

**Tunç, M. (2014). Scientific production and impact analyses of sociometry field. *Turkish Journal of Sociology*, 2014/1, 3/28, s.265-283**

## **Scientific Production and Impact Analyses of Sociometry Field**

**Metin Tunç\***

**Abstract:** Since the first presentation of sociometry by Jacob L. Moreno in 1932, there has been significant scientific production in the field. However scientific production consists of many different activities, the core consists of scientific publications. This study is evaluating scientific publications as the core performance indicator of sociometry field. The citations to these publications are also analyzed in the scope of impact generation. With combination of publications and citations, it analyses sociometry field not as the source only, but also as generated impact environment. In addition, related fields of sociometry are analyzed within clusters as publication production and impact generation. This additional analyze has shown significant differentiations between time periods, as well as field distributions and research and impact generation trends. It is aimed that this study will illustrate if the production in sociometry is in increase, decline or stability phases and also to illustrate research areas characteristics.

**Keywords:** Sociometry, Scientific Production, Scientific Impact, Sociodrama, Psychodrama, Scientometrics

## **Sosyometri Bilim Dalının Bilimsel Üretim ve Etki İncelemesi**

**Özet:** Sosyometri bilim dalındaki bilimsel üretim, Jacob L. Moreno'nun 1932 yılında yaptığı ilk takdimden buyana kayda değer düzeyde gerçekleşmiştir. Her ne kadar bilimsel üretim çeşitli biçimlerdeki faaliyetlerden oluşsa da, bu faaliyetlerin ana grubu bilimsel yayınlar çerçevesinde geliştirilmektedir. Bilimsel yayın üretimi bu araştırmada sosyometri sahasındaki bilimsel üretimin ana göstergesi statüsünde değerlendirilerek işlenmektedir. Üretilen bilimsel yayınlara yapılan bilimsel atıflar, bilimsel yayın üretimi ile beraber etki üretimini de inceleyecek biçimde ayrıca değerlendirmektedir. Bilimsel yayın ve bu yayınlara yapılan atıfların incelemesi ile sosyometri sahasının sadece dâhili analizi ile kalınmayıp çevresel etki bağlamı da incelemeye eklenmiştir. Ek olarak sosyometri bilim dalı ile ilgili olan bilim dalları, ortak yayınlar kapsamında bilimsel üretim ve bilimsel etki olarak incelemeye eklenmiştir. Bu eklemeye bilim dalı grupları arasında bilimsel yayın üretimi ve etki geliştirmesinde kayda değer düzeyde ayrışan sonuçlar gözlemlenmiştir. Bu bağlamıyla araştırmmanın amacı; sosyometri sahasındaki bilimsel üretimin genel analiziyle birlikte ilgili olduğu araştırma alanları dağılımlarını incelemektir.

**Anahtar Kelimeler:** Sosyometri, Bilimsel Üretim, Bilimsel Etki, Sosyodram, Psikodram, Bilimmetri

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\* Assist. Prof. Dr., Istanbul University Faculty of Letters Department of Sociology, tunc\_metin@yahoo.com.

### **Introduction**

There are two main sources that are commonly used for quantitative scientific output analyses: scientific publications and citations.

Usage of scientific publications as an indicator of performance began at the beginning of the 20<sup>th</sup> century. F. Galton's "English Men of Science" is known as the first attempt to measure scientists according to their scientific publications. (Galton, 1874) It may be regarded that field of scientometrics has been initiated since this study. But as the first known formation of scientometrics, it was by J.M. Cattell's "Statistics of American Psychologists" (Cattell, 1903). It is acknowledged that Cattell's work was the first study to measure performance in scientific publication output (Godin, 2006).

On the other hand, since the aim of this study is to investigate field of sociometry within scientometrical scope, we need to look at historical background of sociometry field.

Sociometry has been shaped by Jacob L. Moreno's "Who Shall Survive" (Moreno, 1934) as the first comprehensive definition which is investigating measurability of relations between individuals, societies, and objects within scope of sociology field. This monograph was a production of 14 years study between 1920 and 1934. He has discussed social network analyses as application of sociometry in this study.

Later he published another monograph named "The Future of Man's World". But this time he presented sociometry within relations to 'sociodrama', 'psychodrama' and 'sociatry' as an alternative social model to Marx's and Freud's materialism which had shaped today's world. (Moreno, 1947)

However J.L. Moreno is founder of sociometry, he was not only scientist in the main stream of sociometry. There have been other important figures such as G. Simmel, J. Baldwin, C. Cooley, G. H. Mead, F. Znaniecki, W. I. Thomas, E. Burgess.

To look at significant milestones in historical background of sociometry field the chronology is as below:

#### ***Chronology Related to Development of Sociometry Field 1934 - 1973***

1934 – The first definition of sociometry by J.L. Moreno.

1937 – The first issue of Journal Sociometry; a Journal of Inter-Personal Relations.

1942 – The Institute of Sociometry was founded officially, however it was established by Moreno in 1934.

1945-1950 – The Research Center for Group Dynamics (RCGD) was established at the Massachusetts Institute of Technology by Kurt Lewin

(1945) (RCGD, n.d.), followed by the Tavistock Institute (1947) (TIHR, n.d.), Harvard Department of Social Relations (1946) (n.d.), and the Institute for Human Relations under Yale University (1949) (HRAF, n.d.).

