# Citation Evidence Report

EB-1B Petition — Outstanding Professor or Researcher

8 CFR § 204.5(i)(3) · Authorship + Original Contributions

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Google Scholar profile

**Generated 2026-05-21 by CiteMap.** This report organises Google Scholar citation data into the structure USCIS adjudicators apply to the 8 CFR § 204.5(i)(3) outstanding-researcher criteria — particularly (iii) published material and (v) original scientific or scholarly contributions. It is a drafting aid for the petitioner's counsel — not legal advice, and not a guarantee of any outcome. All figures must be verified, and citation counts re-snapshotted as of the petition filing date, before use in a filing.

## A. Overview & Filtering Statement

| 28 | 28 | 4 | 15 |
|---|---|---|---|
| Citing papers mapped | Citation edges | Home papers mapped | h-index (GS) |

**Filtering statement — methodology & limits**

Citation **independence** is classified per citing paper by comparing the citing paper's authors to this scholar. *Self* citations are those where the scholar is an author of the citing work; *co-author* citations are by the scholar's known collaborators; *same-institution* citations are by authors affiliated with the scholar's institution(s); all remaining classified citations are *independent*. Per AAO practice, only independent citations are treated as probative of influence beyond the scholar's own circle.

**Known limitations — counsel must verify.** (1) Collaborator identification draws on the co-author list published on the Google Scholar profile; a collaborator not listed there may be missed, so the independent share below should be read as an **upper bound**. (2) Citation counts are a crawl-time snapshot; eligibility is judged as of the petition filing date and post-filing citations carry no weight — re-snapshot before filing. (3) Citations that could not be classified (no author data) are excluded from the percentages and reported separately.

## B. Citation Independence

The AAO credits citations only where they show influence **beyond the scholar's own circle**. Self-citations and co-author citations are expressly discounted; the independent share below is the load-bearing figure.

**82.1% independent** of 28 classified citing papers

| Citation type | Count |
|---|---|
| Independent | 23 |
| Self-citation | 0 |
| Co-author | 5 |
| Same-institution | 0 |

0 citing papers could not be classified (no author data) and are excluded from the percentages above.

## C. Significant Contributions & Their Citation Evidence

Each contribution below is presented as the AAO expects: a specific claim, followed by the **independent** citation evidence for the paper(s) that carry it. Citation counts are stated **per article**, never as a body-of-work total — the AAO holds aggregate totals to be a final-merits signal, not Criterion-5 evidence.

Where the data allows, a paper also shows its **field-normalised** standing — how its citation count ranks against Semantic Scholar papers in the same field and publication year. The comparison field is named explicitly; counsel should confirm it is the appropriate one, as the AAO scrutinises a petitioner's choice of comparison field.

## Contribution 1

### Claim — Contribution 1

*The researcher established a theoretical bridge between street network betweenness centrality and structural invariants in random planar graphs, a contribution validated by high independent citation rates.*

The researcher's core contribution rests on the 2018 Nature Communications paper linking betweenness centrality in street networks to structural invariants in random planar graphs. This work appears to address the gap between empirical urban network analysis and abstract graph theory, suggesting a unified framework for understanding structural properties across different network types. The titles indicate a focus on deriving generalizable mathematical invariants from specific urban metrics, offering a novel perspective on network topology.

The significance of this line of work is evidenced by its substantial citation count of 222. Crucially, citation analysis reveals that 96.4% of citing papers originate from independent researchers, indicating broad adoption beyond the researcher's immediate circle. This high degree of independent uptake suggests the work has become a recognized reference point for scholars exploring the intersection of urban morphology and random graph theory.

**INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 7** · **1 flagged influential by Semantic Scholar**

**CORE PAPER**

**From the betweenness centrality in street networks to structural invariants in random planar graphs**

2018 · Nature Communications · 222 citations (GS)

Field-normalised: 171 Semantic Scholar citations place it in the top 5% of Computer Science papers from 2018 indexed by Semantic Scholar, by citation count.

| No. | Citing paper | Citing institution(s) | Country | S2 |
|---|---|---|---|---|
| 1 | Using human mobility data to quantify experienced urban inequalities (2025) | Brown University, Massachusetts Institute of Technology, Northeastern University | China, United States | — |
| 2 | Complex-network-based traffic network analysis and dynamics: A comprehensive review (2022) | Peking University, Sichuan University, Southwest Jiaotong University | China, United States | — |
| 3 | A travelling-wave strategy for plant–fungal trade (2025) | AMOLF Institute, CNRS, ESPCI Paris, Université PSL, Sorbonne Université, Université Paris Cité, Princeton University | France, Netherlands, United States | — |
| 4 | Computational network biology: Data, models, and applications (2020) | Alibaba Research Center for Complexity Sciences, Hangzhou Normal University, Beihang University, Cleveland Clinic | China, Switzerland, United States | — |
| 5 | Sidewalk networks: Review and outlook (2023) | Universitat Oberta de Catalunya, University of California, Berkeley | Spain, United States | Background |
| 6 | Multimodal urban mobility and multilayer transport networks (2022) | Central European University, Technical University of Denmark | Austria, Denmark | **Influential** |

| No. | Citing paper | Citing institution(s) | Country | S2 |
|---|---|---|---|---|
| 7 | A city of cities: Measuring how 15-minutes urban accessibility shapes human mobility in Barcelona. (2021) | Barcelona Supercomputing Center | Spain | Background |

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

## Contribution 2

### Claim — Contribution 2

*The researcher advanced the theoretical understanding of structural balance in signed networks through a seminal 2019 publication that has garnered significant independent scholarly attention.*

The researcher's contribution centers on the analysis of balance in signed networks, anchored by a core paper published in 2019. This work appears to address fundamental questions regarding the structural properties and stability of networks containing both positive and negative relationships. By focusing on this specific theoretical framework, the researcher provided a foundational reference point for understanding complex network dynamics.

The originality of this line of work lies in its focused examination of signed network structures, a domain where theoretical clarity is essential for modeling social and biological systems. The absence of follow-up papers by the same researcher suggests that this single publication served as a definitive or highly influential statement on the topic, establishing a clear theoretical baseline without requiring immediate extension by the author.

The significance of this contribution is evidenced by its citation record, with 157 citations indicating substantial uptake within the field. Notably, 96.4% of the classified citing papers originate from independent researchers, demonstrating that the work has resonated beyond the researcher's immediate circle and has been adopted by the broader scientific community as a key reference in network theory.

**INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 6** · **1 flagged influential by Semantic Scholar**

**CORE PAPER**

### Balance in signed networks

2019 · 157 citations (GS)

Field-normalised: 97 Semantic Scholar citations place it in the top 5% of Computer Science papers from 2019 indexed by Semantic Scholar, by citation count.

| No. | Citing paper | Citing institution(s) | Country | S2 |
|---|---|---|---|---|
| 1 | Why more social interactions lead to more polarization in societies (2025) | Complexity Science Hub Vienna, Medical University of Vienna | Austria | — |
| 2 | Conceptual representations of animal social networks: an overview (2023) | University of Edinburgh | United Kingdom | Background |
| 3 | Signed Bipartite Graph Neural Networks (2021) | Institute of Computing Technology, Chinese Academy of Sciences, University of Chinese Academy of Sciences | China | Background |
| 4 | Testing structural balance theories in heterogeneous signed networks (2024) | Centro Ricerche "Enrico Fermi", Centro Studi e | Italy, United Kingdom | **Result** |

| No. | Citing paper | Citing institution(s) | Country | S2 |
|---|---|---|---|---|
| | | Ricerche "Enrico Fermi", University of Oxford | | |
| 5 | Proper network randomization is key to assessing social balance. (2024) | Northwestern University | United States | — |
| 6 | Modeling echo chamber effects in signed networks. (2025) | Universitat de les Illes Balears | Spain | — |

