Are Program Committee Members Cited Differently?

Citation Patterns around PC Service in PL Conferences

ICFP POPL OOPSLA PLDI

Ender Sarı

Supervisor: Clément Pit-Claudel

Optional Research Project in Data Science

June 26, 2026

EPFL

Systems and Formalisms Laboratory

Outline

1. Introduction & Research Questions
2. Empirical Design
3. Data Construction & Validation
4. Event Study Analysis (RQ1)
5. Citation Source Analysis (RQ2)
6. Limitations
7. Future Work
8. Timeline & Reflection
9. Summary

Appendix

1. Introduction & Research Questions

- PC lists are public before submission.
- Authors may see who is listed.

Are PC members cited differently?

RQ1: Citation level: cited more around the PC year?

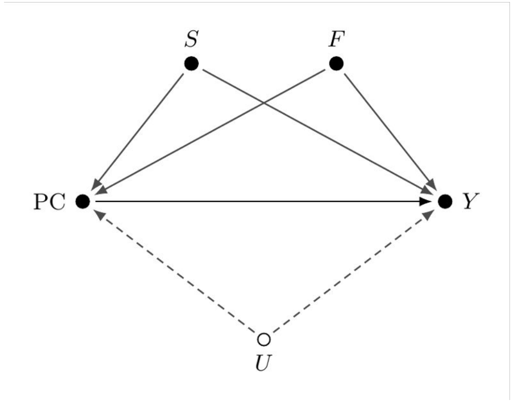
RQ2: Citation source: citations shift toward that conference?

Programming Languages Conferences: ICFP, POPL, OOPSLA, PLDI, 2017–2025

2. Empirical Design

- PC vs. non-PC comparison is not enough.
- PC service is not random.

Possible common causes of PC and citations (Y)



S = seniority
F = fit
U = unobserved

“Ideal” counterfactual (same researcher, listed vs. not) is unobservable.

↓

Panel by researcher × conference × year.

3. Data Construction - Steps

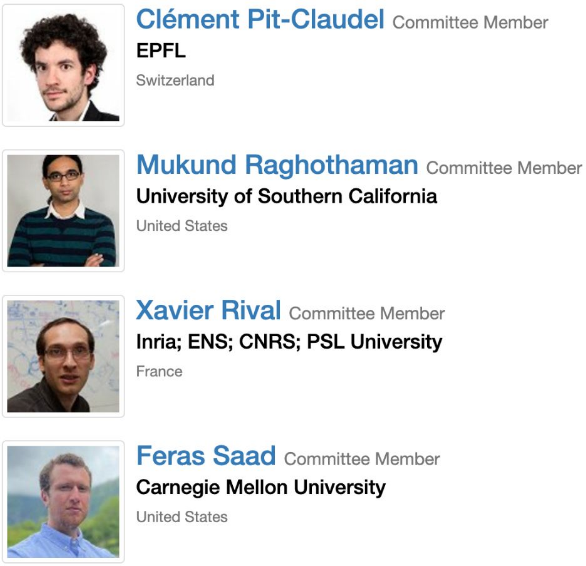
Step 1: PC Data

Public PC lists
Who served where and when

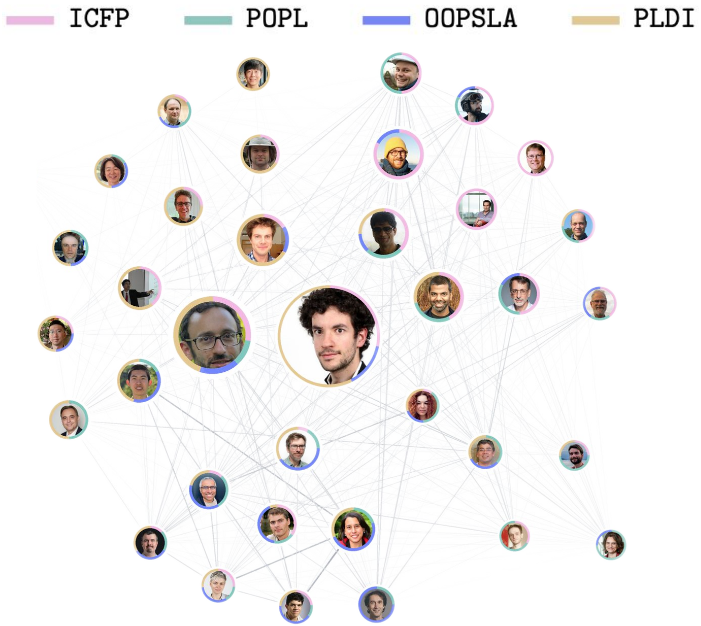
Step 2: Papers & Citations

Who cited whom, by conference year

OpenAlex



https://popl25.sigplan.org/committee/POPL-2025-popl-research-papers-program-committee