1951 – International Council of Group Psychotherapy was established.

1955 – Sociometry Journal is published under American Sociological Society, thus sociometry field has started to be studied within global contexts.

1961 – World Academy of Psychodrama and Group Psychotherapy was established.

1973 – Transformation of Council into Association of Group Psychotherapy numbering 800 members from around the world (Hare, A. P. and Hare, J. R. 1996).

Above timeline and Moreno's investigations for institutional development of sociometry which is defined as 1923-1937 "hot" period, 1937-1950 "cold" period and post-1950 as "perceptual" period (Moreno, 1954) are to be studied in connection with scientific production and impact analyses of sociometry field.

### **Method**

Scientific production analytics have been based on scientific publication production over a century since first known attempt is by J.M. Cattell's "Statistics of American Psychologists" (Cattell, 1903). The scientific impact analyses were developed later in the mid-20<sup>th</sup> century. It was developed based on citation analyses. The first attempt was by Vannevar Bush in 1945 (Bush, 1945). But the complete form of citation use for scientific impact analyses was defined by Eugene Garfield in 1955 (Garfield, 1955). The concept of combined analytics of scientific publications and citations as a core indicator have been used extensively since the mid-20<sup>th</sup> century.

Same approach will be used in this study as annual grow rate of publications in sociometry field and the trends which are based on citations to these publications. Publications are to be organized according to their publication date and citations are to be organized based on publication date of citing paper. The results are to be demonstrated as per year totals.

Since Web of Science citation indexes are the most referenced sources, data source for published items is based on Web of Science (WoS) platform by Thomson Reuters (formerly ISI). Related materials have been retrieved based on search result of publications which includes any of below topics which are the strongest referrals to sociometry;

- Sociometry (searched as "Sociomet\*")
- Sociatry (searched as "Sociatr\*")

- Psychodrama (searched as “Psychodram”)
- Sociodrama (searched as “Sociodram”)

The search results have been limited to Social Science Citation Index (SSCI) only. The aim of this is to increase accuracy and relatedness of results and thus avoiding weak relation publications which may cause noise in analytics. But SSCI only limitation have not been applied in citations. Citation includes any citing paper from citation indexes on WoS platform<sup>1</sup>. The aim of this is to be able to measure potential use of sociometry in all fields comprehensively, since citation to the source publication is a core indicator of use of source material.

None of date limitation have been applied to retrieved results. Thus, analytics have been run from the first publication to the last one until 7<sup>th</sup> December 2012 on WoS which has 1900 – forward archives.<sup>2</sup>

Sociometry related fields have been analyzed in addition. Fundamentals of sociometry in relations to other fields have been visualized. This investigation has been developed based on subject area classifications of retrieved sociometry related publications. Any publication is classified under all necessary fields in WoS platform. An article may be classified under a single or multiple fields. Multiple classified data of publications are used as the source to investigate relatedness within fields. Thus, it provides availability to investigate inter-fields patterns of a certain field. This study is using such data to determine related fields to sociometry. The fields have been classified according to OECD Frascati broad and detailed classification system (OECD, 26 February, 2007).

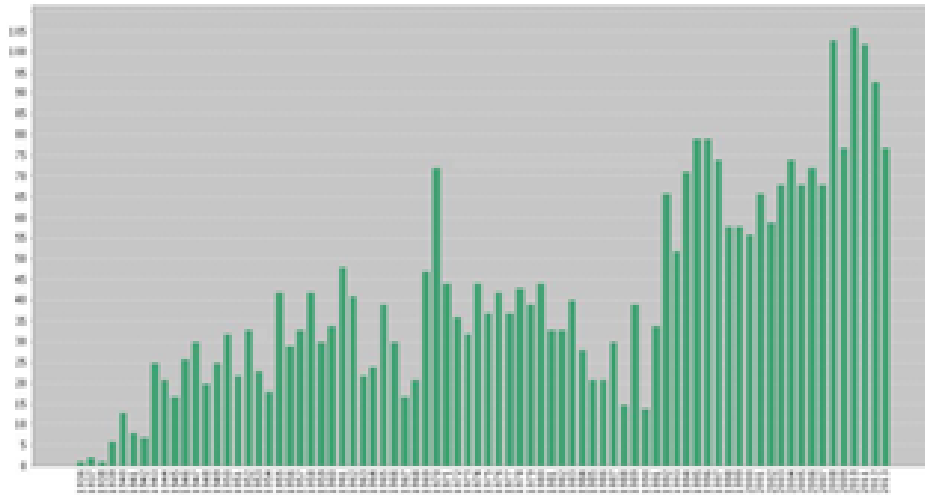
## **Research Results**

### ***Scientific Production in Sociometry Field***

Total number of sociometry related papers are retrieved as 3233 paper dated between 1936 and 2013. At first instance, publication per year trend of sociometry field is showing a strong instability (See Figure 1). The field shows an increasing production from 1936 to 1961, then a slow down until 1967, following a significant increase 1968 until 1980 and again a slowdown until 1992. But a very strong increase starting from 1993 in production up until 2013. However this trend shows many UPs and DOWNS, the increase starting from 1993 is especially significant (see Table 1).

<sup>1</sup> Science Citation Index Expanded, Social Science Citation Index, Arts and Humanities Citation Index, Conference Proceedings Citation index – Science, Conference Proceedings Citation index – Social Sciences, Book Citation Index – Science, Book Citation Index – Social Sciences.

