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Journal Citation Frequency: The Hyperbolic Pattern

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This study introduces a new way to measure the visibility of political science journals and observes a pattern that is well known in a very different field, namely the size of cities. This pattern has thus considerable generality and deserves further attention to its theoretical basis. At the same time the empirical findings are of interest in themselves.

The prominence of political science journals matters for various purposes. Graduate students need advice on which journals to follow with special attention. Tenure and promotion decisions are influenced by the importance of the journals in which a professor has published. It may not be optimal to submit to journals that have low acceptance rates, yet lack commensurate visibility. The Third Wave of democratization adds a further need. When a scholar in a newly democratizing country succeeds in publishing in a Western journal, the local commentaries sometimes declare that particular journal one of the most prestigious in the given field. Some guidance is desirable.

The visibility of journals can be measured in various ways. One can ask a sample of political scientists to rate pre-selected journals. This was done by Giles, Mizell and Patterson (1989). They found that the extent of familiarity with various journals varied widely, but the ratings were rather uniform. On a ten-point scale, the 40 highest-ranked journals rated no lower than 5.9 and no higher than 7.9. Thus the contrast between the top few and the several dozen next ones was limited.

The present study offers an approach where the contrasts are much starker. The question asked is: How many times is a given journal cited in the bibliography sections of chapters in *Political Science: The State of the Discipline II* (Finifter 1993) and *A New Handbook of Political Science* (Goodin and Klingemann 1996)? It is found that the top-ranking *American Political Science Review* has 317 and 132 citations, respectively, while the second-ranking *American Journal of Political Science* is already down to 182 and 33. The 25th-ranking journal is down to 14 and 5 citations, respectively. The top list includes journals in other fields than political science, offering an insight into which other disciplines influence political science most.

Unexpectedly, a broader theoretical aspect also surfaced. The observed rank-size distribution of the citations offers a remarkably clean illustration of the hyperbolic pattern, especially so regarding Finifter (1993) with its more numerous journal citations -- a total of 1834 as compared to 638 in Goodin and Klingemann (1996). The hyperbolic distribution of city populations was first noticed by Auerbach (1923), a finding popularized by Zipf (1941). It will be explained in more detail in a later section.

A recent new insight (Taagepera and Kaskla 2001) addresses the lower boundary of the hyperbolic distribution and the resulting total population. When the lowest non-zero value of the items counted is one (1 person for cities, or 1 citation in the present case), it logically follows from the hyperbolic pattern that the number of items in the largest group equals the number of groups with at least one item. Indeed, *APSR* has 317 citations in Finifter (1993), and a total of

281 periodicals are cited at least once. This is close. In Goodin and Klingemann (1996) the respective figures diverge more, but are still in the same ball park: 132 and 185.

Furthermore, a connection between the largest entry and the total size is proposed by Taagepera and Kaskla (2001) for hyperbolic distribution. It is borne out with uncanny precision (less than 1% error) in both cases. In Finifter (1993) the total number of citations is 1834, while the top-ranking entry predicts 1826. In Goodin and Klingemann (1996) the actual total is 638, while the prediction is 644.

I will first present the method and the empirical findings. The theoretical implications for rank-size distribution will be discussed last.

### The Method

As a starting point for investigating the prominence of journals, *The State of the Discipline II* (Finifter 1993) offers advantages. The book attempts to cover the recent developments in all aspects of political science. The total number of journal articles listed in the biography sections of the 19 chapters is manageable (1834), yet represents selections by 26 authors, thus keeping some check on individual author bias. I determined the number of articles in various periodicals listed in each chapter, ignoring the references to non-periodic sources. The totals of 3 to 4 chapters were added up by six subfields (Philosophy, Methodology, Micropolitics I, Micropolitics II, Macropolitics, and International Relations).

In contrast to the questionnaire approach used by Giles, Mizell and Patterson (1989), my query is open-ended in the choice of journals. A few problems arise. Some chapter authors supply longer bibliographies than some others and hence their preferences weight the outcome more heavily, but the differences are not overwhelming. In a few cases it is hard to distinguish between a periodical and a semi-regular series. The same article may be double-counted, or even more, when cited in the bibliographies of several chapters. We should not correct for this, however, because the mention of the same article in several chapters highlights its impact, and hence that of the journal involved.

One potential problem with Finifter (1993) is ethnocentrism. All 26 authors are from the United States (and 15 of them received their Ph.D. from the same six universities). A mere 0.4 % of journal citations refer to languages other than English: 4 journals in German total 5 citations, and 2 in French total 3 -- and four of them are sociology or economics journals. The only ones in political science are *Politische Vierteljahresschrift* and *Aussenpolitik und Zeitgeschichte*. Does it reflect ethnocentrism or factual hegemony of the English language in political science research?

