Working Papers on The Nature of Evidence:
How Well Do 'Facts' Travel?
No. 24/08

Travelling in the Social Science Community: Assessing the Impact of the Indian Green Revolution Across Disciplines

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February 2008

“The Nature of Evidence: How Well Do ‘Facts’ Travel?” is funded by The Leverhulme Trust and the ESRC at the Department of Economic History, London School of Economics.

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Travelling in the social science community: assessing the impact of the Indian Green Revolution across disciplines[1]

Peter Howlett[2]

Abstract

The Indian Green Revolution, which began in the late 1960s, offers an exemplary case for studying the nature of evidence and how it travels between academia and the public sphere, between different academic disciplines and over time. Initial assessments of the Green Revolution's effects were generally positive; yet by the mid-1970s, a more negative view of its impact had come to prominence. By the 1990s this view was, in turn, being displaced by a more optimistic one. The aim of this paper is not to evaluate

“the optimism of the early years of the Green Revolution has not proved to be well founded” (Ahmad, 1972, p.11)

The high yielding varieties of crops which are at the heart of the Green Revolution are “a greater force for change than any technology or ideology ever introduced into the poor countries” (Blyn, 1979, p.89)

“the new technology intertwined with the lack of infrastructure,

come from different social science jo 3

displaced by a more optimistic one: it was argued that over time there was a demonstration effect in that poorer farmers were able to see that despite the higher risks and capital input associated with the new crops they did yield an income stream that was better than that provided by more traditional crops. This, combined with improvements in the capital market and with various schemes of support from the state, led to wider and deeper uptake of the new crops. However, it is not clear that this is the end of the story: more recently, economists have become concerned about the negative macroeconomic costs associated with the environmental impact of the new crops, for example in terms of the impact of the massive increase in fertiliser usage.

The aim of this paper is not to evaluate the impact of the Indian Green Revolution but rather to examine how the different constituencies of the social science community have communicated with one another on this topic and to examine what facts about it have travelled over time and between the different social science disciplines. This will be done through an in-depth analysis of 76 articles published between 1969 and 2004 in journals covering the range of social science disciplines. Initially, travelling is assessed in a relatively traditional citation analysis mode, first considering intra-sample journal citations before moving on to consider all journal citations. To examine travelling between the different social science disciplines, use is made of the headings employed for all journals by the *Social Science Citations Index* (*SSCI*).[4] The final section if the paper considers what travels with the citation, in particular our concern is with whether the citation carries some form of fact and whether the type of fact carried differs across the different social science disciplines. One important issue to emerge from the analysis in general is the importance of communication spaces, spaces which are not owned by one particular discipline but which are designed

[4] The *SSCI* is complied by Thomson Scientific. It was accessed online via the *The ISI Web of Knowledge Service for UK Education* **(**http://wok.mimas.ac).

to be areas where multi- and inter-disciplinary, communication is encouraged. These spaces may be journals or may themselves be classified as a “discipline,” such as Area Studies.

The Sample

This study is concerned only with traveling facts within journal articles and as such ignores the importance of books, edited volumes, and conference proceedings to debates about the Indian Green Revolution. This decision was taken because by concentrating on journals the analysis is made more transparent and manageable, in terms of deciding on the sample, in terms of classifying material by discipline, and in terms of the citation analysis. However, if there is a disciplinary bias in terms of how important journal articles are to this particular debate, or indeed in general, this will affect the interpretation of some of what follows.[5] The sample was compiled in late November and early December 2005. Four major databases were used to search for articles: the International Bibliography of Social Sciences, JSTOR, PCI Full Text and the catalogue of the London School of Economics (LSE) library (the

the subcontinent, those articles were removed from the sample. The remaining articles were then reviewed and a second round of winnowing occurred: this time articles that were not, despite their title or abstract, focused on the Green Revolution, or articles which paid little or no attention to India, or were not in English were removed from the sample. Finally, articles in Indian journals were removed from the sample. The first reason for doing this is that the although the search procedure captured articles from journals such as the *Indian Journal of Agricultural Economics* and the *Indian Journal of Economics*, as well as *Economic and Political Weekly*, an examination of these publications (not surprisingly) revealed that they contained far more than the dozen or so articles the search procedure had yielded. In effect, the search procedure had captured articles used in teaching at the LSE. If all the relevant articles published in the Indian journals were included in the sample they would completely dominate it. Furthermore, an examination of the references in the Indian journal articles captured by the search procedure revealed that they rarely cited the non-Indian journal articles in the sample (this is what will be characterized below as a “ghetto”). Thus, the Indian journals in many ways do provide a richer, and certainly more plentiful, account of the Green Revolution in their country but they do so in a relatively insular manner. Including relevant articles from them in the sample would unbalance it in a way that would not be helpful in terms of our aims; a more appropriate course of action would be to do a similar but separate study based on them alone. Having said that, the analysis will pay special attention to the role that certain Indian journals play in the citations of the sample articles.