<sup>2</sup> Searches have been run on SSCI as of 7<sup>th</sup> December 2012. Citation reports have been run on the same date.

**Figure 1.** Number of Publications per Year Related to Sociometry

### Related Fields Analytics of Sociometry Publications

When analyzing sociometry related fields the majority of interrelated field are from Medical and Health Sciences. Almost 36% (1153 papers) are related to medical and health sciences too. Then it follows with natural sciences only 4% (139 papers). Remaining fields are humanities, engineering/technology and agricultural science with a total of 1% (36 papers). Details are shown below.

**Table 2.** Related Field Totals of Sociometry Papers by Clusters

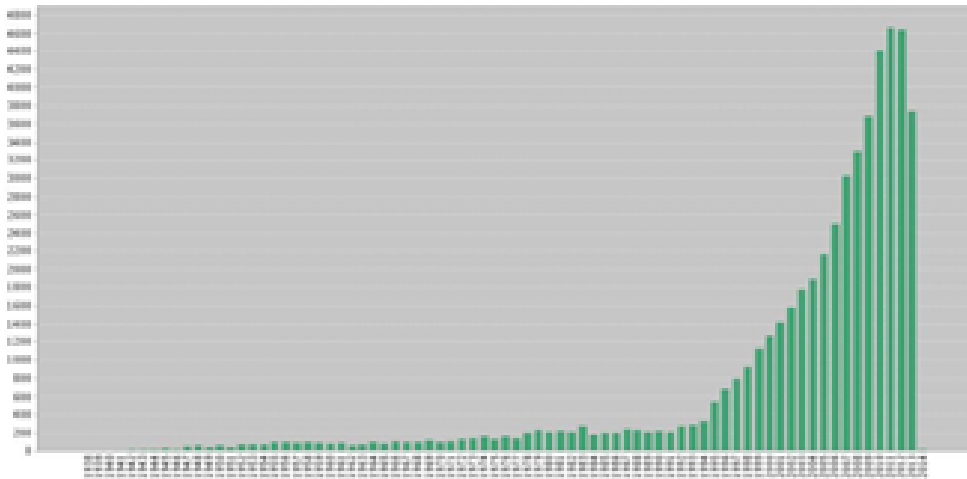
| RELATED FIELDS CLUSTERS     | Related Articles | %    |
|-----------------------------|------------------|------|
| MEDICAL AND HEALTH SCIENCES | 1153             | 36%  |
| NATURAL SCIENCES            | 139              | 4%   |
| HUMANITIES                  | 25               | 0,7% |
| ENGINEERING AND TECHNOLOGY  | 9                | 0,3% |
| AGRICULTURAL SCIENCES       | 2                | 0,1% |

### Impact Production in Sociometry Field

Search results retrieved 28.171 citing articles for sociometry related papers within all WoS citation indexes. Total number of citations per year trend, as the impact indicator, shows a very opposite case compared to scientific production (see Figure 2). It reveals a strong stability with a very significant increase. However the increase rate between 1938 and 1994 is fairly moderate,

the increase starting 1995 and afterwards is showing very high volume. 1995 onward increase may be a result of a potential milestone development in the field. The impact difference between 1994 and 2012 is approximately 21-fold higher (see Table 3).

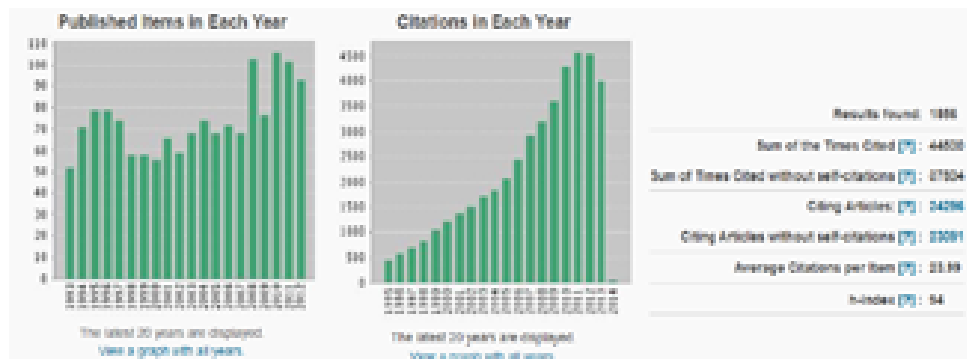
**Figure 2.** Total Numbers of Citations to Sociometry Related Articles per Year



**Field Analytics of Impact (Citing Articles)**

15.89 citation per paper average of sociometry field is significantly higher than world social science average. World average of social sciences related papers between 1981 and 2012 is 9.78 (InCites, 2013). But sociometry related papers in same time period has generated 23.99. This is almost 2.5 times higher impact score than world average (see Figure 3).

**Figure 3.** Citation Per Paper for Sociometry Related Papers Between 1981-2012. (WoS 2013)



Such a high impact generation is a strong indicator of potential use of sociometry from other fields. Only 1,708 of 28.171 citing papers (only 6%) are sociometry related. Remaining majority (26,463 – 93%) of papers does not have direct relation to sociometry. But these remaining papers have used sociometry content in their fields.

When looking at details of fields analyses of citing articles it shows; 79% from social sciences, 35,3% from medical and health sciences, 6,2% from natural sciences, 1,7% from humanities, 1,1 from engineering/technology and only 0,2% from agricultural sciences. Medical and health sciences are performing a significant proportion in impact generation as well. Details are shown below.