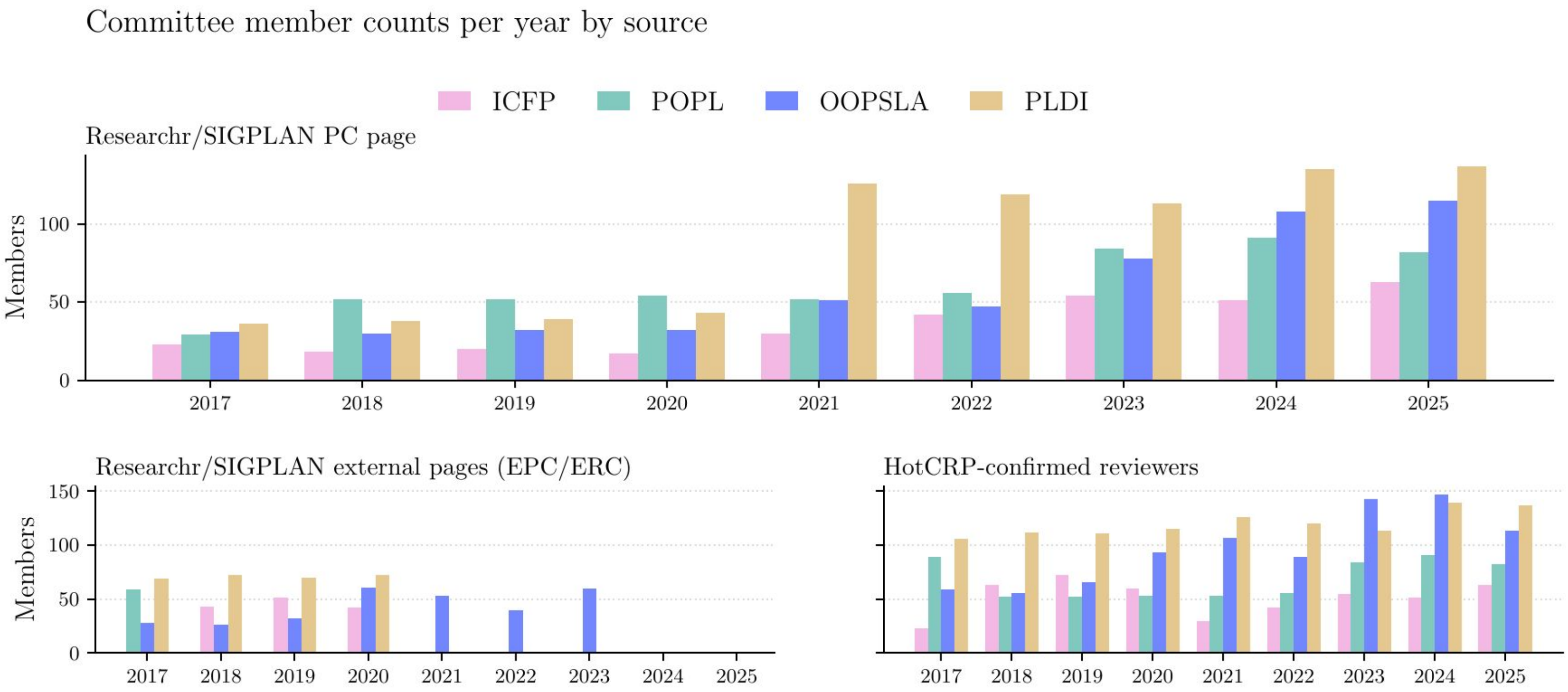
3. Data Construction - Final Panel Structure

Researcher	Conference	Year	PC status	Citations
r_1	ICFP	2021	0	2
r_1	ICFP	2022	1	7
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
r_2	POPL	2021	0	3
r_2	POPL	2022	0	4
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
r_i	c_j	t	p_{ijt}	y_{ijt}

Final panel: ~37K rows. 952 researchers.

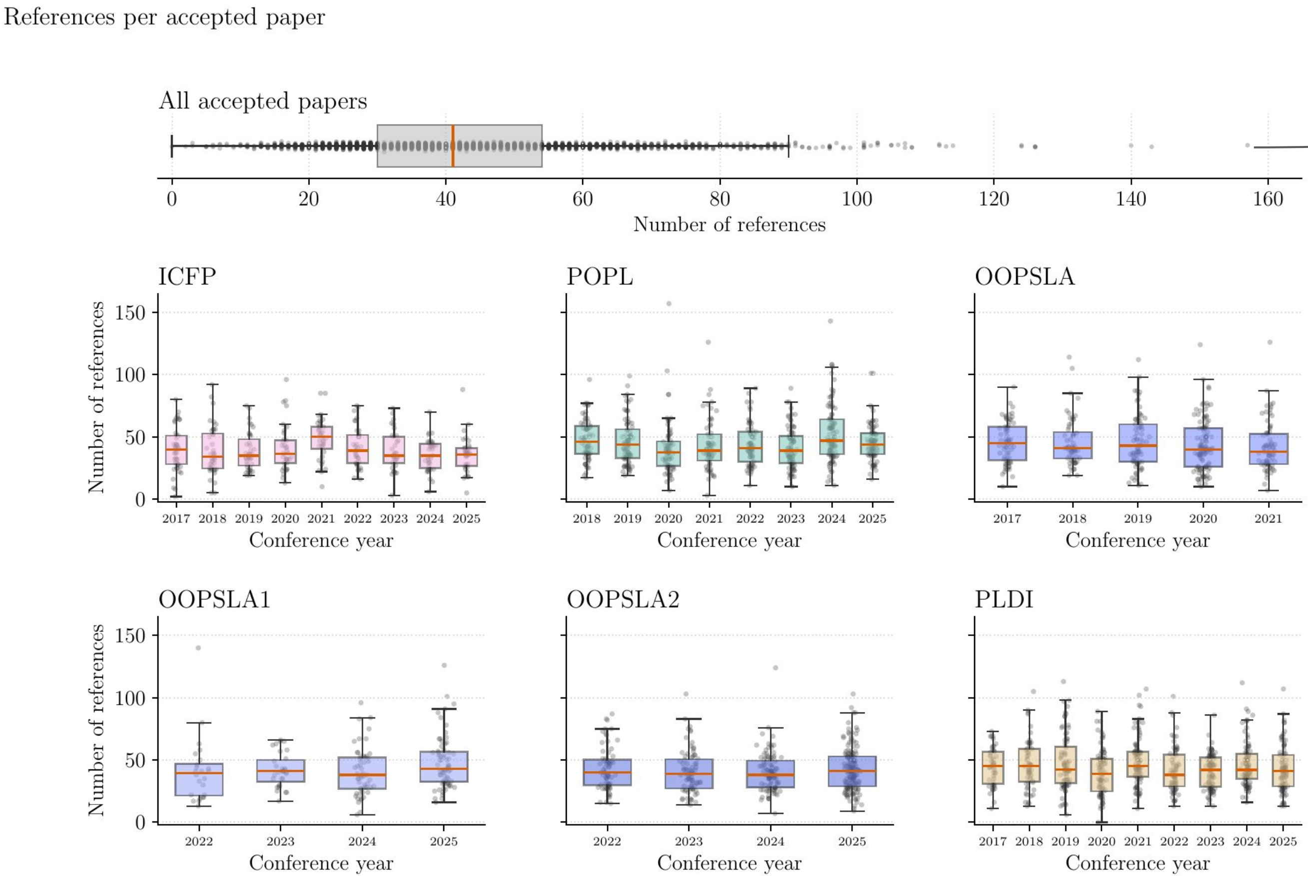
- One observation per researcher × conference × year.