This process left a sample of 76 articles, which are specially denoted in the reference list at the end of the paper, covering the period 1969 to 2004: 30 were published between 1969 and 1979, 15 in

the1980s, 23 in the 1990s, and 8 between 2000 and 2004.[7] The articles were distributed across 44 different journals and table 1 shows the number of articles by journal. Given the importance of the Indian Green Revolution the size of the sample was surprisingly small. In part, this might reflect that a large part of the academic debate takes place in books rather than articles but it may also reflect the search criteria as there are undoubtedly articles which deal with this topic but which do not use the term “Green Revolution” in their title or mention it in their abstract.

Intra-sample citations

The first question that can be asked is did articles in the sample cite each other? This would be the most basic evidence of travelling as a citation suggests that the citing article is taking something from the article being cited - what travels with the citation will be discussed below. If there were no intra-sample citations, all of which are concerned with the Green Revolution in India, it would be a depressing comment on the nature of academic dialogue. Fortunately, table 2 shows that dialogue, or travelling, did occur. Excluding self-citations, there were 49 intra-sample citations which encompassed 27 of the sample articles (36%); including self-citations raises the total to 61 citations, covering 33 articles (43%). The articles that make the most intra-sample citations are spread throughout the period, the earliest being Franke from 1974 and the latest being Das from 2002. In contrast, the three most cited intra-sample articles are the three oldest articles in the sample and the Cleaver articles is also an article elder, dating from 1972. Another contrast is that whereas the articles making the most intra-sample citations are spread across a range of social science journals, although it is noteworthy than none are pure economics journals, three of the most cited intra-sample articles are from political

[7] Appendix 1 shows the annual breakdown.

science journals, although the most cited, Falcon, is from an economics journal.[8] The latter also generally show great longevity: the most recent citation of Falcon in the sample occurred in 1989, 19 years after its publication, whilst the most recent citations to Cleaver and Wharton were, respectively, 23 and 26 years after their publication.

The intra-sample citation analysis can be taken a step further by utilising a “listening citation tree.” This has some similarity to family trees as it traces a citation hereditary map; it takes a particular article and shows all the other articles in the sample that it cited and then it takes each of those articles in turn and repeats the process, and so on. It is called a listening citation tree because it shows which articles are formally acknowledged as having been listened to by the parent article

suggests that there was some form of long-term temporal travelling in this debate. The longest chain of citations has 8 levels, from Das 2002, through to Yapa 1993 and then all the way down to Wharton 1969. Furthermore, it was noted above that the intra-sample citations, including self-citations, encompassed 33 articles and of the 32 articles that Das 2002 might have been connected to figure 1 encompasses 19 (or 59%) of them. Another impressive feature of figure 1 is that the articles range across the social science community: the Das paper is in a geography journal, but the other articles encompass area studies, anthropology, development studies, economics and political science. Another feature to note in figure 1 are the dead-ends: the lack of intra-sample references by the two earliest articles requires no comment but the other two dead ends are interesting. Neither Corta and Venkateshwarlu 1999 nor Gill 1994 has any citations to other articles in the sample. Furthermore, both are anthropology articles and the only other anthropology article in figure 1 is Bhalla 1999, whose only intra-sample citation is to Gill 1994. This is a striking outcome and suggests that, at least in the context of figure 1, anthropology is a "ghetto," a discipline which although discussed by the rest of the social science community does not itself reach out to that wider community.[9] Overall figure 1 provides some initial evidence that in terms of the Indian Green Revolution the academic debate has both temporal length and disciplinary breadth. What that means – in terms of what was travelling over time or across disciplinary divides, in particular what facts, if any,

[9] At first this reflection regarding anthropology contradicts the more general view provided by Rigney and Barnes in their 1980 study: "True to its calling as a holistic discipline, anthropology has been among the most interdisciplinary of the social sciences, with close citation ties to the periodicals in general science (e.g., *Science* and *Nature*), sociology, biology, history and linguistics, and weaker ties to medicine, psychology and the arts" (p.120). However, this observation is based on their analysis of *American Anthropologist* between 1936 and 1975(table 3, p.121) and this also reveals that social science disciplines central to our analysis such as economics, political science and geography, accounted for less than 1% of the citations in that journal.