**Table 4.** Related Fields Total of Sociometry Papers

| <b>Citing Articles Per Field Cluster</b> |              |          |
|--|--------------|----------|
|  | <b>Total</b> | <b>%</b> |
| SOCIAL SCIENCES                          | 22287        | 79,11%   |
| MEDICAL AND HEALTH SCIENCES              | 9947         | 35,31%   |
| NATURAL SCIENCES                         | 1765         | 6,27%    |
| HUMANITIES                               | 489          | 1,74%    |
| ENGINEERING AND TECHNOLOGY               | 318          | 1,13%    |
| AGRICULTURAL SCIENCES                    | 50           | 0,18%    |

### **Pre and Post 1992 Analytics of Scientometry Field**

Since there has a very obvious production and impact increase starting around 1992, we needed to have an additional analytics for pre 1992 and afterwards. Results are helping to identify more insight.

### ***Fields Analytics of Scientific Production***

Total number of papers pre and post 1992 are almost identical. This shows a balanced distribution (see below Table 5).

**Table 5.** Total Number of Papers Published

|   |             |
|---|-------------|
| Total Number of Papers Pre 1992 (1936 – 1992)   | <b>1672</b> |
| Total Number of Papers After 1992 (1993 – 2013) | <b>1561</b> |

Pre 1992 research field distribution is homogeneous and condensed to the first two fields; PSYCHOLOGY and PSYCHIATRY. 1346 papers out of 1672 (80.5 %) are related to PSYCHOLOGY. It is by 450 papers of PSYCHIATRY (27%). 13 fields out of top 25 have produced less than 10 papers.

In addition, pre 1992 shows much more productivity in basic research fields than applied fields. 1549 of 1672 papers (~93%) are related to basic research. In pre 1992, there are 12 basic fields out of top 25. Pre 1992 top 25 research area totals are shown in Table 6 (see Table 6).

However, when analyzing post 1992 scientific production, field distribution is showing much more heterogeneous. PSYCHOLOGY is again top producing field but not as much as pre 1992. Second field is changing to EDUCATION EDUCATIONAL RESEARCH but it is not with a high proportion, only ~9%. However total number of papers is less than pre 1992, this time only 5 fields have produced less than 10 publications.

In addition, post 1992 shows more productivity in applied research fields. 389 out of 1561 papers (25%) are related to applied research. In post 1992, there are 17 applied fields out of top 25. Top 25 research area totals for post 1992 are shown in Table 7 (see Table 7).

### ***Pre and Post 1992 Analytics of Impact Generation***

Total numbers of citing papers pre and post 1992 have a significant difference. There are significant between two totals. Post 1992 total is 6-fold more than pre 1992. This case underlies supportive indicator for potential milestone before and after 1992 (see Table 8).

**Table 8.** Total Number of Citing Papers

|  |              |
|--|--------------|
| Total Number of Citing Papers Pre 1992 (1936 – 1992)   | <b>3940</b>  |
| Total Number of Citing Papers After 1992 (1993 – 2013) | <b>24492</b> |

Opposite to scientific production distribution, citing paper research fields analyses shows an heterogeneous distribution in both post and pre 1992 totals, however citing article totals have a big gap.

In the distribution of pre 1992 citing paper research fields, PSYCHOLOGY is taking the lead again, but this time with 60%. Surprisingly second field is placed with EDUCATION EDUCATIONAL RESEARCH, not PSYCHIATRY. (See Table 9)

16 fields outside of top 25 are applied research fields. This is indicating potential use of sociometry applications in different fields. Pre 1992 research fields are shown in Table 9. (See Table 9)



The distribution of research fields in post 1992 is heterogeneous also, but as indicated before totals are much higher. PSYCHIATRY is taking its second place again, but not with a big difference when compared to following field; EDUCATION EDUCATIONAL RESEARCH. The most surprising finding is that NEUROSCIENCES NEUROLOGY is the fourth largest field and almost doubling SOCIOLOGY field total (for details see Table 10).

In the citing article dataset of post 1992, 19 fields outside of top 25 are applied research fields. This is a strong indicator of usage of sociometry in applications and implementations by other in other research fields. Top 25 citing articles research area totals for post 1992 are shown in Table 10 (see Table 10).

## **Discussion**

### ***Regarding Scientific Production***

Analytics show two main periods as pre and post 1992. But when checking pre 1992, it has two up-and-down periods which may be interpreted separately as 1936-to-1967 and 1968-to-1992. These two periods have low number of papers and concentrated more on basic/core research fields.

When checking 1936-to-1967, first 5 top producing fields are Psychology, Psychiatry, Sociology, Mathematics and “Mathematical Methods in Social Sciences”. 701 papers out of 761 (92%) are from these 5 core fields. This is a potential indicator of 1936-to-1967 period as theoretical development phase of sociometry (see Table 11).

Second half of pre 1992 period (1968-to-1992) has concentration on basic/core fields as well. 819 papers out of 911 (90%) are from basic fields. But education and rehabilitation are in top 5 fields which are applied areas in relation to sociometry field. This outcome is showing that theoretical development is accompanied by practical development phase in the period of 1968-to-1992 (see Table 12).

