

## **Bibliographics on publication productivity of J. V. Narlikar and his collaborators**

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### **ABSTRACT**

*Jayant Vishnu Narlikar has published number of papers in the following domains: Cosmology (119), Action at a distance and gravitation (62), Quasars and high energy astrophysics (51), Quantum cosmology (22), General topics in science (18), and Science education (14), which were analysed for authorship credits to collaborators, Lotka's Law, and Bradford's Law and growth of his publications in his highly preferred journals are depicted.*

### **INTRODUCTION**

A proposal to establish databases [1-2] on publication productivity of individual scientists, triggered an era of inter-disciplinary studies [3-46] documenting life-time achievements and correlating bibliodata with biodata.

### **MATERIALS AND METHODS**

Jayant Vishnu Narlikar is taken as a case study and well-known bibliometric methods are used.

### **RESULTS AND DISCUSSION**

Multiauthorship is widely used as an indicator to measure research collaboration; the underlying assumption is that the authors involved had carried out the research leading to the paper in collaboration.

#### ***Cosmology***

J.V. Narlikar had 68 single authored papers in cosmology. Among multiauthored papers he had two authored (30), three authored (16), four authored (3) and five authored (2) publications. Cosmology group consisted of 27 collaborators and total authorships were 198 (Figure 1).

#### ***Action at a distance and gravitation***

J.V. Narlikar had 27 single authored papers in the domain action at a distance and gravitation. Among multiauthored papers there were two-authored (31), three-authored (3), and one four-authored publication (Figure 2).

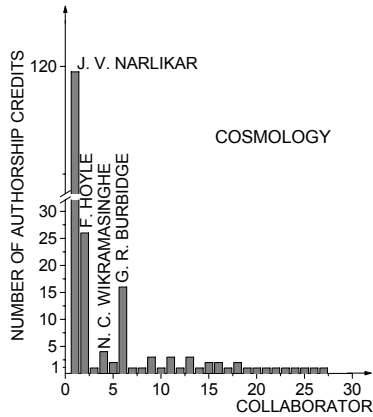


Fig. 1 Authorship credits to collaborators with J.V. Narlikar in the domain Cosmology during 1962-2001

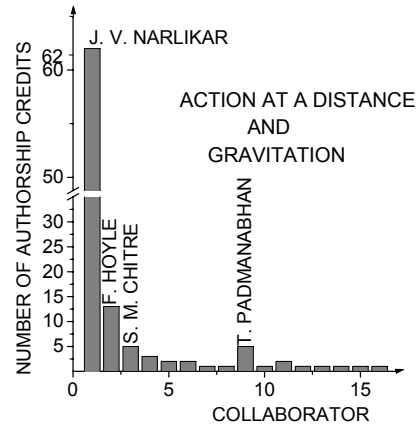


Fig. 2 Authorship credits to collaborators with J.V. Narlikar in the domain Action at a Distance and Gravitation during 1961-2001

***Quasars and high energy astrophysics***

This research group constituted of 23 researchers. J.V. Narlikar had one-authored 14 publications in quasars and high energy astrophysics. Out of multi-authored papers published, two-authored were 10, four-authored were 2, and five-authored was only one paper. This group had total authorships of 105 to their credits. Out of that two-authored authorships were 48, three-authored credits were 30, four-authored credits were 8, and five-authored credits were 5 (Figure 3).

***Quantum cosmology***

This group comprised of only 5 collaborators. Total authorship credits were 36 out of which one-authored authorships belonging to J.V. Narlikar were only eight whereas two-authored authorships were 28 (Figure 4).

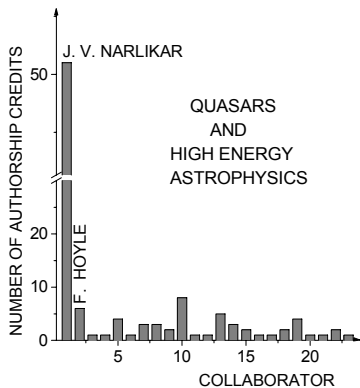


Fig. 3 Authorship credits to collaborators with J.V. Narlikar in the domain Quasars and high energy astrophysics during 1969-2000

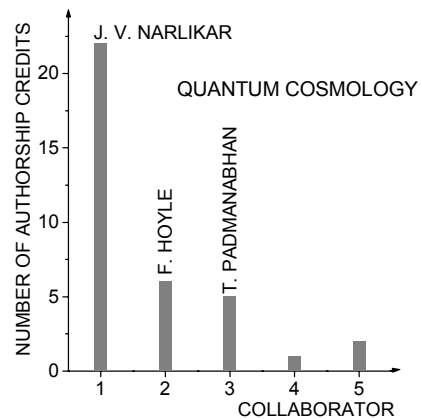


Fig. 4 Authorship credits to collaborators with J.V. Narlikar in the domain Quantum cosmology during 1967-1998

### ***General topics in science***

This research group under the leadership of J.V. Narlikar consisted of 12 collaborators having total of 31 authorships to their credit (Figure 5).