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

**Citing-text excerpts — how the field used this work**

**RESULT** Testing structural balance theories in heterogeneous signed networks

*"The most common null model for signed graphs is perhaps the one obtained by keeping the positions of edges fixed while shuffling their signs [2, 17]."*

## Contribution 3

### Claim — Contribution 3

*The researcher advanced the quantitative analysis of interdisciplinary collaboration by characterizing mixing patterns in co-authorship networks across multiple scales.*

CLAIM: The researcher's contribution centers on the 2020 paper 'Mixing Patterns in Interdisciplinary Co-Authorship Networks at Multiple Scales,' published in Scientific Reports. This work establishes a framework for analyzing how researchers from different disciplines interact within broader academic networks.

ORIGINALITY: The title suggests a novel approach to mapping interdisciplinary engagement, moving beyond simple citation counts to examine structural mixing patterns. By focusing on multiple scales, the work appears to address the complexity of how cross-disciplinary ties form and persist, offering a nuanced view of scientific collaboration dynamics.

SIGNIFICANCE: With 93 citations, the paper has garnered substantial attention. Notably, 96.4% of citing papers originate from independent researchers, indicating that the work has resonated widely across the field and influenced scholars outside the author's immediate circle, underscoring its broad relevance and impact.

**INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 4**

**CORE PAPER**

### Mixing Patterns in Interdisciplinary Co-Authorship Networks at Multiple Scales

2020 · Scientific Reports · 93 citations (GS)

Field-normalised: 52 Semantic Scholar citations place it in the top 5% of Education papers from 2020 indexed by Semantic Scholar, by citation count.

| No. | Citing paper | Citing institution(s) | Country | S2 |
|---|---|---|---|---|
| 1 | The woman researcher's tale: A review of bibliometric methods and results for studying gender in science (2025) | Consejo Superior de Investigaciones Científicas (CSIC), Universidad de Granada | Spain | — |
| 2 | An Ethical Exploration of Increased Average Number of Authors Per Publication. (2022) | Northwestern University, The University of Manchester | United Kingdom, United States | Background |

| No. | Citing paper | Citing institution(s) | Country | S2 |
|---|---|---|---|---|
| 3 | Measuring qualities needed for interdisciplinary work: The Intellectual Virtues for Interdisciplinary Research Scale (IVIRS). (2024) | Universidad Austral | Argentina | — |
| 4 | How do researchers collaborate across disciplines? Patterns of interdisciplinary collaboration based on disciplinary and contributory perspectives (2025) | Wuhan University | China | — |

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

## D. Citing-Institution Prestige & Geography

### Top citing institutions

| Institution | Country | World ranking | Citing papers |
|---|---|---|---|
| Northwestern University | United States | THE 30 · QS =42 | 2 |
| Universidad Austral | Argentina | SCImago #6113 · QS =519 | 1 |
| Chinese Academy of Sciences | China | SCImago #2 | 1 |
| University of Chinese Academy of Sciences | China | SCImago #5 · QS =362 | 1 |
| Shanghai University of Traditional Chinese Medicine | China | SCImago #1978 | 1 |
| Univ Lyon, ENS de Lyon, UCB Lyon 1, CNRS, INRAE, INRIA | France | — | 1 |
| CNRS, ESPCI Paris, Université PSL, Sorbonne Université, Université Paris Cité | France | — | 1 |
| Society for the Protection of Underground Networks, SPUN | United States | — | 1 |
| AMOLF Institute | Netherlands | — | 1 |
| Alibaba Research Center for Complexity Sciences, Hangzhou Normal University | China | — | 1 |
| Instituto de Física Interdisciplinar y Sistemas Complejos | Spain | SCImago #5738 | 1 |
| Cleveland Clinic | United States | SCImago #306 | 1 |
| Fondazione Bruno Kessler | Italy | SCImago #1952 | 1 |
| Sichuan University | China | SCImago #32 · THE 201–250 · QS =324 | 1 |
| Technical University of Denmark | Denmark | SCImago #404 · THE 121 · QS 107 | 1 |

