the specialty areas it depicts. The number of citing articles in these research

Figure 1: Multidimensionally scaled map of research clusters cited by at least eight 1981 *SCI*® Latin American articles. Numbers correspond to accompanying index of research front names.



KEY

Names of research fronts that included at least eight 1981 *SCI*® articles from Latin America. A=number on map. B=research front name. C=total number of citing articles. D=percentage of Latin American citing articles.

Physics & Astrophysics

A	B	C	D
1	Spectroscopic studies of Wolf-Rayet stars	75	17
2	Interacting boson model	133	7
3	Neutrino masses, neutral currents, and other factors involved in unified field theories	288	15
4	Chemical composition and structure of globular clusters	205	5
5	Mass, photometric abundances, and colors of cepheids, carbon stars, and super giants; stellar evolution	108	8
6	Monte Carlo and other studies of renormalization, roughening transitions, and expansions in lattice-gauge theories	225	4
7	Renormalization group studies of percolation behavior in lattice models	77	16

Physical Chemistry

8	Intermediate valence states	118	9
9	Auger spectron and self-consistent band structure theory of metals	276	3
10	Electronic structure, magnetism, conductivity, and related properties of solid surfaces described by the Hubbard, Anderson, and other models	105	8
11	Self-consistent field X-alpha-scattered wave calculations of electronic structure and magnetic properties of molecules	134	7

Life Sciences

12	Macrophage activation and intercellular infection	63	19
13	Development and structure of trypanosoma	38	24
14	Enzymes which control DNA conformation and the effect of interactions with intercalating drugs	988	1
15	Analysis of tight junctions in various tissue	244	3
16	Transmembrane electrical potentials and membrane permeability	383	3
17	Ecological and adaptation strategies in community stability	315	3
18	Kallikrein and hypertension	126	9
19	Serodiagnosis and subtyping of arbovirus diseases	88	10
20	Mechanisms of ion exchange and transport ATP	337	3
21	Sarcoplasmic reticulum ATPase	263	4
22	Renal physiology and ion transport	419	2
23	Methods for the analysis and characterization of proteins	1034	3
24	Effects of anti-arrythmic drugs on cardiovascular disease	314	3
25	Adrenoreceptors and physiology of neurotransmission	567	3
26	Etiology and pathology of viral gastroenteritis	495	4
27	Glycoprotein biosynthesis	180	6

28	Biochemistry and metabolism of zinc, copper, and other trace elements	669	3
29	Effects of dietary cholesterol on the plasma and arterial wall of undernourished rats	21	38
30	Nutrition and the immune response	112	10
31	Immune aspects of systemic lupus erythematosus and other related diseases	136	7
32	Phospholipids in the fetal lung	234	3
33	Clinical treatment of pituitary prolactinoma and adenoma	336	5
34	Hormone interactions at the pituitary level	74	11
35	Neuropharmacological regulation of pituitary hormones	402	5
36	Prolactin and male reproductive organs	100	8
37	Hormone receptor function and sexual abnormalities	161	5

fronts range from 20 to more than 1,000 but they are all shown on the map as single points. However, the map *is* multidimensionally scaled[18]—the distances *between* clusters reflect how close or far apart they are in subject matter. In effect, the map depicts the *cognitive* structure of the research areas shown. Keep in mind that the scaling is multidimensional—when it is reproduced on a flat page, the distances between some clusters are altered to prevent overlapping. Ideally, a three-dimensional model could be built for these maps, like the ball and stick models used by chemists.

The research fronts numbered one through seven on the map in Figure 1 deal with physics and astrophysics. They discuss the interacting boson model, lattice-gauge theories, unified field theories, stellar evolution, and studies of various types of stars. More than 1,100 1981 citing papers are included in these seven research fronts, and 104, or nine percent, are from Latin America.