To double-check on this issue, the same method was applied to *A New Handbook of Political Science* (Goodin and Klingemann 1996). Here the editors are Australian and German, respectively, and 16 out of the 35 chapters have been written entirely by non-Americans (and 2 others in part). It is indicative of the U.S. hegemony in political science that these non-American editors still recruited one-half of their collaborators in the United States. When the two co-authored chapters are prorated, the shares are as follows: U.S. 17.8 chapters; UK 7.5; Germany 3.8; Sweden 2; France, Netherlands and Italy 1 each; Australia 0.5; and Belgium 0.3. I kept separate track of citations by U.S. and non-U.S. authors, and some differences will be described. In view of the smaller total number of citations, I did not analyze the *Handbook* by subfields the way I did for *The State of the Discipline II*.

Once more, vanishingly few articles cited in the *Handbook* are in languages other than

English. (The picture might be somewhat more balanced in terms of books cited. I did not carry out a count of non-periodicals.) If significant research were published in German, French etc., one might expect the authors hailing from these areas to be aware of it. But it would seem that most researchers from other language areas publish their most important works in English. There seems to be a single worldwide political science community, and for better or for worse, its present hub is in the United States and its language is English.

English dominates in political science. Out of the more than 600 periodicals relevant to political science compiled by Gregory Brunk (1989) only 33 (i.e., 5 %) were in languages other than English (15 in French, 8 in German, and 10 in six other languages) -- and that inquiry dug sufficiently deep to list *Revue d'histoire des sciences* and *Politiikka* (Finnish). Specialized journals largely exist only in English. To achieve worldwide readership scholars tend to publish or republish their best universally relevant work in English even in language areas that do have strong political science journals in other languages. Thus Scandinavian Political Studies (5 citations in *The State of the Discipline II*) may have more articles of general significance than *Statsvetenskaplig Tidskrift* or *Internasjonal Politikk*. Such a state of affairs, in turn, enables the American reviewers of the state of political science to be negligent of other languages.

Could even English-language publications encounter neglect, if published outside North America? *British Journal of Political Science*, *European Journal of Political Research* and *Political Studies* (UK) are the only non-North American journals among the top 26 both in Finifter (1993) and Goodin and Klingemann (1996). Again, there may be a self-reinforcing tendency to publish one's most important work not only in English language but in the American journals, for maximum worldwide. In sum, while *The State of the Discipline II* is bound to overemphasize the American topics, authors and journals, comparison with the *Handbook* shows that it still reflects the worldwide state of political science to a fair degree.

## Empirical Results

### *The State of the Discipline II*

The total number periodicals mentioned at least once was 281, and the total number of listings was 1834, for an average of 6.5 mentions per periodical. Only one mention was made for 129 journals; for the 152 multiple-citation journals the average was 11.2 mentions per periodical. Table 1 lists the highest ranking 36 journals, those that net at least 10 citations. They account for 68.4 % of all entries (1295 out of 1834). Besides the total, the number of entries in groups of 3 or 4 chapters is also shown in Table 1. The *American Political Science Review* (17.3 % of all citations) and the *American Journal of Political Science* dominate in almost all groups, with some exceptions, to be discussed next.

**TABLE 1. Number of journal citations in the biography sections of Political Science: The State of the Discipline II (1993).**

Chapters	1-3 PHILO	4-6 METHOD	7-9 MICRO I	10-12 MICRO II	13-16 MACRO	17-19 INTERNAT	TOTAL
1 <i>Am Pol Sci Rev</i>	36	89	63	49	47	33	317
<i>Am J of Pol Sci</i>	10	77	35	22	32	6	182
<i>Political Theory</i>	62	--	--	--	--	--	62
<i>Journal of Politics</i>	6	9	12	17	13	1	58
<i>Legisl Studies Quart</i>	2	--	--	2	52	--	56
6 <i>J of Conflict Res</i>	--	17	--	5	--	27	49
<i>Internat Organization</i>	--	--	--	--	--	40	40
<i>World Politics</i>	1	11	1	1	1	20	35
<i>Soc Sci Quarterly</i>	4	--	1	26	3	--	34
<i>Comp Pol Studies</i>	--	5	20	1	3	2	31
11 <i>Pol Res Quart= WPQ</i>	5	--	2	8	14	--	29
<i>Public Opinion Quart</i>	3	--	18	8	--	--	29
<b><i>Brit J of Pol Sci</i></b>	3	2	13	2	6	2	28
<b><i>Eur J of Pol Res</i></b>	--	1	21	--	2	--	24
<i>Internat Stud Quart</i>	--	12	--	--	--	12	24
16 <i>Political Analysis</i>	--	21	--	1	--	--	22
<i>Political Behavior</i>	--	--	13	5	1	--	19
<i>Public Admin Rev</i>	--	--	--	--	18	--	18
<i>Comparative Politics</i>	1	5	5	--	3	3	17
<b><i>Political Studies</i></b>	6	--	6	--	5	--	17
21 AM SOCIOL REV	--	3	3	10	--	--	16
<i>National Pol Sci Rev</i>	--	--	--	15	--	--	15
<i>Public Choice</i>	--	9	2	--	2	1	14
AM ECON REV	--	7	1	--	--	6	14
<i>Pol Methodology</i>	--	9	--	5	--	--	14
26 ECONOMETRICA	--	13	--	--	--	1	14
Philos. & Public Aff	14	--	--	--	--	--	14
<i>Pol Sci Quarterly</i>	1	--	2	4	6	--	13
ETHICS	12	1	--	--	--	--	13
<i>Am Pol Quarterly</i>	1	1	4	3	3	--	12
31 <i>J of Theoretical Pol</i>	--	2	8	1	--	1	12
<i>J of Pol Economy</i>	--	3	--	--	2	7	12
J PERS & SOC PSYCH	--	--	11	--	--	--	11
<i>Review of Pol</i>	7	--	--	--	3	--	10
AM J SOCIOLOGY	--	1	--	9	--	--	10
36 CAN J PHILOS	10	--	--	--	--	--	10

Non-U.S. journals are shown in bold and non-political science journals in capital letters.