Checking on scientific production outcomes of post 1992, it is showing significant production growth with contribution from significantly more applied research fields. 17 fields out of top 25 are applied research fields. This is an indicator of implementation phase of sociometry in applied as well as basic fields. It may be criticized that the growth rate after 1992 is because of content increase in citation indexes. But when checking on status of indexed journals, there are only 4 new journals added after 1992 which are covering only 8% of papers. This total is overall new content added to citation index after 1992.

When matching above outcomes with historical background of sociometry, it is proving that scientific papers production characteristics is complying

with timelines. The foundational period of sociometry starts from 1934, and continues until establishment of a global association in 1973. This timing is covering almost same period for theoretical development phase of sociometry in terms of scientific production between 1936 and 1967. In addition, it may be said that periods which Moreno defined (Moreno, 1954) as 1923-1937 “hot” period, 1937-1950 “cold” period and post-1950’s “perceptual” period have developed in this period.

Scientometrical analytics show that starting from 70s, sociometry content and methods started to be used by other fields globally. This has been observed by Erdogan, A. which she indicates that starting from 1970s, sociometry have started to be used as applied technical information in specific field such as social psychology, small groups sociology, network analyses, etc. (Erdogan, 2014).

Observing on research field clusters analytics of scientific production, it shows medical and health sciences cluster with an expected total of 1/3 distribution (36%). This is because of interdisciplinary relation of Psychiatry and Psychology fields with medical and health sciences (see Table 2).

### ***Regarding Impact Analyses***

It is showing that sociometry related research papers have generated impact on multidisciplinary context even from early stages. 15 out of first 25 top citing fields (1936-1967) are fields which have no direct relations to sociometry, but have potential use of it in their applications. Following period of 1968-1992 is almost identical to 1936-1967, 16 out of top 25 fields are form field which has indirect relations to sociometry. Differentiation of 1936-1967 and 1968-1992 are not as explicit as in scientific production (see Tables 13 and 14)

However, post 1992 impact analyses show significant growth and differentiation to pre 1992. The overall impact of post 1992 is 6 times more than previous period of 56 years (1936-1992). In addition, research fields’ distribution shows much more multidisciplinary. 19 out of top 25 fields are from other indirect relation fields to sociometry. This outcomes are firm indicators to show usage potential of sociometry in other fields.

New content addition to citation indexes may be discussed for impact analyses as well. But again, when checking on post 1992 citing journals indexing status, there are only 4 newly added journals (after 1992) in top 25 which have produced only 4% new content in citing papers count.

When observing on field clusters analytics of impact generation, it shows almost identical to scientific production characteristics; medical and health

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sciences cluster is with an expected total of 1/3 distribution (35%) again. Natural sciences cluster is also same as in scientific papers with a ~7% of totals. Engineering and Technology cluster has very low amount which is about 1% only (see Table 4).

To summarize; scientometrical analytics on produced research papers are showing that the period of 1936-to-1992 proves to be theoretical and practical development phase of sociometry field itself. But post 1992 is more on usage booming of sociometry in other fields.

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**Appendix | Ekler****Table 1.** Sociometry Related Papers per Year

|      |     |      |    |
|------|-----|------|----|
| 2013 | 78  | 1974 | 44 |
| 2012 | 93  | 1973 | 32 |
| 2011 | 102 | 1972 | 36 |
| 2010 | 106 | 1971 | 44 |
| 2009 | 77  | 1970 | 72 |
| 2008 | 103 | 1969 | 47 |
| 2007 | 68  | 1968 | 21 |
| 2006 | 72  | 1967 | 17 |
| 2005 | 68  | 1966 | 30 |
| 2004 | 74  | 1965 | 39 |
| 2003 | 68  | 1964 | 24 |
| 2002 | 59  | 1963 | 22 |
| 2001 | 66  | 1962 | 41 |
| 2000 | 56  | 1961 | 48 |
| 1999 | 58  | 1960 | 34 |
| 1998 | 58  | 1959 | 30 |
| 1997 | 74  | 1958 | 42 |
| 1996 | 79  | 1957 | 33 |
| 1995 | 79  | 1956 | 29 |
| 1994 | 71  | 1955 | 42 |
| 1993 | 52  | 1954 | 18 |
| 1992 | 66  | 1953 | 23 |
| 1991 | 34  | 1952 | 33 |
| 1990 | 14  | 1951 | 22 |
| 1989 | 39  | 1950 | 32 |
| 1988 | 15  | 1949 | 25 |
| 1987 | 30  | 1948 | 20 |
| 1986 | 21  | 1947 | 30 |
| 1985 | 20  | 1946 | 26 |
| 1984 | 28  | 1945 | 17 |
| 1983 | 40  | 1944 | 21 |
| 1982 | 33  | 1943 | 25 |
| 1981 | 33  | 1942 | 7  |
| 1980 | 44  | 1941 | 8  |
| 1979 | 39  | 1940 | 13 |
| 1978 | 43  | 1939 | 6  |
| 1977 | 37  | 1938 | 1  |
| 1976 | 42  | 1937 | 2  |
| 1975 | 37  | 1936 | 1  |

**Table 2.** Related Field Totals of Sociometry Papers by Clusters

| RELATED FIELDS CLUSTERS     | Related Articles | %    |
|-----------------------------|------------------|------|
| MEDICAL AND HEALTH SCIENCES | 1153             | 36%  |
| NATURAL SCIENCES            | 139              | 4%   |
| HUMANITIES                  | 25               | 0,7% |
| ENGINEERING AND TECHNOLOGY  | 9                | 0,3% |
| AGRICULTURAL SCIENCES       | 2                | 0,1% |