3. Data Validation - PC Structure Matters



- **Structure differs by conference / year**
  - OOPSLA1/OOPSLA2 after 2021; PLDI source structure changes around 2021
    - POPL & ICFP most comparable.

3. Data Validation - Papers & Citations (OpenAlex)



Pointer life cycle types for lock-free data structures with memory reclamation

https://dl.acm.org/doi/10.1145/3371136

Reference coverage:

- Mean ~44
- Median 41
- (IQR 30–54)

4. Event Study (RQ1) - Method

Are PC members cited differently?

└ **RQ1: Citation level:** Do accepted papers cite PC members' earlier work more around their PC year?

1. Event Time

• For each researcher–conference, find the first PC-service year
• Set that year to t = 0
• Keep the window
t = −2, −1, **0**, +1, +2

first PC-service year

No follow-up same conference PC service at t=+1 or t=+2

⇨

2. Transform Outcome

• i = researcher-conference history
• t = event time

• x[i,t] = $\log_{10}$(citations[i,t] + 1)

• +1 keeps zero-citation observations.
• The log scale reduces skewness.

⇨

3. Compare to Own Baseline

• Use t= -2 as the baseline year.

• Compute the change relative to that baseline.

• d[i,t] = x[i,t] - x[i,-2]
• d[i,-2] = 0

(By construction)

⇨

4. Average & Add Uncertainty

• At each t, average d[i,t]

• Bootstrap researcher-conference histories 2,000 times.

• 95% CI = 2.5th to 97.5th percentiles.

⇨

5. Plotting

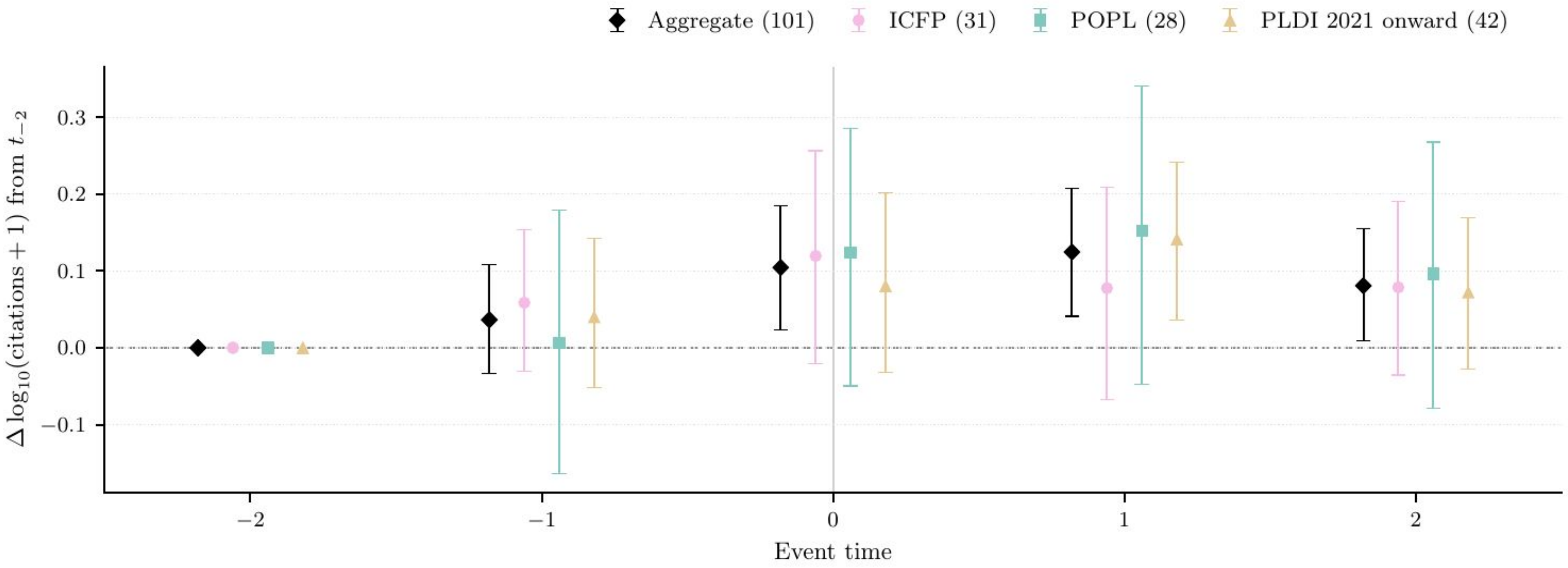
• Plot event time on the x-axis: t= -2, -1, 0, +1, +2.

• Plot: change from t= -2 on the y-axis.

• Add 95% bootstrap CIs as error bars.