SSCI for 2006, plus 11 non-*SSCI* journals which were already in the

3 also suggests that this is a literature which, in terms of journal articles, economics has been to the fore.

Defining social science disciplines and categories

One of our aims is to assess to what

analysis will exceed 518, in fact the total is 703. Finally, another term that will be utilised below is **mono category**. There is obviously for each discipline, a category which is the same as the discipline (that is, many journals, such as the *American Sociological Review* are only denoted under one heading by the *SSCI*) – such a category will be termed a mono category. To summarise the terminology used below: a **category** reflects the headings provided by the *SSCI* for each journal and may be **mono categories**, where only one heading (say, “Sociology”) is given, or may involve multiple headings, such as “Area Studies – Development Studies – Economics”; the citation count for a social science **discipline** is the summation of all relevant category citations, and may involve the multiple counting of a citation where the relevant journal is not a mono category.

Table 4 shows the distribution of the sample articles by category and by discipline. In terms of categories, the table shows that most of the categories which have more than one article are mono categories, and indeed overall mono categories account for two-thirds of all categories. It also shows that economics is well represented in that its mono category accounts for the second highest number of sample articles and that it is also part of the third and fourth most popular categories. This feeds though to the ranking by discipline shown in Table 5.

science schools as departments or institutes – Area Studies and Development Studies. What is interesting about both is that they are another example of communication spaces that are explicitly intra-disciplinary or even multi-disciplinary in that they do typically contain social scientists from several of the traditional social science disciplines, and indeed Area Studies departments often also include specialists from the humanities. So as well as journals that are explicitly trying to act as communication spaces between different social scientists, there are also “disciplines” (in terms of the *SSCI* classification, and in terms of how the term is used here) that ar

categories where the share of citations is greater than their share of the sample articles are also mono categories, “Anthropology” (7.7% vs. 3.9%), “Sociology” (4.2% vs. 1.3%) and “Development Studies” (1.9% vs. 1.3%). However, it should also be noted that another mono category, “Area Studies” does particularly poorly in terms of “under-representation” (4.5% vs. 17.1%).

Turning to disciplines, it is no surprise to see that table 5 shows that “Economics” is the dominant discipline in terms of citations with 45.8% of the total, which is more than three times the share of the next discipline, “Development Studies” (13.7%). “Development Studies,” in turn, has nearly twice the citation share of the next discipline, “Area Studies” (7.8%), which is followed by disciplines that have shares of between 4% and 6% (“Anthropology,” “Geography,” “Social Science Interdisciplinary,” “Political Science,” “Sociology”). Comparing the distribution of discipline citations to the distribution of sample articles by discipline those disciplines which received a higher proportion of references relative to their share of the sample articles were: “Economics” (whose share of citations was 1.67 times its share of sample articles), “Anthropology” (1.65), “Sociology” (1.57), and “History” (1.11).[14] Amongst those that were “under-represented” in these terms were both “Area Studies” (0.41) and “Development Studies” (0.75). If we believe that citations are one means by which facts can travel within the social science community this, admittedly rather basic, analysis could be taken to suggest that whilst the existence of communication spaces like Area Studies and Development Studies is important, when it comes to travelling those facts, or citations, that come from the traditional

[14] “Social Science Interdisciplinary” (SSI) had a 5% share of citations but only accounted for 1.2% of the sample articles. One potential issue with the discipline count for “SSI” is that some of the journals captured could easily be re-classified; for example, half of the “SSI” discipline citations are accounted for by citations to the journal *Econometrica* which comes under the category “Econ - SSI” but could just as easily be classified simply as “Econ” as its readership is almost certainly dominated by economists. Further, there are of course several disciplines that were not represented in the sample articles but are represented in the citations.

disciplines (Economics, Anthropology, Sociology) are more likely to travel than those that come out of journals which target more than one discipline.[15]

Of course, there is a problem in this simple form of citation analysis, not least because it is driven by the number of citations and you really need to, for example, weight the results by the relative number of citations in particular journals. This could be done by some form of association analysis.[16] However, our primary interest is not in the quantity of references or even the strength of citation links, rather it is to know if there was any sort of communication across the different social science communities in terms of their analysis of the Green Revolution in India. To assess this, the method used here is the "single count" approach, captured in the **single count matrix analysis**. The method is as follows: if the sample article has any reference to a category, this is recorded as 1, otherwise it is recorded as 0 (that is, for each article, each category will have record either 1 or 0); these scores where then summed across all sample articles, producing a cited category to citing category matrix; finally, aggregating across categories yields a discipline matrix, expressed in percentage terms.

