Supplemental Materials

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**Table S1.**

*Baseline Metrics of the Full Academic Network*

|  |  |  |
| --- | --- | --- |
| Metric | 2010 | 2020 |
| N of Nodes (disciplines) | 254 | 254 |
| N of Edges (directed citation relations) | 20,119 | 35,826 |
| Median Degree (existing relations per node) | 162 | 316 |
| Median Weighted Degree | 1,907 | 11,549 |
| Density | .31 | .56 |
| Median Clustering Coefficient | .69 | .80 |
| Average Distance | 1.54 | 1.37 |
| Median Reciprocity | .65 | .81 |

**Table S2.**

*Baseline Metrics of Five Social Science Disciplines in the Full Academic Network*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Metric | Year | Communication | Psychology | Political Science | Sociology | Business |
| N of articles | 2010 | 2,381 | **28,551** | 5,797 | 4,500 | 9,073 |
| 2020 | 6,567 | **55,699** | 10,939 | 8,682 | 19,781 |
| Change1 | **176%** | 95% | 89% | 93% | 118% |
| Indegree (In-Citation) | 2010 | 150 | **225** | 132 | 173 | 177 |
| 2020 | 221 | **246** | 208 | 234 | 235 |
| Change | 47% | 9% | **58%** | 35% | 33% |
| Outdegree(Out-Citation) | 2010 | 115 | **145** | 109 | 131 | 128 |
| 2020 | 168 | **184** | 151 | 175 | 183 |
| Change | **46%** | 27% | 39% | 34% | 43% |
| Weighted Indegree (In-Citation Volume) | 2010 | 2,177 | **73,710** | 3,915 | 4,657 | 12,267 |
| 2020 | 19,163 | **297,752** | 28,827 | 29,271 | 92,068 |
| Change | **780%** | 304% | 636% | 529% | 651% |
| Weighted Out-degree (Out -Citation Volume) | 2010 | 2,872 | **14,135** | 4,144 | 5,172 | 8,451 |
| 2020 | 20,894 | 31,903 | 21,396 | 24,327 | **64,910** |
| Change | 628% | 126% | 416% | 370% | **668%** |
| Degree Centrality | 2010 | 1.047 | **1.462** | 0.953 | 1.202 | 1.206 |
| 2020 | 1.538 | **1.700** | 1.419 | 1.617 | 1.652 |
| Change | 47% | 16% | **49%** | 35% | 37% |
| Betweenness Centrality | 2010 | .0039 | **.0143** | .0033 | .0063 | .0074 |
| 2020 | .0024 | **.0039** | .0028 | .0039 | .0036 |
| Change | -38% | **-73%** | -15% | -38% | -51% |
| Closeness Centrality | 2010 | .71 | **.90** | .68 | .76 | .77 |
| 2020 | .89 | **.97** | .85 | .93 | .93 |
| Change | 25% | 8% | **26%** | 22% | 21% |
| Clustering Coefficient | 2010 | **.63** | .46 | .63 | .55 | .54 |
| 2020 | .72 | .67 | **.74** | .69 | .69 |
| Change | 16% | **47%** | 19% | 25% | 27% |
| Reciprocity | 2010 | .79 | .78 | .75 | .80 | **.81** |
| 2020 | .84 | .86 | .84 | .85 | **.87** |
| Change | 6% | 9% | **12%** | 6% | 7% |

