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Source Indexing through Bibliographic Citations Brings UFO's down to Earth

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There appeared recently in Nature an editorial(1) with the unusual title "Harwell's UFO's brought down to Earth". The editorial called attention to two letters published in the same issue that had been written in answer to an appeal by physicists at the Atomic Energy Research Establishment in Harwell. England, for aid in identification of minute "airborne organisms" discovered in the air around their research station. The airborne organisms were identified by David S. Smith of Miami(2) and A.C. Neville of Oxford(3) as brochosomes, the somewhat bizarre excretory product of leafhoppers and other homopterous insects.

The editorial was of interest to me mainly because of a conclusion drawn by its author-either John Maddox or an anonymous assistant.

"The incident may also interest connoisseurs of scientific literature, particularly those who like cynically to maintain that 90 percent of any list of references is aimed at displaying the erudition of the author rather than the antecedents of his paper. Seven of the eight references by both Neville and Smith are identical (the two papers were written entirely independently), which is a neat exhibition of the principle that underlies their inclusion".

The "principle" is the same one that makes the Science Citation Index®

(SCI®) possible. The excerpt quoted above is an excellent refutation of the idea, expressed so often by K.O. May and others, that citations are capricious, that an "author selects citations to serve his scientific, political and personal goals and not to describe his intellectual ancestry".(4)

An equally neat refutation, more down to earth, has been provided by a Soviet scientist<sup>(5)</sup> in an analysis of more than 400 metallurgy articles. She found that although self-citation does average 20%, as I reported in 1963(6), self-citations are, along with others, necessary in the vast majority of cases. The study concludes that bibliographic citations are far from capricious and should form an excellent basis for reconstructing the historical development of any area of scientific endeavor. As Cawkell has repeated only last week(7)(8) the presumed capricious nature of citations is the exception rather than the rule and it is the general practice of scientists to include a sufficient number of citations to guarantee the proper inclusion of each paper in the historical network which the SCI represents. Each entry in the SCI provides the "coordinates" of the node for each cited paper.

The principle that underlies the SCI is one that was frequently misunderstood before its publication. But even now it continues to be ignored in

endless discussions of "source indexing" (9), by which is meant the authors shall do the indexing by supplying classification numbers or keywords along with abstracts of their articles. Before the expression "source indexing" was first used, scientists had been doing just that for centuries, and with a technique that has proven consistently reliable and usually more effective than

any since devised. The method used all along was citation indexing. The SCI represents "source indexing" par excellence. The masterly use of the unambiguous, universally understood language of the citation by the scientist himself is what makes SCI so effective both for retrieval and sociometric purposes.

- 1. Anonymous, "Harwell's UFO's brought down to Earth". Nature 225: 126 (Jan. 10, 1970).
- 2. Smith, D.S., "'Airborne Organism' Identified". Nature 225: 199 (Jan. 10, 1970).
- 3. Neville, A.C., "'Airborne Organism' Identified". Nature 225: 199 (Jan. 10, 1970).
- 4. May, K.O., "Abuses of Citation Indexing". Science 156: 890-891 (1967).
- Preobrazhenskaia, G.B., "Semantic Analysis of References in Metallurgical Articles". Nauchno-Tekh. Inf. 2(10): 10-11 (1969).
- Garfield, E. & Sher, I.H., "New Factors in the Evaluation of Scientific Literature through Citation Indexing". American Documentation 14(3): 195-201 (1963).
- 7. Cawkell, A.E., "Science Citation Index". Nature, 228(5273): 789-790 (Nov. 21, 1970).
- 8. Anonymous, "More Games with Numbers". Nature 228(5273): 698-699 (Nov. 21, 1970).
- 9. Knight, G.N., Training in Indexing. MIT Press, Cambridge, Mass., pp. 4, 165 (1969).