The single count discipline matrix for the sample article citations is shown in table 6.[17] Reading down a column gives the percentage of the sample articles in that discipline which cited articles in the row discipline; for example, the first cell in the "Anth" column shows that 75% of the Anthropology sample articles cited at least 1 Anthropology journal reference, whilst the second cell in this column shows that 25%

[15] A similar conclusion is reached by Pieters and Baumgartner 2002 in their far more sophisticated citation analysis of economics journals: "journals aimed specifically at interdisciplinary issues play only a modest role in transferring knowledge from economics to its sister discisplines and the other way around" (p.504).
[16] Examples of more sophisticated forms of citation analysis, all concerned with economics, are: Liebowitz and Palmer, 1984; Pieters and Buamgartner, 2002; Fok and Franses 2007.
[17] For ease of presentation, table 6 only includes the main disciplines, and as such is portion of a larger matrix.

nether does Economics, although, as we shall see below, there is an important caveat to that.

Travelling facts

Up to now it has been assumed, at least implicitly, that a citation is synonymous with a travelling fact but this is not necessarily the case. This final section will therefore look inside the black box of the travelling citation to see what fact, if any, travels with the citation. In examining this two main questions will be posed. First what “fact” does the reference carry? Of course, there may be cases where the citation does not seem to carry any fact, or where it is not possible to discern what fact travels with the citation. In the latter case, for example, one article in the sample has a fairly impressive list of references at the end of the paper but in the body of the paper there are no explicit mentions of any of these citations either in the text or footnotes. The second question to be posed about travelling is how is the fact used in the receiving domain? This also raises the issue about whether the fact is transformed or misconstrued in the receiving domain. The nature of this assessment of “quality” makes it a more subjective process than that in the rest of the paper and at this stage should be regarded as a tentative rather than conclusive analysis; as such, no attempt was made to be comprehensive, rather a selection of material was examined to see if any patterns emerged. Thus, to examinanyin c.[(i)5ot0003 TcsT18 02(anare)3.6(rge3sg

evidence of someone else; this would the case of a **contested fact**. An example of this is: “It is, however, unrealistic to make statements of the order “Output would increase 50% if areas not actively adopting GR technology were to adopt the best practices of Punjab wheat farmers and Japanese rice farmers in the 1930s” (Neale and Edwards, 1983)” (Farmer, 1986, pp.180-1). Using these terms should enable us to determine whether there is any pattern and if this varies across time or discipline. For example, is it the case that generic facts find it easier to travel in the communication space of Area Studies whereas particular facts find it easier to travel in Economics? In what follows use is made of categories rather than disciplines and thus “discipline” effect will be assessed via the relevant mono category and hence citations made by sample articles in the mono categories of “Economics,” “Anthropology” and “Area Studies” were considered.

The mono category “Economics” yielded 92 citations but of these 65 (71%) were citations to other “Economics” articles and a further 14 were to articles in *Econometrica* or *Review of Economics and Statistics* both of which although classified as “Econ – SSI” are in essence economics journals. Of the remaining 13 citations, 5 were mono category (in the sense that the cited journal was classified as being mono category) and 8 were multiple category. The mono category citations were comprised of two “Demography” citations and one citation each to “Political Science,” “Sociology,” and “SSI.” However both of the “Demography” citations were self-citations (Foster and Rosenzweig again) as was the “SSI” reference. It was decided that these self-citations should be ignored, as it is not clear if there is any travelling across disciplinary boundaries with such citations. For example, in the case of the “Demography” self citations, Foster and Rosenzweig 1996 cited Foster 1993 whilst Rosenzweig 1982 cited Boulier and Rosenzweig 1978. In both cases, whilst demography has shown a willingness to embrace other disciplines by allowing an economist to

publish a paper in a demography journal, the economists do not appear

other categories are overwhelming generic in nature, and rarely facts that are specific to India or indeed the Green Revolution.