Broadly speaking, Chapters 1 to 3 (PHILO, 271 citations) deal with political philosophy and qualitative theory, and here Political Theory is most frequently cited. Chapters 4 to 6 (METHOD, 384 citations) are dominated by methodology concerns and follow the general pattern of APSR and AJPS dominance. So do the six chapters on what could be characterized as

Micropolitics. In Table 1 this large group is divided into two groups, 7 to 9 (MICRO I, 310 citations) and 10 to 12 (MICRO II, 324 citations), although there is no clear dichotomy in subject matter. MICRO I includes political parties, voting behavior, and public opinion research, while MICRO II has ethnic politics, social contexts, and political communication. In MICRO II *Social Science Quarterly* offers competition to *AJPS*.

In what could be called Macropolitics (Ch. 13-16, MACRO, 314 citations), *Legislative Studies Quarterly* surpasses *AJPS* and even *APSR*, but this pinpoints a problem with the approach used: Out of a total of 56 mentions of *LSQ*, 51 occur within a single chapter ("Legislatures"), which has a total of 154 journal articles listed. A different author might well have selected sources throughout a wider range of journals. In particular, this is an area of strength for *Comparative Political Studies* and *Comparative Politics*, both of which receive higher ratings than *LSQ* in the Giles, Mizell and Patterson (1989) inquiry as well as in the *Handbook* (see next section).

In what could be called International Relations (Ch. 17 to 19, INTERNAT, 236 citations) *International Organizations* predominates. *APSR* holds the second position, but *AJPS* is surpassed by half a dozen journals. Of the 40 mentions of *International Organizations*, 28 come from a single chapter ("Global Political Economy").

The number of citations in each of the six aforementioned categories ranges from 236 (International Relations) to 384 (Methodology), with a mean of 306. The impact of any single category on the overall picture is limited, but prorating them would move some journal rankings up (*International Organization*) or down (*Policy Analysis, Econometrica*) by several notches. The impact of within-category selection by specific authors is more severe.

If a single author's preferences can influence top rankings (such as boosting *Legislative Studies Quarterly*), this can be even more the case down the list, where randomness can be considerable. Hence Table 1 does not list journals with less than 10 mentions. Most journals among the listed top 36 draw support from several groups of chapters and hence do not depend completely on a few authors. Five journals are mentioned in all six groups: *APSR*, *American Journal of Politics*, *World Politics*, and *British Journal of Political Science*. On the other hand, four journals owe their presence in the top 36 solely to the author(s) of one single chapter: *Journal of Personality and Social Psychology* (Ch. 9, on public opinion), *National Political Science Review* (Ch. 10, on minority politics), *Philosophy and Public Affairs* and *Canadian Journal of Philosophy* (both in Ch. 2, political theory).

*The journals' breadth of coverage across various subfields.* It could be characterized by an "effective number" of subfields covered, analogous to the effective number of parties:  $N = C^2 / \sum C_i^2$ , where  $C$  is the total number of citations for the given journal and  $C_i$  is the number in the  $i$ -th category among the six in Table 1. For example, the effective number of 5.3 for *APSR* means roughly that its coverage extends over more than five of the six subfields. The possible maximum is  $N=6$ , a ceiling that depends on the number of categories chosen. The journals with the largest  $N$  are:

<i>American Political Science Review</i>	5.3
<i>Journal of Politics</i>	4.7
<i>Comparative Politics</i>	4.2
<i>American Politics Quarterly</i>	4.0
<i>American Journal of Political Science</i>	3.8
<i>British Journal of Political Science</i>	3.5

No other journal surpasses  $N=3.0$ . Apart from APSR, all the wide-scope journals have a gap in international relations.

*The degree of dispersal of articles among journals* can also be characterized by an effective number. Here no a priori limitations are imposed on  $N$ . If 50 journals should be quoted with equal frequency,  $N$  could be close to 50. The actual overall figure is much lower:  $N=20.3$  for the entire book.<sup>1</sup> For most individual subfields it is even lower, as one might expect:

Political Philosophy	11.9
Methodology	9.4
Micropolitics I	10.2
Micropolitics II	21.2
Macropolitics	14.0
International Relations	13.0

### *A New Handbook of Political Science*

The total number periodicals mentioned in *A New Handbook of Political Science* (1996) at least once was 185, and the total number of listings was 638, for an average of 3.4 mentions per periodical. Table 2 shows the number of citations for the 26 highest ranking journals in Goodin and Klingemann (1996), with cutoff below 5 citations. The journals listed represent 60.8 % of all citations. Also shown is the number of chapters (out of 35) over which the citations spread. A journal heavily cited by a single chapter author and by no one else obviously involves a large element of randomness. Chance also affects all journals at the bottom of the list, due to the small number of entries. For comparison, Table 2 also shows the rankings for *The State of the Discipline II*. These are often widely different, an issue to which I'll return.