### ***Science education***

J.V. Narlikar had written 12 single-authored papers in this domain, out of which N.C. Rana had two-authored 4 publications. Total authorship credits to the group were 16 (Figure 6).

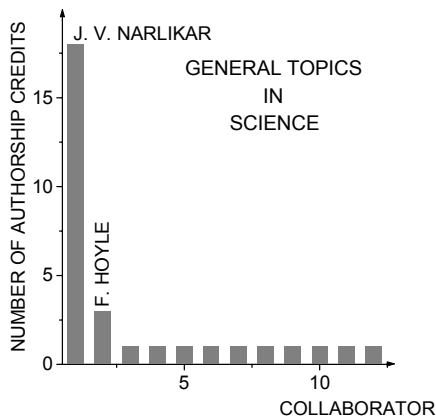


Fig. 5 Authorship credits to collaborators with J.V. Narlikar in the domain General topics in science during 1968-2001

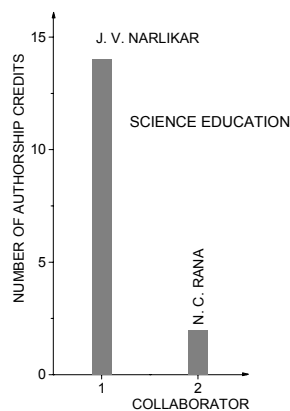


Fig. 6 Authorship credits to collaborators with J.V. Narlikar in the domain Science education during 1975-2001

### ***Overall collaboration productivity***

J.V. Narlikar had excellent collaboration activities with 45 researchers (including himself). He had published 286 papers with total authorship credits 488 to the group (Figure 7). Publications per year on an average were 6.97 and publications per author were 6.3.

J.V. Narlikar's research group during 1961 – 2001 consisted of prominent collaborators: F. Hoyle (54 authorship credits), G.R. Burbidge (19 authorship credits), S.M. Chitre (15 authorship credits), T. Padmanabhan (14 authorship credits), N.C. Wikramasinghe (9 authorship credits) in collaboration with J.V. Narlikar having 145 collaborative papers. Three authors (P.K. Das, N.C. Rana and K. Subramanian) each were having 6 authorship credits in collaboration with J.V. Narlikar. P.K. Das and H.C. Arp both had five papers each in collaboration with J.V. Narlikar. There were four authors who had collaborated with J.V. Narlikar in four papers each. There were five collaborators who had contributed three papers each in collaboration with J.V. Narlikar. There were 7 authors who had contributed two papers each. There were 18 collaborators with J.V. Narlikar who had published only one paper each with him.

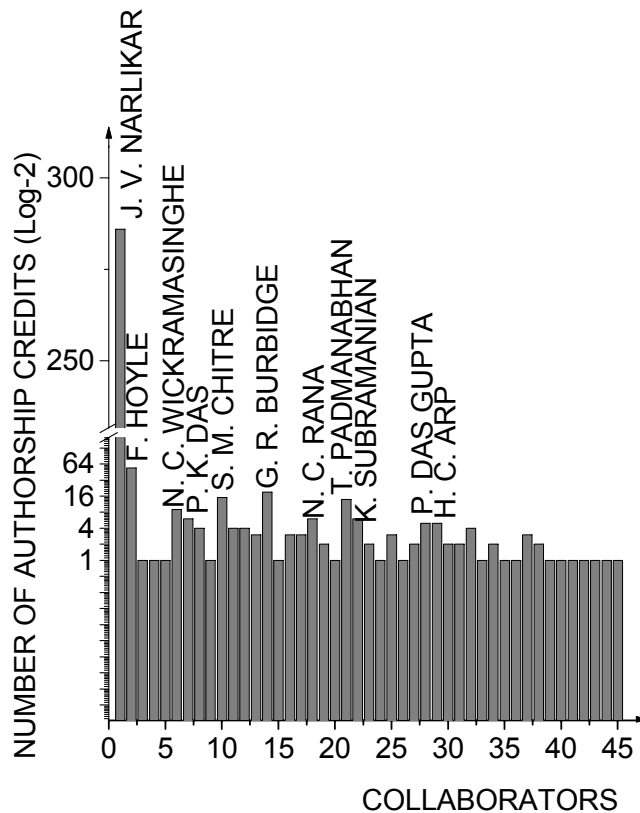


Fig. 7 Authorship credits to collaborators with J.V. Narlikar during 1961-2001

So, 40 percent of the authors (45) had contributed to the team of J.V. Narlikar in only one paper each. About 15.6 per cent of the authors had only two publications with J.V. Narlikar.