**Table S3.**

*Ego-networks of Five Neighboring Disciplines (with only Top 10 Neighbors)*

S3a. Top 10 Neighbors based on In-citations to each Ego in Column Heading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | Ranking | Communication | Psychology | Political Science | Sociology | Business |
| 2010 | 1st | psychology | psychiatry | international relations | psychology | management |
| 2nd | information science library science | psychology experimental | economics | political science | economics |
| 3rd | business | neurosciences | public administration | social sciences interdisciplinary | psychology |
| 4th | psychology social | psychology clinical | sociology | economics | psychology applied |
| 5th | linguistics | psychology multidisciplinary | area studies | public environmental occupational health | operations research management science |
| 6th | sociology | behavioral sciences | environmental studies | psychology social | business finance |
| 7th | political science | clinical neurology | law | environmental sciences | ethics |
| 8th | public environmental occupational health | psychology developmental | social sciences interdisciplinary | environmental studies | engineering industrial |
| 9th | social sciences interdisciplinary | psychology biological | psychology | education educational research | environmental studies |
| 10th | language linguistics | psychology applied | geography | social sciences biomedical | information science library science |
| 2020 | 1st | psychology | psychiatry | international relations | psychology | management |
| 2nd | political science | neurosciences | economics | political science | economics |
| 3rd | sociology | psychology clinical | public administration | social sciences interdisciplinary | psychology |
| 4th | business | psychology experimental | sociology | economics | environmental studies |
| 5th | psychology multidisciplinary | psychology multidisciplinary | area studies | public environmental occupational health | environmental sciences |
| 6th | information science library science | clinical neurology | environmental studies | environmental sciences | green sustainable science technology |
| 7th | social sciences interdisciplinary | public environmental occupational health | geography | environmental studies | information science library science |
| 8th | psychology social | psychology developmental | psychology | hospitality leisure sport tourism | business finance |
| 9th | public environmental occupational health | multidisciplinary sciences | communication | management | psychology applied |
| 10th | management | behavioral sciences | social sciences interdisciplinary | communication | hospitality leisure sport tourism |

S3b. Top 10 Neighbors based on Out-citations from each Ego in Column Heading

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | Ranking | Communication | Psychology | Political Science | Sociology | Business |
| 2010 | 1st | information science library science | psychiatry | international relations | social sciences interdisciplinary | management |
| 2nd | business | psychology experimental | economics | public environmental occupational health | economics |
| 3rd | sociology | psychology clinical | public administration | economics | business finance |
| 4th | political science | psychology multidisciplinary | sociology | political science | psychology applied |
| 5th | linguistics | psychology | law | hospitality leisure sport tourism | operations research management science |
| 6th | psychology social | psychology developmental | environmental studies | geography | computer science information systems |
| 7th | education educational research | psychology social | area studies | education educational research | ethics |
| 8th | public environmental occupational health | behavioral sciences | social sciences interdisciplinary | environmental studies | environmental studies |
| 9th | management | psychology applied | geography | psychology social | engineering industrial |
| 10th | social sciences interdisciplinary | clinical neurology | communication | social sciences biomedical | information science library science |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2020 | 1st | computer science information systems | psychology multidisciplinary | international relations | hospitality leisure sport tourism | management |
| 2nd | engineering electrical electronic | psychiatry | economics | social sciences interdisciplinary | economics |
| 3rd | telecommunications | psychology clinical | public administration | environmental sciences | business finance |
| 4th | business | public environmental occupational health | environmental studies | public environmental occupational health | environmental sciences |
| 5th | psychology multidisciplinary | psychology experimental | sociology | environmental studies | environmental studies |
| 6th | public environmental occupational health | neurosciences | communication | communication | green sustainable science technology |
| 7th | political science | psychology developmental | environmental sciences | political science | computer science information systems |
| 8th | computer science artificial intelligence | education educational research | area studies | management | hospitality leisure sport tourism |
| 9th | information science library science | psychology social | geography | economics | information science library science |
| 10th | social sciences interdisciplinary | environmental sciences | social sciences interdisciplinary | education educational research | psychology applied |