The *American Political Science Review* again emerges as the most cited journal by far (20.7% of all citations). It is followed at a distance by *American Journal of Political Science*, itself clearly ahead of the rest of the pack. Table 2 shows separately the fully or partly U.S.-authored chapters and the non-U.S. ones. For APSR, there is little difference. Indeed, the fully non-U.S. chapters give APSR a share of citations (17.3%) equal to that in *The State of the Discipline II* (where all authors are Americans). In contrast, AJPS seems much less well known

outside the U.S.: The non-U.S. authors give it only 3 out of a total of 231 citations (1.3%), a figure surpassed by at least 9 other journals. In the U.S.-authored (or co-authored) chapters *AJPS* gathers 30 out of 407 citations (7.4%), which is comparable to *S of D II* (182/1834=9.9%).

**TABLE 2. Number of journal citations in A New Handbook of Political Science (1996), and the number of chapters (out of 35) in which they occur.**

	Number of Citations	Number of Chapters	Rank in S of D II
1 <i>American Political Science Review</i>	132	27	1
<i>American Journal of Political Science</i>	33	10	2
AMERICAN ECONOMIC REVIEW	16	5	24
<b><i>Political Studies</i></b>	15	9	20
<i>World Politics</i>	14	13	8
6 <i>International Studies Quarterly</i>	13	4	15
<i>Comparative Political Studies</i>	12	8	10
<i>International Organization</i>	12	5	7
<b><i>British Journal of Political Science</i></b>	11	9	13
<i>Journal of Politics</i>	11	8	4
11 <b><i>European Journal of Political Research</i></b>	11	7	14
AMERICAN J OF SOCIOLOGY	11	7	35
<i>Journal of Political Economy</i>	11	6	32
<i>Political Analysis</i>	9	1	16
<i>Comparative Politics</i>	8	5	19
16 <i>International Security</i>	8	3	~90
J. OF LAW, ECON & ORGANIZATION	8	3	~90
PHILOSOPHY AND PUBLIC AFFAIRS	7	7	27
<i>Journal of Theoretical Politics</i>	7	5	31
<i>Public Choice</i>	7	4	23
21 <i>Political Theory</i>	6	4	3
QUARTERLY J OF ECONOMICS	6	4	~130
<i>Legislative Studies Quarterly</i>	5	5	5
AMERICAN SOCIOLOGY REVIEW	5	5	21
<i>Public Administration Review</i>	5	3	18
26 <i>Politics and Society</i>	5	2	~50

Non-U.S. journals are shown in bold and non-political science journals in capital letters.

For the non-U.S. authors the second-ranking journal is *Political Studies*, published in UK, with 13 citations (5.6%). All other journals net less than 8 citations from non-U.S. authors so that differences become statistically insignificant. The *European Journal of Political Research* fares slightly better with non-Americans than with Americans (2.2 vs. 1.5%) but the *British Journal of Political Science* actually does worse (1.3 vs. 2.0%). The conclusion seems to be that both non-American and American authors overwhelmingly cite U.S.-published journals, with no significant and consistent preference for non-U.S. publications as a whole.



Below the second rank, the rankings for particular journals differ appreciably in Finifter (1993) and Goodin and Klingemann (1996). One would expect this when the number of citations for the given journal is below 10 so that random chance plays a large role. It is still remarkable that four journals that rank sixth to twelfth in *The State of the Discipline II*, receiving 49 to 29 citations, could fall off the *Handbook* radar screen, receiving only 3 (*Social Science Quarterly* and *Public Opinion Quarterly*), 1 (*Journal of Conflict Resolution*) or even 0 (*Western Political Quarterly* = *Political Research Quarterly*) citations. These are mostly cases where the citations in *The State of the Discipline II* were contributed chiefly by a single or very few chapter authors who may be devoted fans of the particular journal.

### *Combined Results*

One might wish to combine the scores for the two books so as to even out the picture. Adding the two scores or taking the arithmetic mean would preserve the "single fan effect". This is why Table 3 shows rather the geometric means of the two scores for the 32 top-ranking journals.<sup>2</sup> A single author still can impact the results, and such cases are indicated in the table as "single fan". The most salient case is *Legislative Studies Quarterly* which receives 51 out of its total 56 citations in *The State of the Discipline II* from a single chapter, where it represents exactly one third of all citations. For such journals even the geometric mean may overstate their impact. The four top ranking journals have a broad profile, as do the three European top journals, which rank ninth to twelfth. The remaining five among the top twelve specialize in international relations (*International Organization*, *International Studies Quarterly*), comparative politics (*Comparative Political Studies*, *Legislative Studies Quarterly*) or political philosophy (*Political Theory*). The international relations chapters in the *Handbook* cite the broad-profile journals very sparingly, and even in *The State of the Discipline II* only *APSR* and *World Politics* appear in IR chapters beyond a non-token extent.