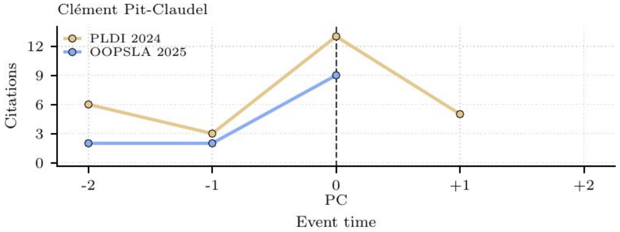
4. Event Study (RQ1) - Rise around PC

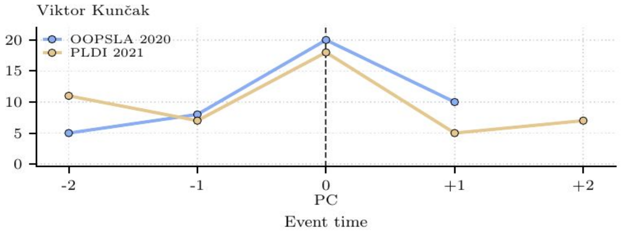
No earlier PC service sample.

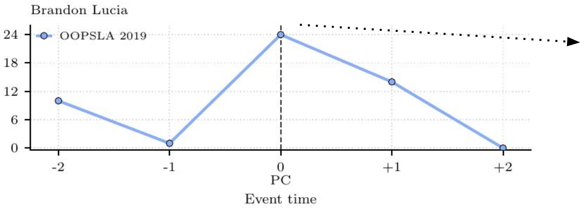


- **Largest jump:** year before PC to PC year, **+0.65 raw citations**.
- After that: **+0.06** in the next year, then **-0.11** in the second year.
- Temporary rise around PC service, not steady growth.
- *Possible reasons: PC-list visibility, recent citation momentum, temporary topic fit...*

4. Selected PC Member Examples

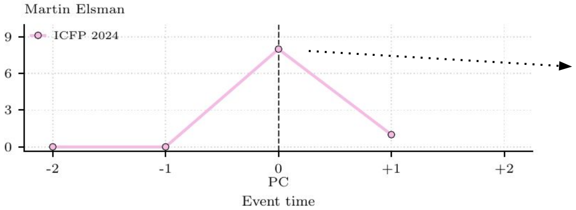






A **co-authored paper** that cites Brandon Lucia's earlier work: 13 of 24 citations (~54%).

https://dl.acm.org/doi/10.1145/3360609#



An accepted paper authored by Martin Elsman: 4 of 8 citations (50%).

https://dl.acm.org/doi/10.1145/3674628

5. Citation Source (RQ2) - Method

Are PC members cited differently?

└ **RQ2: Citation source:** Do PC members' citations shift toward the conference where they serve?

1. Event Time

- Keep researcher–conference pairs with exactly one observed PC year.
- Set that unique PC year to t = 0.
- Keep the window

t = −2, −1, **0**, +1, +2

first PC-service year

⇨

2. Compute Citation Share

- i = researcher-conference history
- n[i,t] = citations from the conference
- **m[i,t] = citations from all conferences**
- share: q[i,t] = n[i,t] / m[i,t]

⇨

3. Compare to Own Baseline

- Use t= -2 as the baseline year.
- Change in share (percentage points).
  - **d[i,t] = 100·(q[i,t] - q[i,-2])**
  - **d[i,-2] = 0**

(By construction)

⇨

4. Average & Add Uncertainty

- At each t, average d[i,t]
- Bootstrap researcher-conference histories 2,000 times.
- 95% CI = 2.5th to 97.5th percentiles.

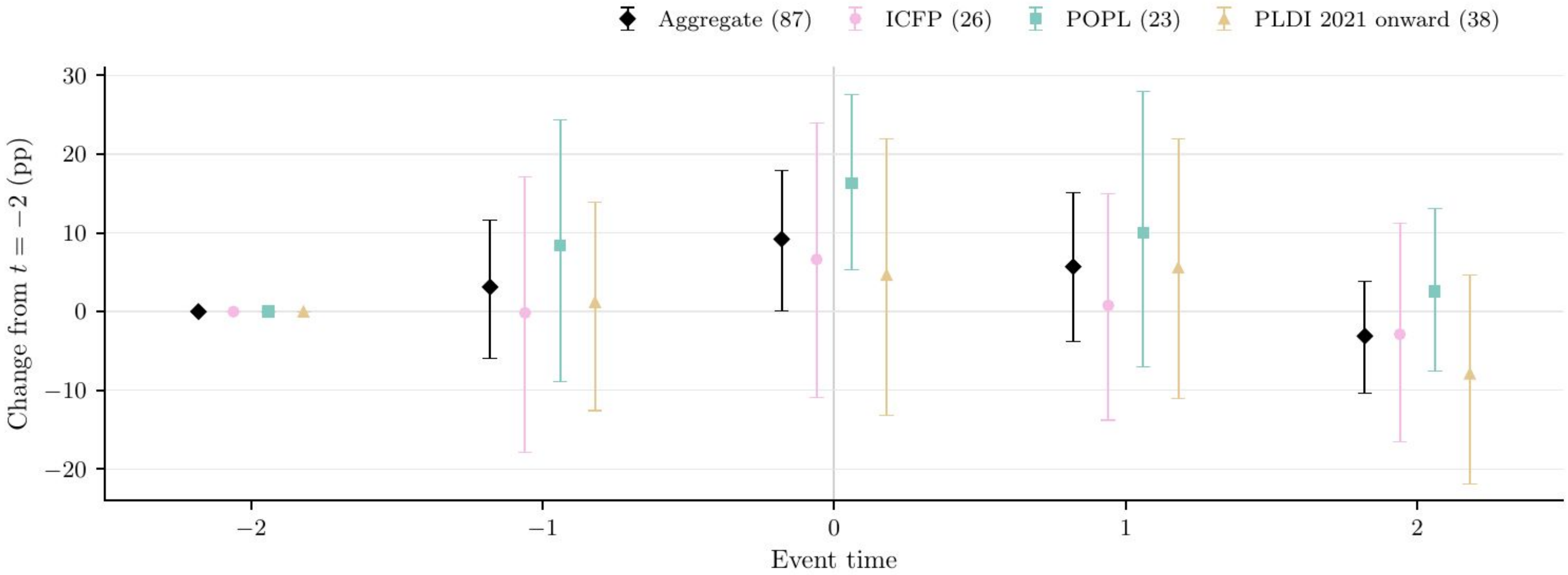
⇨

5. Plotting

- Plot event time on the x-axis: t= -2, -1, 0, +1, +2.
- **Plot: share change (pp) from t= -2 on the y-axis.**
- Add 95% bootstrap CIs as error bars.