**Table S4.**

*List of Measures of 46 Social Science Disciplines*

S4a. 2010

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Social Science Disciplines** | **SCR** | **IOR** | **ODD** | **IDD** | **C\_TO\_SSCI** | **C\_BY\_SSCI** | **Reciprocity** |
| anthropology | 28.2% | 1.33 | 5.158 | 6.111 | 28.88% | 20.50% | 0.702 |
| area studies | 24.5% | 1.20 | 4.452 | 4.964 | 81.33% | 66.73% | 0.646 |
| **business** | **28.0%** | **1.55** | **4.606** | **4.381** | **76.65%** | **75.93%** | **0.813** |
| business finance | 25.5% | 0.61 | 2.774 | 3.442 | 86.38% | 77.73% | 0.743 |
| **communication** | **23.3%** | **0.91** | **5.537** | **5.967** | **65.00%** | **55.08%** | **0.792** |
| criminology penology | 24.4% | 0.59 | 4.686 | 5.021 | 68.14% | 55.00% | 0.726 |
| demography | 19.3% | 1.18 | 5.047 | 5.497 | 58.85% | 56.22% | 0.774 |
| development studies | 17.8% | 1.39 | 4.851 | 5.299 | 78.29% | 67.14% | 0.709 |
| economics | 33.2% | 1.17 | 5.233 | 5.832 | 61.24% | 48.89% | 0.836 |
| education special | 16.0% | 0.68 | 4.220 | 4.435 | 63.57% | 54.81% | 0.706 |
| environmental studies | 18.9% | 1.35 | 5.031 | 5.684 | 53.99% | 35.35% | 0.793 |
| ergonomics | 16.9% | 1.29 | 4.575 | 5.399 | 44.99% | 30.81% | 0.689 |
| ethics | 20.2% | 1.05 | 4.813 | 5.188 | 57.45% | 50.03% | 0.801 |
| family studies | 16.0% | 0.78 | 4.619 | 5.169 | 65.07% | 54.95% | 0.795 |
| geography | 22.3% | 1.32 | 5.064 | 5.638 | 69.76% | 46.24% | 0.738 |
| gerontology | 20.1% | 1.63 | 4.632 | 5.178 | 35.35% | 18.64% | 0.749 |
| health policy services | 16.0% | 1.28 | 4.941 | 5.391 | 27.80% | 18.54% | 0.876 |
| history philosophy of science | 20.1% | 1.04 | 4.330 | 6.229 | 23.09% | 29.54% | 0.691 |
| industrial relations labor | 17.8% | 0.92 | 4.602 | 4.457 | 81.23% | 76.27% | 0.708 |
| information science library science | 26.2% | 1.21 | 5.000 | 5.404 | 37.82% | 25.35% | 0.768 |
| international relations | 30.9% | 1.28 | 4.199 | 4.628 | 75.54% | 63.03% | 0.721 |
| linguistics | 24.6% | 0.89 | 4.046 | 4.617 | 41.57% | 30.99% | 0.716 |