**Table 3.** Citations to Sociometry Related Papers per Year (Impact)

|      |      |      |     |      |    |
|------|------|------|-----|------|----|
| 2013 | 2493 | 1983 | 164 | 1955 | 39 |
| 2012 | 2615 | 1982 | 145 | 1954 | 34 |
| 2011 | 2506 | 1981 | 146 | 1953 | 41 |
| 2010 | 2246 | 1980 | 149 | 1952 | 29 |
| 2009 | 2031 | 1979 | 142 | 1951 | 28 |
| 2008 | 1772 | 1978 | 138 | 1950 | 27 |
| 2007 | 1572 | 1977 | 112 | 1949 | 18 |
| 2006 | 1337 | 1976 | 115 | 1948 | 27 |
| 2005 | 1146 | 1975 | 87  | 1947 | 22 |
| 2004 | 1035 | 1974 | 91  | 1946 | 13 |
| 2003 | 851  | 1973 | 86  | 1945 | 13 |
| 2002 | 829  | 1972 | 76  | 1944 | 8  |
| 2001 | 789  | 1971 | 85  | 1943 | 12 |
| 2000 | 691  | 1970 | 76  | 1942 | 8  |
| 1999 | 639  | 1969 | 74  | 1941 | 6  |
| 1998 | 502  | 1968 | 76  | 1940 | 4  |
| 1997 | 401  | 1967 | 75  | 1938 | 1  |
| 1996 | 400  | 1966 | 83  |      |    |
| 1995 | 274  | 1965 | 60  |      |    |
| 1994 | 208  | 1964 | 67  |      |    |
| 1993 | 163  | 1963 | 33  |      |    |
| 1992 | 163  | 1962 | 37  |      |    |
| 1991 | 131  | 1961 | 40  |      |    |
| 1990 | 135  | 1960 | 53  |      |    |
| 1989 | 128  | 1959 | 46  |      |    |
| 1988 | 129  | 1958 | 45  |      |    |
| 1987 | 125  | 1957 | 56  |      |    |
| 1986 | 120  | 1956 | 46  |      |    |
| 1985 | 139  |      |     |      |    |
| 1984 | 137  |      |     |      |    |

**Table 4.** Related Fields Total of Sociometry Papers

| <b>Citing Articles Per Field Cluster</b> |              |          |
|--|--------------|----------|
|  | <b>Total</b> | <b>%</b> |
| SOCIAL SCIENCES                          | 22287        | 79,1%    |
| MEDICAL AND HEALTH SCIENCES              | 9947         | 35,3%    |
| NATURAL SCIENCES                         | 1765         | 6,3%     |
| HUMANITIES                               | 489          | 1,7%     |
| ENGINEERING AND TECHNOLOGY               | 318          | 1,1%     |
| AGRICULTURAL SCIENCES                    | 50           | 0,2%     |

**Table 5.** Total Number of Papers Published

|   |             |
|---|-------------|
| Total Number of Papers Pre 1992 (1936 – 1992)   | <b>1672</b> |
| Total Number of Papers After 1992 (1993 – 2013) | <b>1561</b> |

**Table 6.** Pre 1992 Total Number of Papers per Research Field (WoS, 2013)

| RESEARCH FIELDS                          | Total Papers |
|--|--------------|
| PSYCHOLOGY                               | 1346         |
| PSYCHIATRY                               | 450          |
| SOCIOLOGY                                | 94           |
| EDUCATION EDUCATIONAL RESEARCH           | 92           |
| MATHEMATICS                              | 81           |
| MATHEMATICAL METHODS IN SOCIAL SCIENCES  | 71           |
| SOCIAL SCIENCES OTHER TOPICS             | 31           |
| REHABILITATION                           | 30           |
| BUSINESS ECONOMICS                       | 29           |
| PEDIATRICS                               | 13           |
| PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH | 13           |
| ANTHROPOLOGY                             | 12           |
| COMMUNICATION                            | 9            |
| NEUROSCIENCES NEUROLOGY                  | 9            |
| BEHAVIORAL SCIENCES                      | 8            |
| GOVERNMENT LAW                           | 6            |
| SOCIAL WORK                              | 5            |
| CRIMINOLOGY PENOLOGY                     | 4            |
| PHARMACOLOGY PHARMACY                    | 4            |
| SOCIAL ISSUES                            | 4            |
| ZOOLOGY                                  | 4            |
| ARTS HUMANITIES OTHER TOPICS             | 3            |
| ENGINEERING                              | 3            |
| ETHNIC STUDIES                           | 3            |
| FAMILY STUDIES                           | 3            |