Table 3 also shows the average acceptance rates for submitted manuscripts, as reported in Martin and Goehlert (1997). High visibility tends to go with low acceptance rate, but there are deviations. When one compares visibility and risk of rejection, the relatively least crowded places for submitting papers are *European Journal of Political Research*, *Political Studies*, and *Public Choice*. The most crowded are *Philosophy and Public Affairs* and *Political Theory*.

The analysis of *A New Handbook of Political Science* confirms most of the conclusions drawn from the analysis of *The State of the Discipline II*, and removes some doubts about the latter's ethnocentrism. The non-U.S. authors in the *Handbook* have hardly more references than the U.S. authors (in either book) to journal articles in languages other than English. For better or for worse, the incidence of non-English articles is negligible. The non-U.S. authors have only slightly more extensive citations to journals published outside the U.S., and the *American Political Science Review* is by far the most cited journal for non-Americans too.

The other American broad profile journals (*American Journal of Political Science*, *World Politics*, *Journal of Politics*), highly visible in the United States, are less visible elsewhere. As for the more specialized journals of some prominence, practically all of them are published in the U.S.. In terms of visibility in the discipline compared to acceptance rates, however, two of the European journals (*European Journal of Political Research* and *Political Studies*) may have been underestimated by those who submit manuscripts.

**TABLE 3. Geometric mean citations in A New Handbook of Political Science (1996) and The State of the Discipline II (1993)**

	Geometric Mean of Citations	Acceptance Rate (%)
1 <i>American Political Science Review</i>	205	8
<i>American Journal of Political Science</i>	77	12
<i>Journal of Politics</i>	25.3	16
<i>World Politics</i>	22.1	10
<i>International Organization</i>	21.9	10
6 <i>Comparative Political Studies</i>	19.3	21
<i>Political Theory</i>	19.3 single fan	7.5
<i>International Studies Quarterly</i>	17.7	13
<b><i>British Journal of Political Science</i></b>	17.5	12.5
<i>Legislative Studies Quarterly</i>	16.7 single fan	20
11 <b><i>European Journal of Political Research</i></b>	16.2	30
<b><i>Political Studies</i></b>	16.0	25
AMERICAN ECONOMIC REVIEW	15.0	--
<i>Political Analysis</i>	14.1 single fan	--
<i>Comparative Politics</i>	11.7	12
16 <i>Journal of Political Economy</i>	11.5	--
AMERICAN J OF SOCIOLOGY	10.5	--
<i>Social Science Quarterly</i>	10.1 single fan	13
<i>Public Choice</i>	9.9	27.5
PHILOSOPHY & PUBLIC AFFAIRS	9.9	4.5
21 <i>Public Administration Review</i>	9.5	12.5
<i>Public Opinion Quarterly</i>	9.3	15
<i>Journal of Theoretical Politics</i>	9.2	20
AMERICAN SOCIOLOGY REVIEW	8.9	--
<i>Political Behavior</i>	7.5	20
<i>Political Methodology</i>	7.5	--
ETHICS	7.2	--
J. PERSONALITY & SOCIAL PSYCH.	7.2	--
<i>Journal of Conflict Resolution</i>	7.0	25
PS	5.7	--
31 ECONOMETRICA	5.5	--
<i>Political Res. Quarterly = Western PQ</i>	[5.4]	16

Manuscript acceptance rates from Martin and Goehlert (1997). Non-U.S. journals are shown in bold and non-political science journals in capital letters.

### *Empirical Conclusions*

No more should be read into these results than there is. Rather than being a refined ranking of journal visibility worldwide, they are what they are: rankings of journal visibility in the eyes of 26-plus-41 authors invited to write chapters in two overviews of the state of political science. These results should be read in conjunction with those of differently designed studies such as

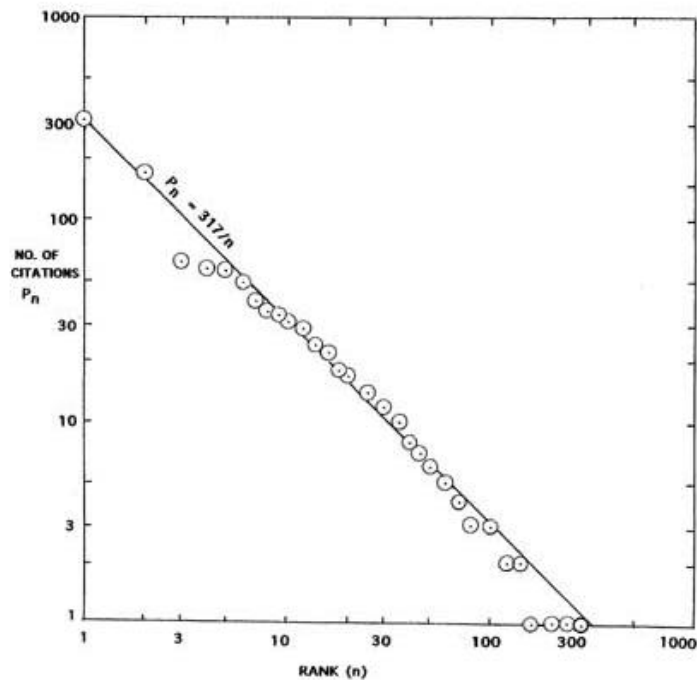
Giles, Mizell and Patterson (1989). In particular, many well-known but specialized journals receive less than 10 mentions in both books analyzed here. Professional journals may have other emphases than widening the bounds of the discipline, the aspect stressed at least in *The State of the Discipline II*. In particular, some journals may be on the applied side or in area studies.