5. Citation Source (RQ2) - Peaks, Then Fades

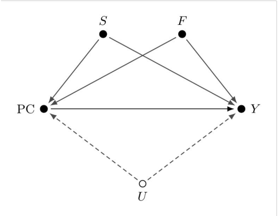
*<u>*No earlier PC service sample.</u>*



- The concentration peaks in the PC year, then fades afterward.
- The share is **+9.2 percentage points higher** in the PC year than two years before service *(95% CI: -0.6 to 17.9).*
- Citation counts are sparse (instability).
- *Possible reasons: PC visibility, topic timing, coauthor networks, review-stage suggestions, or citation mix changes*.

6. Limitations

Design



- PC service is not random.
- Panel reduces fixed researcher differences, but not time varying factors, like citation momentum or topic timing.
- Observed final papers references only: I do not know when references were added.

Data

- First observed PC service may not be first actual service.
- OpenAlex and author matching are useful but imperfect.
- No estimate of how many bibliography references OpenAlex captures.
- Sparse citation counts: a few papers can move the average.

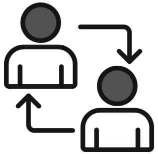
Generalizability

- Four PL conferences, 2017 to 2025.
- Patterns may differ in other fields.
- Results are sensitive to sample slicing because service history, career stage, and visibility are connected.

7. Future Work

- **Matched design:** compare PC members with similar not yet PC researchers.

  Limitations: unobserved professional networks, unmeasured topic timing, whether citations were added before or during review.



- **Reference timing:** compare submitted and final reference lists, if available.

  **Barnett, A. (2025). Are peer reviewers influenced by their work being cited?*

- **Generalization:** apply the framework to ML, HCI, or computational social science.

- **OpenAlex recall:** estimate coverage with sampled bibliography checks.

- **Robustness**: check sensitivity to self citation, coauthor links, and influential papers.

*https://doi.org/10.7554/eLife.108748.4

8. Timeline & Reflection

Mostly on-track **Behind the plan**

Weeks 1-3
Data Construction

- OpenAlex updates and metadata checks expanded.

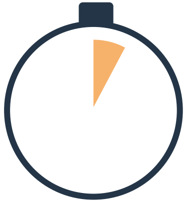
Weeks 4-6
Dataset & confounders

- Reliable panel data construction (author matching)
(IDs / ORCID / DOI)

Weeks 7-9
Main analysis

- Within-researcher analysis.
- Exploratory website.

Weeks 10-13
Extension + validation



- Added PLDI
- Validated earlier service
- OOPSLA1/2 & PLDI-2021

Weeks 14+
Final documentation

- Cleaned notebooks
- Refreshed figures & tables
- Organized the repository

Main bottlenecks: data validation and sample sensitive interpretation.

9. Summary

Are PC members cited differently?

RQ1: Citation level: cited more around the PC year?

→ Citation levels **rise around PC**, then partly fade.

RQ2: Citation source: citations shift toward that conference?

→ Conference share increases by **+9.2 pp**, then softens.

- Both RQ1 and RQ2 **reduce fixed researcher differences** through the panel design.
- RQ2 **reduces general citation momentum** by using citation shares.

Code & reproducibility
gitlab.epfl.ch/systemf/student-projects/2026-02-citations-vs-pc-memberships

Interactive data explorer
sariender.github.io/citemeifyoucan

Note: *These are descriptive results, not causal estimates, because PC service is not random and confounding remains.*

Appendix - Additional Figures

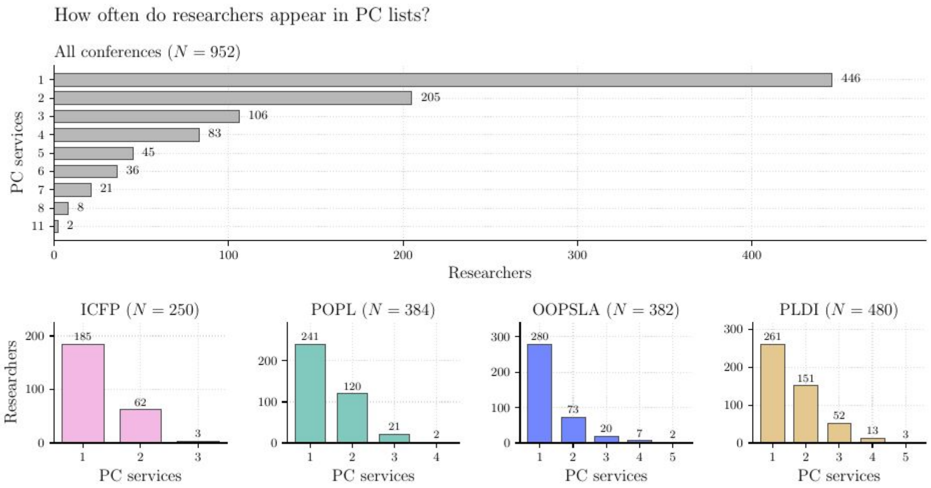


Figure 3: How often researchers appear in the PC data.