Turning to “Anthropology” there are 23 citations, only one of which is a self-citation. Excluding the latter there are 9 citations to “Economics” and 3 citations to “Development Studies – Economics.” Thus there is an immediate contrast to citations made by “Economics” in that “Anthropology” is far more open, with half of its citations being accounted for by categories other than “Anthropology,” and indeed to disciplines outside “Anthropology.” There is another striking contrast between the two in the way they use the *Indian Journal of Agricultural Economics*: for the mono category “Economics,” only 2 of the 65 citations to “Economics” were to this journal whereas for “Anthropology” 7 of the 8 citations to “Economics” are to the *Indian Journal of Agricultural Economics*.[23] One of the main qualities of the *Indian Journal of Agricultural Economics* articles, at least in terms of the way they are used by “Anthroth

yields 50 citations, of which 40 are to external citations (ie, citations which are not mono category “Area Study;” citations). Thus, “Area Studies,” in these terms, is even more open to other categories than “Anthropology” with almost 70% of all citations being external to the discipline “Area Studies.” Furthermore, these are also spread across several different social sciences, for example in terms of mono categories it reaches into “Anthropology” (12 citations), “Economics” (8), “Political Science” (5), “Development Studies” (3), and “Geography” (2). It is also worth noting that, after excluding a small number of self-citations, three-quarters of the external citations are to articles in mono category journals and only a quarter to multiple category journals; of the 9 to multiple categories only 4 are outside the “Area Studies” discipline. Thus, whilst being a communication space “Area Studies” appears to be more likely to draw its facts from categories that are not communication spaces. In terms of the type of facts carried by the citations are how they are used there was no obvious discernable difference between the mono and multiple category citations: in most cases, the facts related to India and were used mainly used as corroborative facts. The main exception to this was the case of citations from “Political Science” in that most of the 11 cases of cited facts did not concern India.[25] These “Political Science” citations also exhibited several examples of facts being used as contested facts, more so than was observed in the other category citations. Finally, it is worth noting that of the facts culled from citations from “Economics,” there were only two cases of particular facts, both of which were used as corroborative facts, and these were both taken from the *Indian Journal of Agricultural Economics*.

emphasised when the citations, and what they carried, was looked at in more detail.[27] The communication spaces of “Area Studies” and “Development Studies” also emerge as important, although it was suggested that they were maybe relatively less important than more traditional disciplines when it came to citation travelling. The more general analysis of citations also revealed the importance of two Indian journals to this topic. *Economic & Political Weekly* plays a crucial role in most debates about Indian economic, political and social issues, in many ways it is a prime example of an effective communication space; here it was found to account for almost a quarter of all journal citations in the sample articles and half of all of the sample articles had at least one citation to it. The *Indian Journal of Agricultural Economics* is an important source of empirical research by Indian scholars and as such is heavily cited in the sample, being the third most cited journal. However, there is an interesting distinction in the use made of the *Indian Journal of Agricultural Economics* by economics compared to the social sciences. Of the 36 citations to the *Indian Journal of Agricultural Economics* only two were made by articles in the same mono category of “Economics”, even though citations in that category were overwhelmingly citations to articles in that category. Comparing the *Indian Journal of Agricultural Economics* to its American equivalent, the *American Journal of Agricultural Economics*, is also instructive: whereas two-thirds of all citations to the latter are in articles that fall under the discipline of “Economics” only one-third of all citations to the former do.

explains the popularity of the *Indian Journal of Agricultural Economics* with the other social sciences – they often want to cite a specific piece of evidence from Indian agriculture to support their arguments. This is one example of where the final section, which considered what facts travelled with the citation, was able to provide more insight into how facts travelled across the social science community. It demonstrated that there was a marked difference betwt ine93eed diffe

Tables, Figures,
& References

Table 1. Distribution of sample articles by journal

Economic Development and Cultural Change	8
International Labour Review	6
Journal of Development Studies	4
American Journal of Agricultural Economics	4
Bulletin of Concerned Asian Scholars[1]	3
Journal of Peasant Studies	3
World Development	3
Annals of the Association of American Geographers	3
Economic Geography	3
Foreign Affairs: an American Quarterly Review	2
Journal of Contemporary Asia	2
Journal of Development Economics	2
Journal of Political Economy	2
Modern Asian Studies	2
Pacific Affairs	2

Notes: (1) Now known as *Critical Asian Studies*. The other 29 articles were spread across 29 journals.