In contrast to questionnaires where one can afford to give high rankings to many journals (grade inflation!), in the present approach the space for chapter bibliographies was limited. The authors picked articles rather than journals, and the journal in which these articles were published was secondary in their minds, at least in the direct sense. Indirectly, of course, their rating of journals as such entered, to the extent that they subscribed to, scanned and read some journals more attentively than others -- plus the feeling of obligation to cite articles in perceived prestige journals. The result is a steep gradation in citation frequency among journals to which all authors involved might give high ratings, if they had to rank them explicitly.

As mentioned earlier, the same article might occur in the bibliographies of several chapters and thus may be double-counted and more (the limit being the number of chapters, 19 and 35, respectively). This is not a weakness but a strength of the method used. Publishing articles that rate mention in overviews of several subfields may increase the visibility of a journal more than several separate articles mentioned in only one subfield.

The open-endedness in the choice of journals exposes external influences on political science. The top 36 journals for Finifter (1993) include 3 sociology and 2 economics journals, plus several interdisciplinary. The top one hundred add a smattering of philosophy, psychology and law journal. Surprisingly, *American Anthropologist* was cited only once, in contrast with the 15-odd citations of *American Sociological Review* and *American Economic Review*. The top 26 journals for Goodin and Klingemann (1996) include 2 sociology, 2 economics and one applied philosophy journal. Strikingly, *American Economic Review* actually ranks third.

Figure 1. Citation Frequency versus rank of the Journal for State of the Discipline II (1993): Data and Hyperbolic Fit.



In sum, American top journals in economy and sociology feature quite visibly in both overviews of political science, while psychology and philosophy enter to a lesser degree and anthropology hardly at all. Is this cross-disciplinary interaction reciprocal or one-way? Is political science a mutually interactive or a recipient discipline? To answer this question one would have to analyze citation structures in related disciplines.

### The Hyperbolic Rank-size Pattern

#### *The Rank-size Pattern*

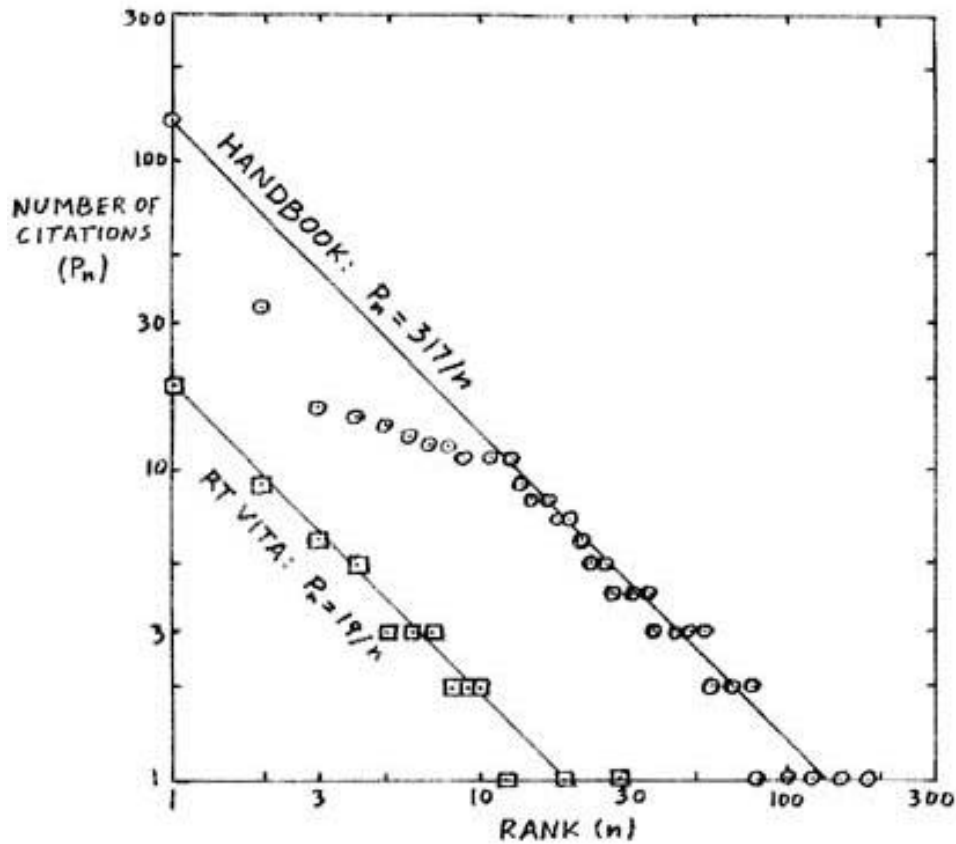
The rank-size pattern of these journal citations will now be discussed. Populations of cities in many countries have been observed to approximate a rule first observed by Auerbach (1923) and Lotka (1925:306), and later popularized by Zipf (1941): The population of the  $n$ -th ranked city ( $P_n$ ) is related to that of the largest one ( $P_1$ ) as:  $P_n = P_1 / n$ .