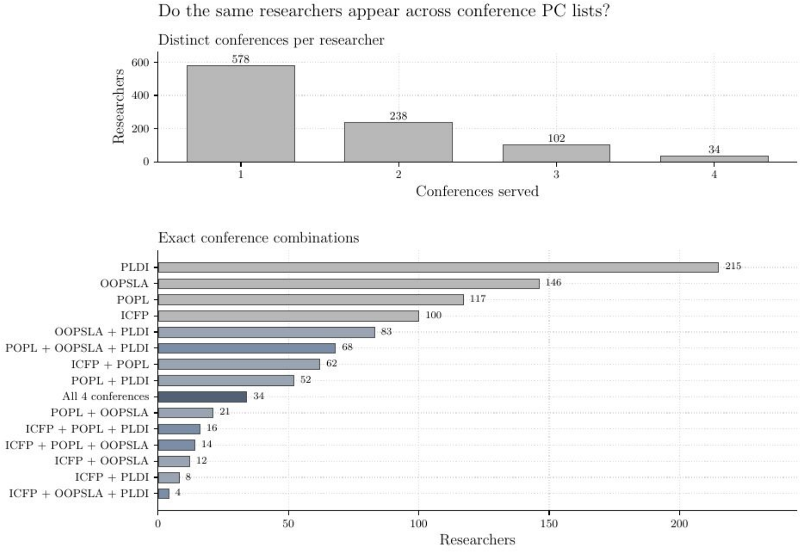


Figure 13: Conference overlap in the PC data.

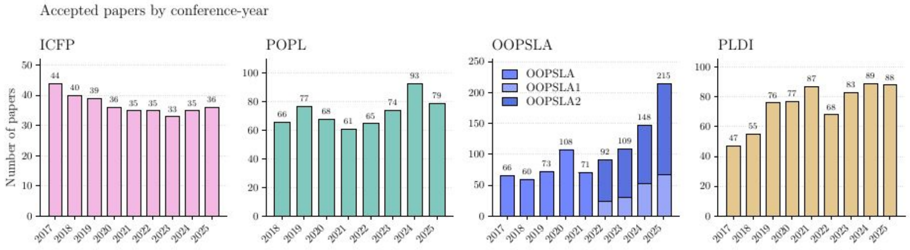


Figure 5: Accepted paper counts by conference year.

Researcher	Services	Conferences	Conference set	Years
Nadia Polikarpova	11	4	ICFP, OOPSLA, PLDI, POPL	2018 to 2025
Sukyoung Ryu	11	3	OOPSLA, PLDI, POPL	2018, 2020 to 2025
Adam Chlipala	8	3	ICFP, POPL, PLDI	2017, 2018, 2020, 2021, 2023, 2025
Arjun Guha	8	4	ICFP, OOPSLA, PLDI, POPL	2018, 2020, 2021, 2023 to 2025
Colin Gordon	8	3	OOPSLA, PLDI, POPL	2018, 2020 to 2022, 2024, 2025
Hakjoo Oh	8	4	ICFP, OOPSLA, PLDI, POPL	2018, 2021, 2022, 2024, 2025
Jan Hoffmann	8	3	ICFP, POPL, PLDI	2017, 2019 to 2023, 2025
Neel Krishnaswami	8	4	ICFP, OOPSLA, PLDI, POPL	2018, 2019, 2022 to 2024
Ranjit Jhala	8	4	ICFP, OOPSLA, PLDI, POPL	2017, 2021 to 2025
Ronald Garcia	8	4	ICFP, OOPSLA, PLDI, POPL	2017, 2019, 2021, 2022, 2024, 2025

Table 5: Researchers with the most repeated PC service records.

Appendix - Additional Figures

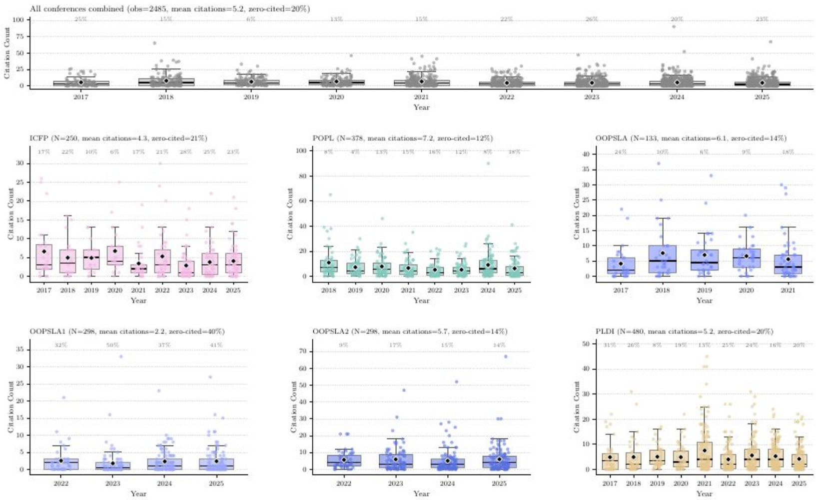


Figure 21: Raw citation count distribution around PC service.

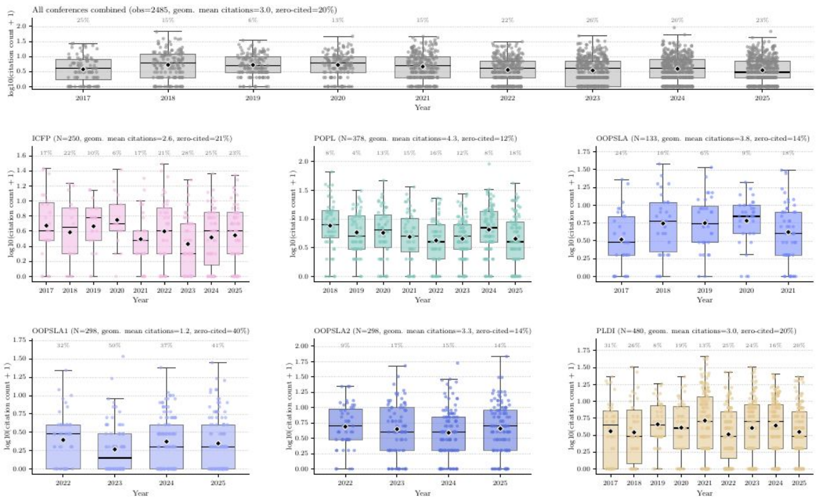


Figure 22: Log scale citation count distribution around PC service.