**Table 7.** Post 1992 Total Number of Papers per Research Field (WoS, 2013)

| RESEARCH FIELDS                          | Total Papers |
|--|--------------|
| PSYCHOLOGY                               | 1191         |
| EDUCATION EDUCATIONAL RESEARCH           | 142          |
| PSYCHIATRY                               | 102          |
| REHABILITATION                           | 91           |
| SOCIOLOGY                                | 55           |
| FAMILY STUDIES                           | 54           |
| BUSINESS ECONOMICS                       | 43           |
| COMMUNICATION                            | 35           |
| PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH | 34           |
| SOCIAL SCIENCES OTHER TOPICS             | 25           |
| ANTHROPOLOGY                             | 22           |
| NEUROSCIENCES NEUROLOGY                  | 22           |
| PEDIATRICS                               | 20           |
| COMPUTER SCIENCE                         | 19           |
| BIOMEDICAL SOCIAL SCIENCES               | 17           |
| INFORMATION SCIENCE LIBRARY SCIENCE      | 16           |
| BEHAVIORAL SCIENCES                      | 14           |
| SUBSTANCE ABUSE                          | 14           |
| MATHEMATICAL METHODS IN SOCIAL SCIENCES  | 12           |
| MATHEMATICS                              | 11           |
| HEALTH CARE SCIENCES SERVICES            | 9            |
| LINGUISTICS                              | 9            |
| SOCIAL WORK                              | 8            |
| CRIMINOLOGY PENOLOGY                     | 7            |
| ENGINEERING                              | 6            |

**Table 8.** Total Number of Citing Papers

|  |              |
|--|--------------|
| Total Number of Citing Papers Pre 1992 (1936 – 1992)   | <b>3940</b>  |
| Total Number of Citing Papers After 1992 (1993 – 2013) | <b>24492</b> |



**Table 9.** Pre 1992 Total Number of Citing Papers per Research Field (WoS, 2013)

| RESEARCH FIELDS                          | Total Papers |
|--|--------------|
| PSYCHOLOGY                               | 2393         |
| EDUCATION EDUCATIONAL RESEARCH           | 493          |
| SOCIOLOGY                                | 370          |
| PSYCHIATRY                               | 301          |
| BUSINESS ECONOMICS                       | 210          |
| SOCIAL SCIENCES OTHER TOPICS             | 208          |
| REHABILITATION                           | 203          |
| MATHEMATICS                              | 160          |
| MATHEMATICAL METHODS IN SOCIAL SCIENCES  | 140          |
| ANTHROPOLOGY                             | 113          |
| PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH | 62           |
| SCIENCE TECHNOLOGY AND OTHER TOPICS      | 60           |
| BEHAVIORAL SCIENCES                      | 53           |
| GOVERNMENT LAW                           | 49           |
| COMMUNICATION                            | 40           |
| PEDIATRICS                               | 35           |
| ZOOLOGY                                  | 34           |
| CRIMINOLOGY PENOLOGY                     | 27           |
| NEUROSCIENCES NEUROLOGY                  | 25           |
| FAMILY STUDIES                           | 24           |
| INFORMATION SCIENCE LIBRARY SCIENCE      | 24           |
| COMPUTER SCIENCE                         | 22           |
| GENETICS HEREDITY                        | 22           |
| ENVIRONMENTAL SCIENCES ECOLOGY           | 20           |
| BIOMEDICAL SOCIAL SCIENCES               | 18           |

**Table 10.** Pre 1992 Total Number of Citing Papers Per Research Field (WoS, 2013)

| RESEARCH FIELDS                          | Total Papers |
|--|--------------|
| PSYCHOLOGY                               | 15430        |
| PSYCHIATRY                               | 2298         |
| EDUCATION EDUCATIONAL RESEARCH           | 1991         |
| NEUROSCIENCES NEUROLOGY                  | 1437         |
| BUSINESS ECONOMICS                       | 1366         |
| REHABILITATION                           | 1092         |
| FAMILY STUDIES                           | 1021         |
| PEDIATRICS                               | 857          |
| PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH | 797          |
| SOCIOLOGY                                | 774          |
| BEHAVIORAL SCIENCES                      | 675          |
| COMPUTER SCIENCE                         | 593          |
| SOCIAL SCIENCES OTHER TOPICS             | 521          |
| SOCIAL WORK                              | 442          |
| CRIMINOLOGY PENOLOGY                     | 412          |
| COMMUNICATION                            | 380          |
| INFORMATION SCIENCE LIBRARY SCIENCE      | 355          |
| SUBSTANCE ABUSE                          | 297          |
| LINGUISTICS                              | 283          |
| ANTHROPOLOGY                             | 232          |
| HEALTH CARE SCIENCES SERVICES            | 230          |
| ENGINEERING                              | 224          |
| GOVERNMENT LAW                           | 222          |
| GENERAL INTERNAL MEDICINE                | 186          |
| SCIENCE TECHNOLOGY OTHER TOPICS          | 180          |

**Table 11.** 1936-to-1967 Total Number of Paper per Field

| RESEARCH FIELDS                          | Total Papers |
|--|--------------|
| PSYCHOLOGY                               | 585          |
| PSYCHIATRY                               | 178          |
| MATHEMATICS                              | 58           |
| MATHEMATICAL METHODS IN SOCIAL SCIENCES  | 49           |
| SOCIOLOGY                                | 42           |
| EDUCATION EDUCATIONAL RESEARCH           | 39           |
| BUSINESS ECONOMICS                       | 18           |
| SOCIAL SCIENCES OTHER TOPICS             | 12           |
| COMMUNICATION                            | 4            |
| NEUROSCIENCES NEUROLOGY                  | 4            |
| ENGINEERING                              | 3            |
| GOVERNMENT LAW                           | 3            |
| PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH | 3            |
| REHABILITATION                           | 3            |
| ANTHROPOLOGY                             | 2            |
| ARTS HUMANITIES OTHER TOPICS             | 2            |
| CRIMINOLOGY PENOLOGY                     | 2            |
| DEMOGRAPHY                               | 1            |
| FAMILY STUDIES                           | 1            |
| GERIATRICS GERONTOLOGY                   | 1            |
| HEALTH CARE SCIENCES SERVICES            | 1            |
| LINGUISTICS                              | 1            |
| NURSING                                  | 1            |
| PEDIATRICS                               | 1            |
| PUBLIC ADMINISTRATION                    | 1            |