Table 2. Most popular intra-sample citations[1]

Author	Year	Journal	Number of intra-sample citations
Articles making most citations			
Das	2002	*Geoforum*	7
Franke	1974	*Bull. C.A.S.*	4
Freebairn	1995	*World Dev.*	3
Parayil	1992	*Tech. & Cult.*	3
Sisaye & Stommes	1985	*Pub. Adm. & Dev.*	3
Mayer	1984	*Pea. St.*	3
Most cited articles			
Falcon	1970	*Am. J. Agr. Econ.*	6
Wharton	1969	*For. Aff.*	5
Ladejinsky	1970	*For. Aff.*	4
Cleaver	1972	*For. Aff.*	3[2]

Notes: (1) Excluding self-citations. If self-citations were included there would be two changes to the table: first, the number of citations made by Das would rise to 8; secondly, Foster and Rosenzweig 1996 would appear under the “Most cited articles” list with 3 citations, 2 of which were self-citations. (2) The Cleaver article also appeared in same year in shorter version and without references in the *American Economic Review* and this version was cited by 2 other articles in the sample, giving Cleaver 5 citations in total.

Table 3. Most cited journals

Journal	Number of citations
American Journal of Agricultural Economics	43
Journal of Peasant Studies	37
Indian Journal of Agricultural Economics	36
American Economic Review	32
Economic Development and Cultural Change	30
World Development	29
Journal of Political Economy	25
Econometrica	17
Journal of Development Studies	17
Foreign Affairs	13
Food Policy	10
Rural Sociology	10
Agricultural Economics	9
Bulletin of Concerned Asian Scholars	9
Economic Geography	9

Table 4. Distribution of sample articles by category and discipline

	Number of articles	As Per cent of all articles
Category[1]		
Area Studies	13	17.1
Economics	11	14.5
Area Studies-Development Studies-Economics	8	10.5
Development Studies-Economics	8	10.5
Political Science	7	9.2
Geography	6	7.9
Industrial Relations and Labour	6	7.9
Anthropology	3	3.9
Economics-Geography	2	2.6
Social Sciences Interdisciplinary	2	2.6
Discipline[2]		
Economics	30	27.5
Area Studies	21	19.3
Development Studies	20	18.3
Geography	9	8.3
Political Science	9	8.3
Industrial Relations and Labour	6	5.5
Anthropology	4	3.7
Sociology	3	2.8
Business Studies	2	1.8
Social Sciences Interdisciplinary	2	1.8

Demography	1	0.9
History	1	0.9
Public Administration	1	0.9

Notes: (1) Total number of articles is 76. The categories with only one sample article in them, not shown in the table, are: “Anthropology-Sociology”, “Business Studies”, “Business Studies-Development Studies”, “Demography-Sociology”, “Development Studies”, “Development Studies-Economics-Political Science”, “Development Studies-Public Administration”, “Geography-Political Science”, “History”, “Sociology’. (2) Due to multiple counting, the total number of “articles” by discipline is 109.

Table 5. Distribution of citations by category and discipline

The table shows all categories or disciplines
which account for at least 1% of the total citations

	Number of citations	**As Per cent of all citations**
Category[1]		
Economics	198	38.2
Development Studies-Economics	48	9.3
Anthropology	40	7.7
Area Studies-Development Studies-Economics	30	5.8
Economics- Social Sciences Interdisciplinary	24	4.6
Area Studies	23	4.4
Geography	23	4.4
Political Science	23	4.4
Sociology	22	4.2
Development Studies	10	1.9
Economics-Geography	9	1.7
Industrial Relations and Labour	6	1.2
Social Sciences Interdisciplinary	6	1.2
Discipline[2]		
Economics	322	45.8
Development Studies	96	13.7
Area Studies	55	7.8