Work ID	Referenced work	Authors	Year	Citations	Threshold
W1480909796	Z3: An Efficient SMT Solver	Leonardo de Moura, Nikolaj Bjørner	2008	227	200+
W2901454403	Iris from the ground up: A modular foundation for higher-order concurrent separation logic	Ralf Jung, Robbert Krebbers, Jacques-Henri Jourdan, Aleš Bizjak, et al.	2018	151	150+
W2043100293	Abstract interpretation	Patrick Cousot, Radhia Cousot	1977	130	100+
W2137628566	Separation logic: a logic for shared mutable data structures	John Reynolds	2003	109	100+
W4285719527	W4285719527 (OpenAlex work lookup returned `null`)	Missing in direct OpenAlex lookup	n/a	105	100+

Table 7: Referenced works cited more than 100 times in the corpus.

Conference	Citation obs.	Missing	Zero obs.	Zero researchers	Zero share	Mean	Median
ICFP	317	1	67	60	21.1%	4.33	3.0
OOPSLA	174	2	24	23	13.8%	6.13	4.0
OOPSLA1	344	4	139	130	40.4%	2.24	1.0
OOPSLA2	344	4	49	48	14.2%	5.65	3.0
PLDI	783	3	154	140	19.7%	5.20	3.0
POPL	523	0	62	55	11.9%	7.18	4.0

Table 10: PC service observations with zero citations in the conference year.

Appendix - Additional Figures

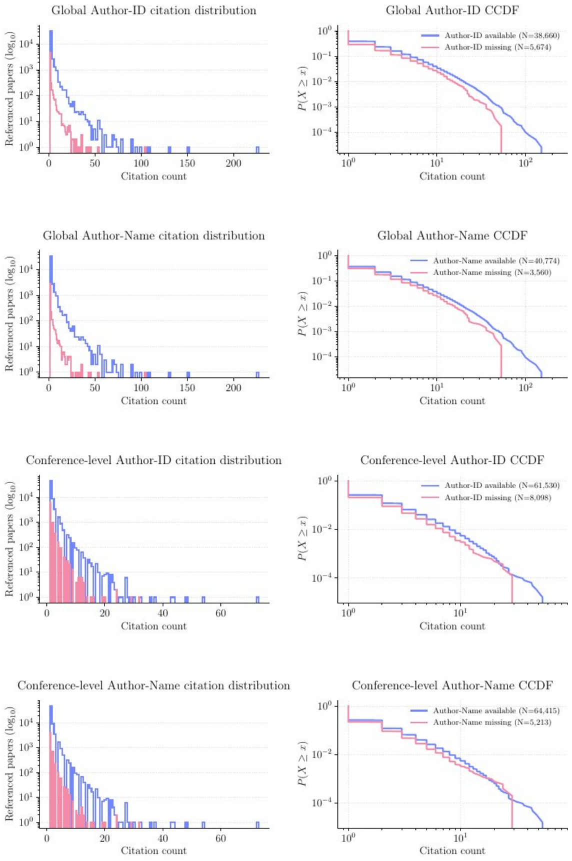


Figure 16: Referenced work citation distributions by cited author metadata availability.

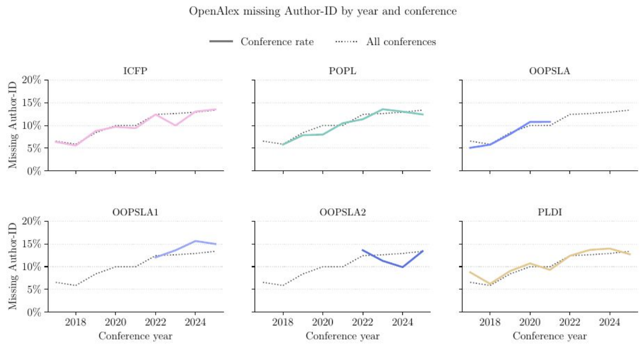


Figure 18: OpenAlex cited author ID missingness by conference year.