One paper-producing authors (18) had contributed to the group about 3.7 percent authorships. Lotka's Law has been applied to the data and depicted in Figure 8. Six domains to which J.V. Narlikar's group had contributed 105 two-authored publications, followed by 30 three-authored publications, and 6 four-authored publications.

Position of J.V. Narlikar in bylines of multi-authored papers, was interesting to observe that he had contributed 27 papers in which he was second author in the domain action at a distance and gravitation.

Review articles are of great importance as they are historical summing of retrospective, contemporary and prospective knowledge base of a micro topic. J.V.Narlikar had published 18 reviews. His first review was published when he was as young as 28 years chronologically and six years productivity agewise. In cosmology he had published 11 reviews, followed by 3 reviews in quantum cosmology. One review each was published in the remaining domains.

### Channels used

It is of great significance to note that J.V. Narlikar has published 23 papers in *Nature*, the journal having very high impact factor, followed by 16 papers in *Monthly Notices of the Royal Astronomical Society*, 14 papers in *The Astrophysical Journal*, and 13 papers in *Proceedings of the Royal Society*. He had published 10 papers each in *Astrophysics and Space Science*, and *Journal of Astrophysics and Astronomy*. Bradford-Zipf bibliograph is provided in Figure 9.

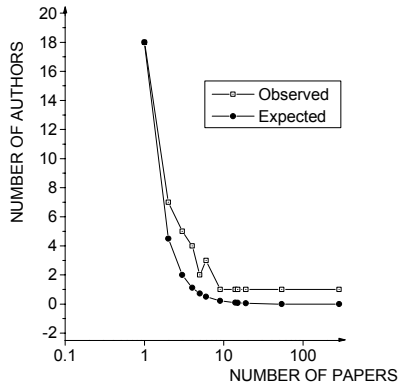


Fig. 8 Productivity of authors observed and expected as per Lotka's Law in the case of J. V. Narlikar's research group during 1961-2001

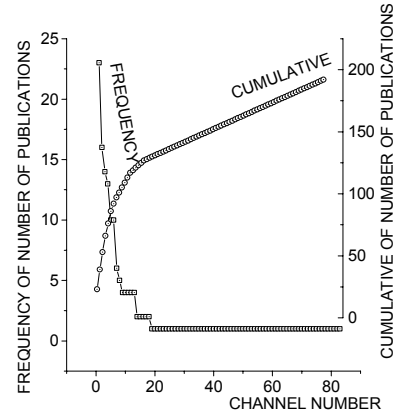


Fig. 9 Bradford-Zipf bibliograph for J.V. Narlikar during 1961-2001

When 286 publications are grouped into three zones having almost equal number of papers, first zone (96 papers), second zone (95 papers), and third zone (95 papers) had corresponding number of journals having those number of papers were: First zone (8 journals), second zone (75 journals), and third zone (95 journals). Bradford multiplier for second zone was 9.37.

### Growth of publications in preferred core journals

The high preferences of J.V. Narlikar to publish his papers in top four core journals were considered for the detailed frequency and cumulative values of publications with time during 1961 – 2000 and the growth trends of publications in each of the four journals viz.: *Nature*, *Monthly Notices of the Royal Astronomical Society*, *The Astrophysical Journal*, and *Proceedings of the Royal Society* are depicted in Figure 10.

## CONCLUSIONS

Team of research collaborators (45) working with a successful scientist documents the sociological aspects of history of science in the process of generating knowledge. J.V. Narlikar has gained the status of a mentor by contributing to human resource development. His success can be attributed to well focused research programmes and team efforts.

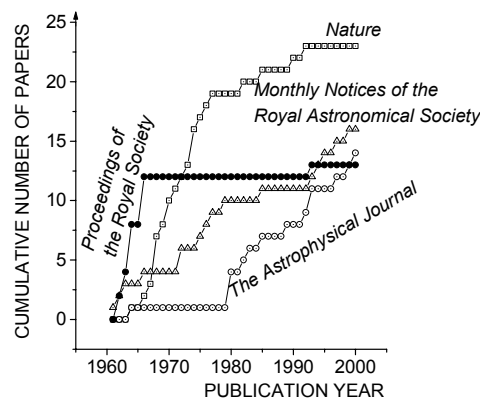


Fig. 10 Growth of publications in highly preferred core channels used by J. V. Narlikar during 1961-2000

J.V. Narlikar has collaborated with giants in astrophysics with following authorship credits: F. Hoyle (54) and G. R. Burbidge (19). He is the most effective mentor for S. M. Chitre (15), T. Padmanabhan (14), N.C. Wikramasinghe (9) and other 39 collaborators (91 credits). On an average he had published 7 papers per year during 1961 – 2001. His productivity follows Lotka’s Law of author productivity in a research group.

J.V. Narlikar has channelised his publications preferentially through the esteemed journals: *Nature* (23), *Monthly Notices of the Royal Astronomical Society* (16), *The Astrophysical Journal* (14), and *Proceedings of the Royal Society* (13).

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