| management | 26.0% | 1.18 | 4.781 | 5.289 | 69.47% | 43.27% | 0.804 |
| **political science** | **33.0%** | **1.01** | **4.802** | **5.031** | **79.43%** | **73.82%** | **0.747** |
| **psychology** | **25.1%** | **5.83** | **5.073** | **5.650** | **44.24%** | **49.36%** | **0.784** |
| psychology applied | 16.2% | 0.77 | 4.314 | 5.403 | 76.38% | 62.15% | 0.792 |
| psychology biological | 10.0% | 1.30 | 3.986 | 5.020 | 55.79% | 29.41% | 0.741 |
| psychology clinical | 14.9% | 0.86 | 4.203 | 5.040 | 59.28% | 34.82% | 0.831 |
| psychology developmental | 16.1% | 0.98 | 4.251 | 5.373 | 66.33% | 42.09% | 0.840 |
| psychology educational | 15.3% | 0.87 | 3.969 | 4.972 | 73.47% | 53.63% | 0.769 |
| psychology experimental | 18.0% | 0.98 | 4.069 | 5.096 | 61.29% | 36.75% | 0.827 |
| psychology mathematical | 10.1% | 0.88 | 4.092 | 4.956 | 71.05% | 59.85% | 0.707 |
| psychology multidisciplinary | 11.2% | 0.87 | 4.772 | 5.945 | 66.69% | 46.84% | 0.826 |
| psychology psychoanalysis | 22.2% | 0.38 | 3.022 | 2.961 | 71.90% | 60.34% | 0.421 |
| psychology social | 17.1% | 1.15 | 4.107 | 5.851 | 80.79% | 57.66% | 0.803 |
| public administration | 21.6% | 0.93 | 4.773 | 5.070 | 77.83% | 71.43% | 0.782 |
| regional urban planning | 13.9% | 1.18 | 4.789 | 5.164 | 72.92% | 56.22% | 0.729 |
| rehabilitation | 18.7% | 0.72 | 5.139 | 5.368 | 42.61% | 30.78% | 0.806 |
| social issues | 16.4% | 1.01 | 4.998 | 5.233 | 64.34% | 56.02% | 0.820 |
| social sciences biomedical | 15.0% | 1.19 | 5.175 | 5.574 | 44.85% | 36.75% | 0.836 |
| social sciences mathematical methods | 12.5% | 1.04 | 4.423 | 4.989 | 48.19% | 50.07% | 0.762 |
| **sociology** | **21.0%** | **1.03** | **5.731** | **6.134** | **64.32%** | **56.00%** | **0.796** |
| substance abuse | 22.0% | 0.84 | 4.144 | 4.848 | 47.40% | 26.77% | 0.803 |
| transportation | 18.4% | 0.94 | 4.436 | 5.069 | 44.10% | 27.78% | 0.713 |
| urban studies | 16.8% | 1.49 | 4.722 | 5.114 | 73.69% | 61.17% | 0.751 |
| women s studies | 11.2% | 0.76 | 5.228 | 5.633 | 61.39% | 43.54% | 0.773 |