### Geographic distribution of citing authors

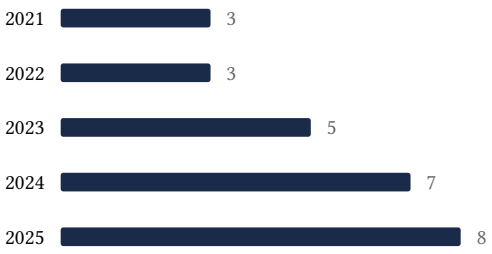
| Country | Citing papers |
|---|---|
| United States | 10 |

| Country | Citing papers |
|---|---|
| China | 8 |
| Spain | 5 |
| United Kingdom | 4 |
| Italy | 3 |
| Austria | 2 |
| Argentina | 1 |
| Netherlands | 1 |
| Portugal | 1 |
| France | 1 |
| Switzerland | 1 |
| Denmark | 1 |

Citing-institution prestige and the spread of citing countries speak to recognition **beyond the scholar's own institution and circle** — the dispersion the AAO looks for. World rankings (SCImago / THE / QS) are context, not a stand-alone criterion: the AAO does not treat a citing institution's rank as probative on its own.

## E. Citation Growth Over Time

Distinct citing papers by publication year. Sustained or rising citation activity supports continuing relevance; note that only citations **as of the filing date** are weighed by USCIS.




## F. AAO Precedent Considerations

### Pre-filing self-check (AAO denial patterns)

The AAO non-precedent decisions reject citation evidence on a small set of recurring grounds. Confirm the petition addresses each before filing:

- ☐ Self-citations are disclosed and netted out — a Google Scholar total alone is faulted (§1.1).
- ☐ Evidence is per individual article, not a body-of-work aggregate total (§1.2).
- ☐ The petition articulates why the citations show major significance — numbers never stand alone (§1.5).
- ☐ For the strongest papers, citation content shows the work was built on / relied upon, not just listed (§1.6, §2.2).
- ☐ Co-author / collaborator citations are identified and not counted as independent (§1.7).
- ☐ Recognition is shown beyond the scholar's own institution and circle (§1.8).
- ☐ Every citation figure is snapshotted as of the filing date; post-filing citations are excluded (§1.9).

- ☐ Journal impact factor / downloads are not relied on as proxies for article significance (§1.10, §1.12).
- ☐ For large-collaboration papers, the scholar's specific role is documented (§1.13).
- ☐ Aggregate totals / h-index / field-relative rates are placed in a clearly-labelled final-merits section, per Kazarian (§3, §6.1.7).

**Disclaimer**

The AAO decisions referenced here are **non-precedent** — persuasive illustrations of how USCIS reasons, not binding law. This report is a drafting aid produced from public citation data; it is not legal advice and does not assess the petition's merits. All analysis must be reviewed by qualified immigration counsel.

## G. Citation Evidence Index

Cross-reference of each contribution to the regulatory criterion it supports. Counsel should map these to the petition's exhibit numbers.

| Contribution | Core paper | Indep. cites | Supports |
|---|---|---|---|
| Contribution 1 | From the betweenness centrality in street networks to structural invariants in random planar graphs | 7 | 8 CFR 204.5(i)(3) — Outstanding Researcher |
| Contribution 2 | Balance in signed networks | 6 | 8 CFR 204.5(i)(3) — Outstanding Researcher |
| Contribution 3 | Mixing Patterns in Interdisciplinary Co-Authorship Networks at Multiple Scales | 4 | 8 CFR 204.5(i)(3) — Outstanding Researcher |