Mathematically, this is a hyperbolic relationship.<sup>3</sup> While cities in many countries deviate from the hyperbolic pattern or follow a more complex modification, the citation frequency data in Table 1 agrees with the simple hyperbolic equation to a remarkable degree, as shown in Figure 1. Here  $P_n$  is graphed vs. rank  $n$ , both on logarithmic scale, so that  $P_n = P_1 / n$  becomes a straight line with slope 1. The straight line shown corresponds to this equation -- it is NOT a statistical best fit. The apparent shortfalls, compared to this line, for ranks beyond 100 reflect the restriction to integer values 2 and 1.

The analogous graph of  $P_n$  vs. rank  $n$  for the *Handbook* (Figure 2) produces a more marked deviation from the hyperbolic model. For *The State of the Discipline II*, only the third- and fourth-ranking journals are below the hyperbolic expectations. In the case of the *Handbook* the shortfall begins with the second-ranking *AJPS* and extends to the tenth rank. As a sideshow, Figure 2 also shows the journal articles in my vita, which fit the hyperbolic pattern quite neatly. The reader who has a fair number of journal articles may wish to test her/his own vita. Some logical consequences can be drawn from the hyperbolic pattern (Taagepera and Kaskla 2001). First, if a journal is cited at all, it is cited at least once. Hence the lowest possible value of  $P_n$  is 1. Let  $J$  be the total number of journals cited, so that  $J$  is also the rank of the lowest-ranking journal. Then the equation above yields  $I = P_1 / J$ , or  $J = P_1$ .

In other words, the number of journals cited at least once is expected to equal the number of citations received by the top journal. In Finifter (1993) *APSR* receives 317 mentions, while a total of 281 journals are mentioned, which is low by 11%. In Goodin and Klingemann (1996) *APSR* receives 132 mentions, while 185 journals are mentioned -- high by 40%. Thus we are in the right ball park.<sup>4</sup>

Figure 2. Citation Frequency versus rank of the Journal for A New Handbook of Political Science (1996) and for Rein Taagepera vita: Data and Hyperbolic Fit.



*Rank-size pattern and the total population*

There is also a logical connection between the largest component's population ( $P_1$ ) and the total population ( $P$ ) when the hyperbolic pattern holds (Taagepera and Kaskla 2001):  $P = P_1 \ln P_1$ , where  $\ln P_1$  is the natural logarithm of  $P_1$ .<sup>5</sup> For Finifter (1993)  $P_1 \ln P_1 = 317 \ln 317 = 1826$ , off by less than 0.5% from the actual of 1834. For Goodin and Klingemann (1996)  $P_1 \ln P_1 = 132 \ln 132 = 644$ , off by less than 1.0% from the actual total of 638.

Hence we may have here more than a lucky coincidence.

Table 4 offers an overview of actual and calculated indicators for the structure of journal citations. These indicators are the total number of citations ( $P$ ), the number of journals mentioned at least once ( $J$ ), and entries for the topmost journal ( $P_1$ ). One can use  $P = P_1 \ln P_1$  either to estimate  $P$  from  $P = P_1 \ln P_1$ , or vice versa. Either way, the error is less than 1% for both books.

**TABLE 4. Overall indicators for *The State of the Discipline II* (1993) and *A New Handbook of Political Science* (1996).**

	Handbook			
	SofDII	All	U.S. authors	Non-U.S. authors
Total number of journal citations ( $P$ )	1834	638	407	231
Total number of journals cited at least once ( $J$ )	281	185		
Citations for the most cited journal ( $P_1$ )	317	132	92	40
Expected $J=P_1$ , from total $P$ and $P = P_1 \ln P_1$	318.2	130.9		
Mean citations per journal cited ( $P/J$ )	6.5	3.4		
Percent share of the top journal ( $P_1/P$ )	17.3%	20.7%	22.6%	17.3%
Percent share of the second-ranking journal ( $P_2/P$ )	9.9%	5.2%		

In contrast, the expectation that  $J=P_1$  fares worse. It is met for Finifter (1993) within 11%, and for Goodin and Klingemann (1996) only within 40%. The *Handbook* cites appreciably more journals than expected on the basis of either total citations or those of the topmost journal, while *The State of the Discipline II* cites somewhat fewer than expected. This randomness is limited to the numerous journals with only one citation. Already for journals with two citations the hyperbolic model is followed well in both books. Table 4 also reminds us that relative share of the top journal ( $P_1/P$ ) varies little between the two books (and the *Handbook's* U.S. and non-U.S. authors).