S4b. 2020

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Social Science Disciplines** | **SCR** | **IOR** | **ODD** | **IDD** | **C\_TO\_SSCI** | **C\_BY\_SSCI** | **Reciprocity** |
| anthropology | 17.4% | 1.18 | 5.720 | 6.233 | 34.43% | 26.95% | 0.864 |
| area studies | 13.6% | 0.94 | 5.075 | 5.523 | 73.96% | 61.43% | 0.735 |
| **business** | **22.8%** | **1.42** | **5.045** | **5.098** | **66.78%** | **57.70%** | **0.871** |
| business finance | 18.8% | 0.67 | 3.815 | 4.717 | 78.62% | 61.12% | 0.848 |
| **communication** | **20.8%** | **0.92** | **5.617** | **6.165** | **66.67%** | **48.41%** | **0.838** |
| criminology penology | 19.1% | 0.75 | 4.909 | 5.604 | 71.53% | 54.52% | 0.874 |
| demography | 16.5% | 1.15 | 5.313 | 5.769 | 61.47% | 51.92% | 0.795 |
| development studies | 9.8% | 1.38 | 5.268 | 5.358 | 65.65% | 49.53% | 0.856 |
| economics | 25.9% | 1.39 | 5.486 | 5.829 | 61.20% | 44.07% | 0.924 |
| education special | 12.7% | 0.71 | 4.416 | 4.987 | 65.87% | 51.48% | 0.807 |
| environmental studies | 14.8% | 1.15 | 5.432 | 5.661 | 40.69% | 21.59% | 0.937 |
| ergonomics | 11.4% | 1.49 | 5.450 | 6.001 | 41.64% | 24.36% | 0.891 |
| ethics | 16.4% | 1.53 | 5.288 | 5.851 | 54.98% | 46.62% | 0.804 |
| family studies | 11.3% | 0.81 | 4.715 | 5.396 | 67.61% | 49.64% | 0.841 |
| geography | 15.7% | 1.50 | 5.346 | 5.743 | 63.15% | 38.25% | 0.850 |
| gerontology | 19.7% | 1.92 | 4.875 | 5.582 | 35.42% | 16.48% | 0.820 |
| health policy services | 10.6% | 1.18 | 5.415 | 5.801 | 32.69% | 19.16% | 0.887 |
| history philosophy of science | 14.7% | 1.02 | 5.101 | 6.124 | 34.38% | 31.46% | 0.840 |
| industrial relations labor | 12.2% | 1.03 | 5.023 | 5.166 | 76.69% | 65.31% | 0.813 |
| information science library science | 15.6% | 1.41 | 5.651 | 5.934 | 48.81% | 29.95% | 0.880 |
| international relations | 21.3% | 1.27 | 4.685 | 5.221 | 74.61% | 60.55% | 0.799 |
| linguistics | 21.9% | 0.88 | 4.387 | 5.044 | 39.13% | 27.35% | 0.797 |
| management | 22.2% | 1.53 | 5.232 | 5.616 | 60.79% | 37.89% | 0.919 |
| **political science** | **31.5%** | **1.35** | **5.146** | **5.493** | **77.92%** | **67.03%** | **0.836** |
| **psychology** | **23.2%** | **9.33** | **5.399** | **5.948** | **42.51%** | **47.22%** | **0.856** |
| psychology applied | 11.4% | 1.02 | 4.893 | 5.813 | 70.36% | 52.74% | 0.894 |
| psychology biological | 7.2% | 1.60 | 4.703 | 5.993 | 55.09% | 33.56% | 0.828 |
| psychology clinical | 12.7% | 0.97 | 4.625 | 5.499 | 55.84% | 35.84% | 0.873 |
| psychology developmental | 12.9% | 0.86 | 4.501 | 5.538 | 63.43% | 40.78% | 0.864 |
| psychology educational | 12.0% | 1.06 | 4.291 | 5.158 | 69.23% | 48.01% | 0.828 |
| psychology experimental | 13.2% | 1.07 | 4.638 | 6.052 | 61.93% | 38.54% | 0.883 |
| psychology mathematical | 8.4% | 1.44 | 4.317 | 5.840 | 65.32% | 46.72% | 0.657 |
| psychology multidisciplinary | 8.8% | 0.77 | 5.200 | 6.209 | 59.88% | 38.57% | 0.915 |
| psychology psychoanalysis | 11.1% | 0.28 | 4.024 | 3.997 | 64.62% | 55.41% | 0.615 |
| psychology social | 10.9% | 1.36 | 4.571 | 5.875 | 74.15% | 51.88% | 0.851 |
| public administration | 18.1% | 1.14 | 5.206 | 5.535 | 73.71% | 59.15% | 0.819 |
| regional urban planning | 9.9% | 1.36 | 5.163 | 5.280 | 63.79% | 47.37% | 0.856 |
| rehabilitation | 15.3% | 0.91 | 5.475 | 5.954 | 40.20% | 26.22% | 0.850 |
| social issues | 11.3% | 1.10 | 5.794 | 6.047 | 60.94% | 49.07% | 0.870 |
| social sciences biomedical | 11.1% | 1.11 | 5.392 | 5.840 | 46.12% | 33.12% | 0.864 |
| social sciences mathematical methods | 10.6% | 1.46 | 4.842 | 5.671 | 49.74% | 45.93% | 0.811 |
| **sociology** | **14.3%** | **1.20** | **5.839** | **6.135** | **62.34%** | **50.27%** | **0.846** |
| substance abuse | 18.1% | 0.95 | 4.619 | 5.267 | 41.26% | 25.35% | 0.842 |
| transportation | 15.4% | 1.34 | 4.926 | 5.434 | 42.13% | 23.12% | 0.855 |
| urban studies | 13.8% | 1.85 | 5.139 | 5.289 | 58.83% | 46.98% | 0.844 |
| women s studies | 11.3% | 1.29 | 5.570 | 6.060 | 65.77% | 49.71% | 0.801 |