The concentration of Latin American citing papers was particularly high in three of these research fronts in physics and astrophysics. Of the 75 papers published in 1981 that cited research front number one, "Spectroscopic studies of Wolf-Rayet stars," 17 percent were from Central or South America. Sixteen percent of the 77 papers in research front number seven, "Renormalization group studies of percolation behavior in lattice models," were from Latin America. In research front number three, "Neutrino masses, neutral currents, and other factors involved in unified field theories," Latin America accounts for 15 percent of the 288 papers published.

Latin American scientists were also active in four research fronts in physical chemistry. They are numbered eight to 11 on the map. These research fronts concentrate on valence states, band structure theory of metals, properties of solid surfaces, and properties of molecules. However, of the 633 1981 citing papers in these research fronts, only 36, or six percent, were from Central or South America.

The research fronts numbered 12-37 are in the life sciences. About 8,100 citing papers published in 1981 are included in these 26 research fronts. Only 315, or four percent, are from Latin America. However, several individual research fronts show a high concentration of papers from Latin America. For example, research front number 29, "Effects of dietary cholesterol on the plasma and arterial wall of undernourished rats," includes 21 papers—38 percent of these were from Central or South America. Latin America accounts for 24 percent of the 38 published papers in research front number 13, "Development and structure of trypanosoma." Of the 63 papers in research front number 12, "Macrophage activation and intercellular infection," 19 percent were from Latin America.

This map shows, at a glance, that Latin American science in 1981 continued to place a heavy emphasis on the life sciences. Physics, astrophysics, and physical chemistry are other areas of specialization. Of course, Latin American scientists do work in areas that do not appear on the map—mathematics and engineering, for example. But they are *most* active in the research areas shown here. Also, the research fronts we've discussed were identified *quantitatively* by determining the number of 1981 papers and the percentage from

Latin America. The map shows those research areas in which Latin American scientists published most frequently. They are not necessarily the "best" or highest-impact areas of Latin American science.

This concludes our analysis of Latin American science. As you can see, ISI's data bases can provide unique insights into the scientific output of any nation or group of nations—its productivity, impact, internationality, interlinguality, and areas of specialization. The data we've presented are relevant and important measures of a nation's scientific "economy." In fact, the US National Science Board has used ISI's data in its *Science Indicators* reports since the early 1970s. While these reports provide several international comparisons, they primarily focus on the US. This study demonstrates that ISI's data can be used to compile science indicators reports for any country or region desired. Indeed, a proposal to compile such data may be discussed at a conference sponsored by the United Nations, to be held this May in Graz, Austria. For more information, contact M. Anandakrishnan, Room 1040, 1 United Nations Plaza, New York, New York, 10017.

In the coming weeks, we plan to publish more studies of the scientific literature from various other geographic regions. Interested readers should also refer to earlier studies of highly cited articles and journals from France,[19] Scandinavia,[20] and Italy.[21]

* * * * *

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20. ----------. Journal citation studies. 28. Scandinavian journals. *Essays of an information scientist.* Philadelphia: ISI Press, 1977. Vol. 2. p. 599-605.
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ERRATUM

In the *Current Comments*® essay, "Is your journal 'up front' with your address? Or, the saga of the incomplete address. Part 1," *Current Contents*® (42):5-13, 17 October 1983, I stated, "The signers of the now famous Vancouver Declaration did not consider the issue of author addresses." This statement is indeed true of the original declaration.

However, Edward Huth, North American correspondent, International Committee of Medical Journal Editors, points out that the declaration was intended to define manuscript requirements, not to specify publication format. The latest version of the declaration[1] does specify that the manuscript carry the address of the author responsible for correspondence about the manuscript and the address of the author to whom reprint requests should be addressed.

My thanks to Dr. Huth, who is also editor of *Annals of Internal Medicine*, for his correction.

1. **International Committee of Medical Journal Editors.** Uniform requirements for manuscripts submitted to biomedical journals. *Ann. Intern. Med.* 96:766-71, 1982.