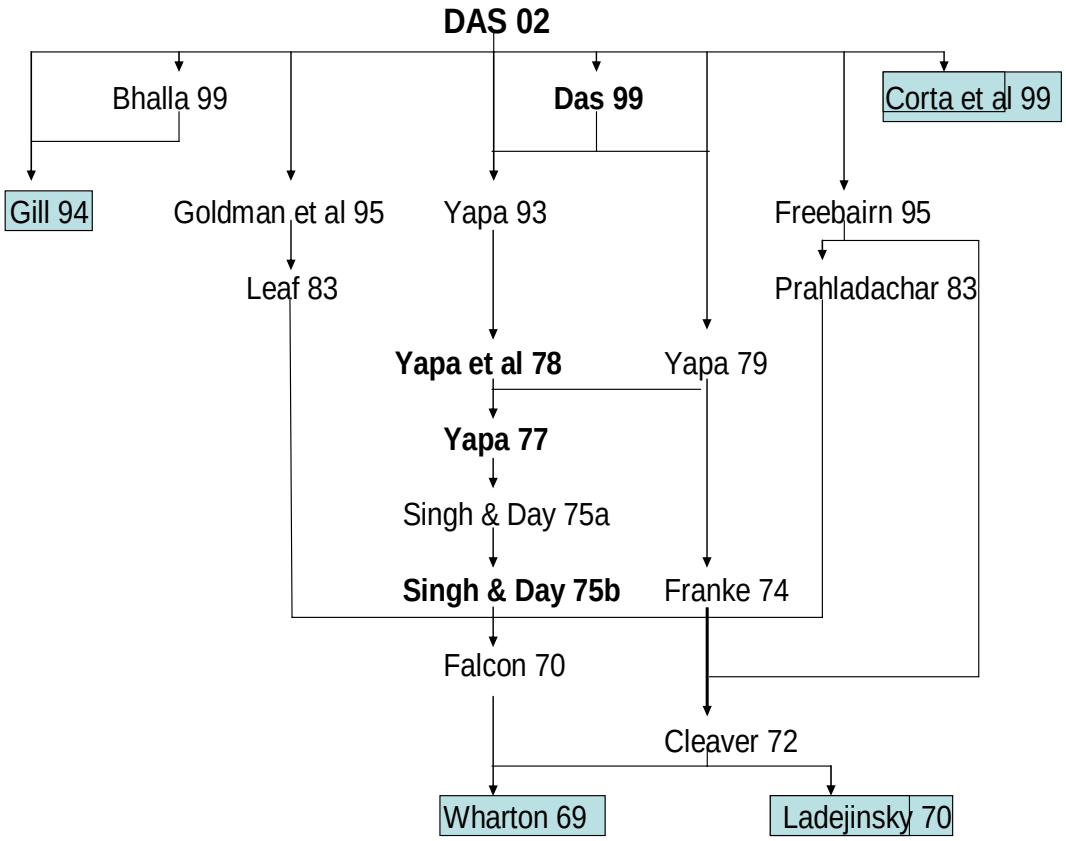
Anthropology	43	6.1
Geography	38	5.4
Social Sciences Interdisciplinary	35	5.0
Political Science	31	4.4
Sociology	31	4.4
Environmental Studies	10	1.4
Industrial Relations and Labour	9	1.3
History	7	1.0

Notes: (1) The total number of category citations is 518. In addition to the 13 categories shown in the table there were 2 categories which had 4 citations each, 7 categories with 3 citations each, 10 categories with 2 citations each and 7 categories with 1 citations each. (2) The total number of discipline “citations” is 703. The disciplines with less than 1% of total citations were Demography (6 citations), Health Studies (4), Psychology (4), Law (2), Urban Studies (2), Public Administration (1) and Social Issues (1).

Table 6. Single count discipline matrix

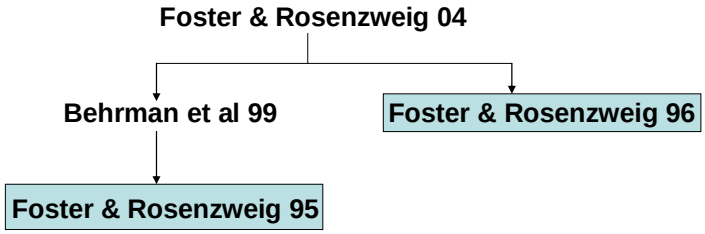
Figure 1. Listening citation tree for Das 2002

The name of the author is followed by two digits representing the year of publication (thus 02 represents 2002)



Note: in order to make the diagram manageable and relatively easy to read, in some cases not all the citations made by an article are shown if they are shown through some other link. For example, above Franke 1974 is only shown as citing Cleaver 1972 and Falcon 1970 but he also cited Ladejinsky 1970 and Wharton 1969.

Figure 2. Listening citation tree for Foster and Rosenzweig 2004



Note: Behrman et al is: Behrman, J. R., Foster, A. D., Rosenzweig, M. R. and Vashishtha, P..

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* *indicates article was part of sample*

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