What is the significance of such a pattern for the development of the discipline? It suggests that there is some inherent order in the frequency of citations of journals, under conditions that remain to be specified. Recall that the rankings of individual journals in the two books used deviate widely, although both books feature a rank-size pattern close to the hyperbolic. When taken seriously (maybe overly so), the hyperbolic norm also hints at a dip that is the most severe around the third- and fourth-ranking journals. Could it be that this is where strong central political science journals for Europe and East Asia are missing?

#### *A Note on the Range of Applicability of the Hyperbolic Pattern*

The conditions under which the hyperbolic pattern and its implications for the total population can be applied to citation patterns and other phenomena will not be investigated here -- this is a much broader task. The hyperbolic pattern does not apply, for instance, to the "Index of Cited Authors" of *The State of the Discipline II*. Here the maximum number of pages in which a given author is mentioned is 20, and  $20 \ln 20 = 60$ , much below the number of authors mentioned at least once, which is around 2,100. Shifting from the number of pages to the number of actual repeats of the name in the text does not improve the outcome significantly.

Superficially, distribution of  $P$  citations among various journal looks analogous to allocation of  $P$  seats in a district among various parties. Yet the relationship between the number

( $J$ ) of journals/parties that receive at least one citation/seat, the mean number of citations/seats for such journals/parties ( $P/J$ ), and the share ( $P_1$ ) of the largest component is quite different. The journals follow a basically hyperbolic pattern, with  $P/J$  much smaller than  $J=P_1$ , while the parties follow a quasi-exponential pattern (see Taagepera 2001), with  $P/J$  equal to  $J$ , which itself is much smaller than  $P_1$ . The underlying difference is the following.

A party that expands its share does so at the expense of other parties. Deprived of seats, some parties exit or persevere without winning any seats. This cuts down the number of parties with seats, and the best guess in the absence of any other knowledge is  $J=P/J=P^{0.5}$  (Taagepera and Shugart 1993). The hypothetical analogue for journals would occur, if journals accepted manuscripts like parties "accept" votes, with those that receive many manuscripts expanding and those with too few manuscripts folding.

The reality is that journals do not expand (at least not in a major way) when receiving more submittals. The most prominent journals accept only the manuscripts most liable to be cited, and the overflow goes to less prominent journals, which stay in business -- and some of what they publish gets to be cited. The outcome is that, compared to the quasi-exponential pattern with a set of  $P$  citations, the number of journals that achieve one or a few citations expands from  $J=P^{0.5}$  to  $J \gg P^{0.5}$ . But why it expands precisely to around  $J=P_1$  (meaning hyperbolic pattern) is harder to explain. As for  $P_1$  as a fraction of  $P$ , it is very much the same for both patterns for a wide range of  $P$ , which also needs explanation.

### Conclusion

Journal citation frequencies in two overviews of political science are found to approximate the hyperbolic pattern. The number of citations for the top journal enables us to calculate the total number of citations within 1% and the total number of journals cited with much lesser precision.

U.S. and non-U.S. political scientists agree on the predominance of journals published in the U.S.. Shortfalls from hyperbolic expectations for third- and fourth-ranked journals may reflect the absence of strong central journals in Europe and East Asia. One may get "most bang for the buck", in terms of risk of rejection versus visibility when accepted, by submitting work to *European Journal of Political Research*, *Political Studies*, and *Public Choice* -- and "least bang for the buck" with *Philosophy and Public Affairs* and *Political Theory*. Political science receives impulses from economics and sociology, less so from psychology and philosophy, and almost none from anthropology.

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## Notes

1 This number should not be construed as some conceptual cutoff at the twentieth-ranked journal; in fact, it depends very much on the share of citations that go to the two top journals. An effective number of 20 could mean that only 20 journals are cited, with equal frequency of 5%, or that each of the two top journals receive 16% of all citations, while a large number of journals receive one citation each. This is why the dispersal in *Micropolitics II* is wider than the overall dispersal: The two top journals are not very dominant.

2 Where one of the scores was zero (*Western Political Quarterly* in the *Handbook*) it was upped to 1 and the mean is shown in brackets.

3 The hyperbolic rank-size relationship has sometimes been called "Zipf's law", but it isn't a "law" in the scientific sense, because the empirical relationship lacks theoretical explanation, and Zipf had no more to do with its discovery than Amerigo Vespucci had with the European discovery of the New World. If anything, it should be called the Auerbach rank-size rule.

4 The equivalent for city sizes is a settlement consisting of one person, which somewhat stretches the notion of "city" and certainly the corresponding data are unavailable. In contrast, journals with a single citation are quite real, and hence this implication of the hyperbolic pattern can be tested with the citations data even better than with city populations.

5 Proof: The total population  $P$  is the sum of terms  $P_n = P_1/n$ , with  $n$  ranging from 1 to  $J = P_1$ . This sum can be approximated with integration:  $P = \int_1^{P_1} P_1/n \, dn = P_1 \int_1^{P_1} 1/n \, dn = P_1 \ln n$ . As  $n$  ranges from 1 to  $J = P_1$ , we obtain  $P = P_1 \ln P_1 - P_1 \ln 1 = P_1 \ln P_1$ .