**Table 12.** 1968-to-1992 Total Number of Paper per Field

| RESEARCH FIELDS                          | Total Papers |
|--|--------------|
| PSYCHOLOGY                               | 722          |
| PSYCHIATRY                               | 245          |
| EDUCATION EDUCATIONAL RESEARCH           | 51           |
| SOCIOLOGY                                | 44           |
| REHABILITATION                           | 27           |
| MATHEMATICS                              | 22           |
| MATHEMATICAL METHODS IN SOCIAL SCIENCES  | 21           |
| SOCIAL SCIENCES OTHER TOPICS             | 19           |
| PEDIATRICS                               | 12           |
| ANTHROPOLOGY                             | 10           |
| BUSINESS ECONOMICS                       | 10           |
| PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH | 10           |
| BEHAVIORAL SCIENCES                      | 8            |
| COMMUNICATION                            | 5            |
| NEUROSCIENCES NEUROLOGY                  | 5            |
| SOCIAL WORK                              | 5            |
| PHARMACOLOGY PHARMACY                    | 4            |
| SOCIAL ISSUES                            | 4            |
| ZOOLOGY                                  | 4            |
| GOVERNMENT LAW                           | 3            |
| BIOMEDICAL SOCIAL SCIENCES               | 2            |
| COMPUTER SCIENCE                         | 2            |
| CRIMINOLOGY PENOLOGY                     | 2            |
| ETHNIC STUDIES                           | 2            |
| FAMILY STUDIES                           | 2            |

**Table 13.** 1936-to-1967 Total Number of Citing Paper per Field

| RESEARCH FIELDS                             | Total Papers |
|---|--------------|
| PSYCHOLOGY                                  | 612          |
| EDUCATION<br>EDUCATIONAL RESEARCH           | 157          |
| PSYCHIATRY                                  | 82           |
| SOCIOLOGY                                   | 80           |
| BUSINESS ECONOMICS                          | 59           |
| MATHEMATICS                                 | 55           |
| MATHEMATICAL METHODS<br>IN SOCIAL SCIENCES  | 46           |
| SOCIAL SCIENCES OTHER<br>TOPICS             | 46           |
| REHABILITATION                              | 15           |
| PUBLIC ENVIRONMENTAL<br>OCCUPATIONAL HEALTH | 11           |
| GOVERNMENT LAW                              | 10           |
| COMMUNICATION                               | 9            |
| ANTHROPOLOGY                                | 7            |
| FAMILY STUDIES                              | 7            |
| NEUROSCIENCES<br>NEUROLOGY                  | 6            |
| CRIMINOLOGY PENOLOGY                        | 4            |
| GENETICS HEREDITY                           | 4            |
| NURSING                                     | 4            |
| SCIENCE TECHNOLOGY<br>OTHER TOPICS          | 4            |
| ZOOLOGY                                     | 4            |
| GENERAL INTERNAL<br>MEDICINE                | 3            |
| PEDIATRICS                                  | 3            |
| PUBLIC ADMINISTRATION                       | 3            |
| SOCIAL ISSUES                               | 3            |
| BEHAVIORAL SCIENCES                         | 2            |

**Table 14.** 1968-to-1992 Total Number of Citing Paper per Field

| RESEARCH FIELDS                             | Total Papers |
|---|--------------|
| PSYCHOLOGY                                  | 1781         |
| EDUCATION EDUCATIONAL<br>RESEARCH           | 336          |
| SOCIOLOGY                                   | 290          |
| PSYCHIATRY                                  | 219          |
| REHABILITATION                              | 188          |
| SOCIAL SCIENCES OTHER<br>TOPICS             | 162          |
| BUSINESS ECONOMICS                          | 151          |
| ANTHROPOLOGY                                | 106          |
| MATHEMATICS                                 | 105          |
| MATHEMATICAL METHODS<br>IN SOCIAL SCIENCES  | 94           |
| SCIENCE TECHNOLOGY<br>OTHER TOPICS          | 56           |
| BEHAVIORAL SCIENCES                         | 51           |
| PUBLIC ENVIRONMENTAL<br>OCCUPATIONAL HEALTH | 51           |
| GOVERNMENT LAW                              | 39           |
| PEDIATRICS                                  | 32           |
| COMMUNICATION                               | 31           |
| ZOOLOGY                                     | 30           |
| INFORMATION SCIENCE<br>LIBRARY SCIENCE      | 24           |
| CRIMINOLOGY PENOLOGY                        | 23           |
| COMPUTER SCIENCE                            | 22           |
| NEUROSCIENCES<br>NEUROLOGY                  | 19           |
| BIOMEDICAL SOCIAL<br>SCIENCES               | 18           |
| ENVIRONMENTAL SCIENCES<br>ECOLOGY           | 18           |
| GENETICS HEREDITY                           | 18           |
| SOCIAL WORK                                 | 18           |