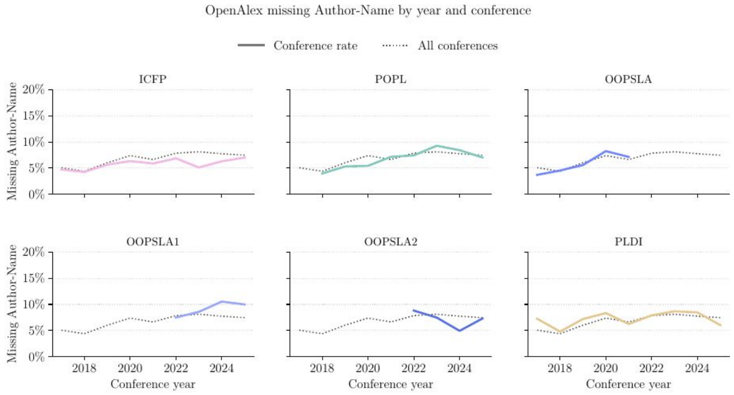
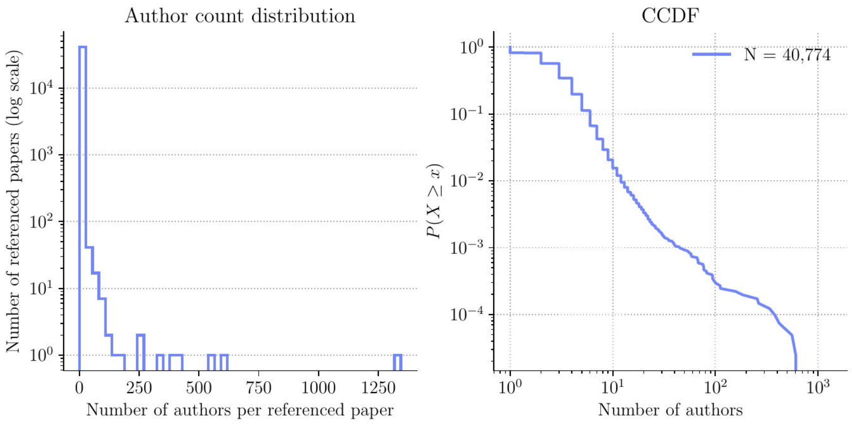
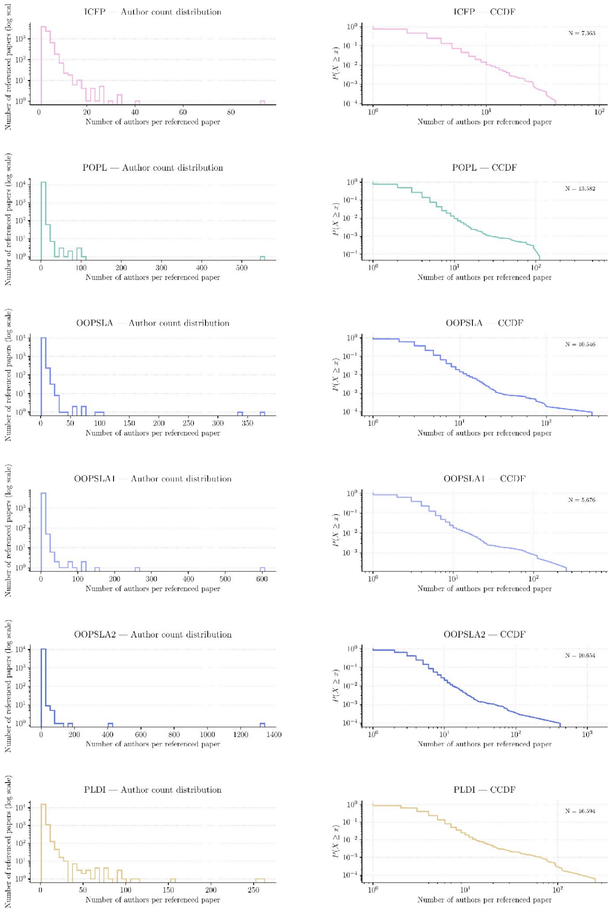


Figure 19: Missing OpenAlex cited author names by conference year.

Appendix - Additional Figures





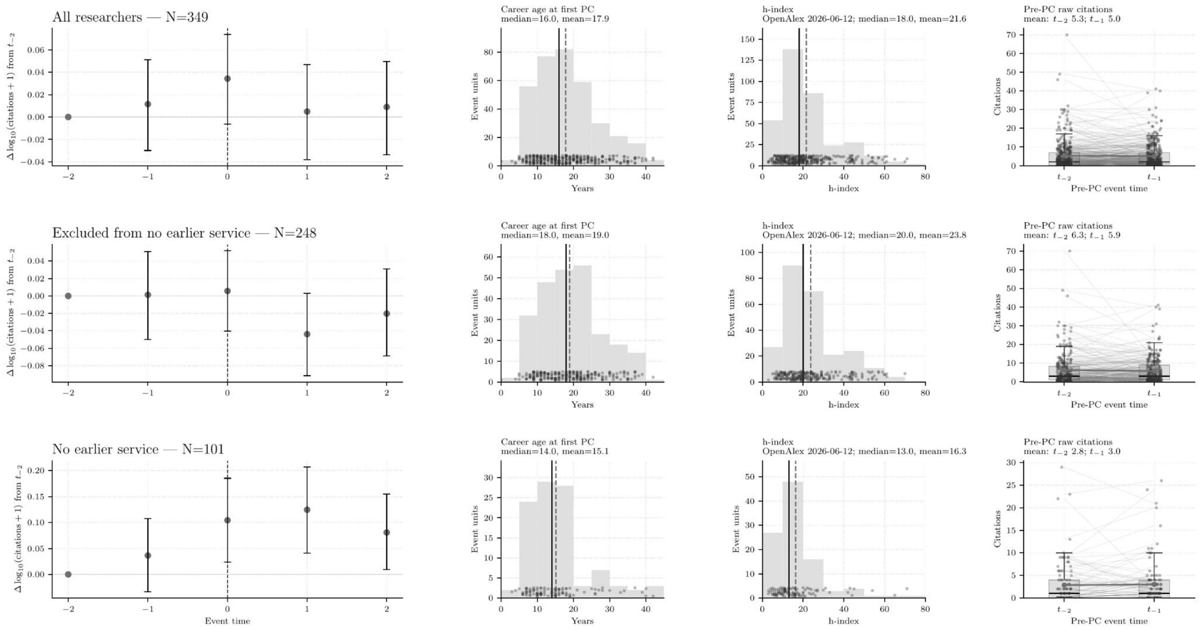
Appendix - Additional Figures

Table 11: Event study sample counts.

Sample	N
Panel rows	37,128
Researchers in panel	952
Event study pairs with a full window (all conferences)	403
No earlier service event study pairs (all conferences)	113
Main text event study pairs (ICFP, POPL, PLDI 2021 onward)	349
Main text no earlier service pairs	101
Citation source pairs (one observed PC year in the same conference)	263
Citation source pairs with defined source share change in the PC year	220
Citation source no earlier service pairs	87
Citation source no earlier service pairs with defined source share change in the PC year	62

Note: An event unit is one researcher and conference pair. "No earlier service" means that the history checks found no earlier review service evidence in the same conference for that pair. For the citation source analysis, the event unit count includes the full balanced window sample; the source share estimate at $t = 0$ uses only event units with a defined $t = -2$ baseline and a defined source share in the PC year.

Aggregate: all researchers, excluded complement, and no earlier service



Appendix - Additional Figures

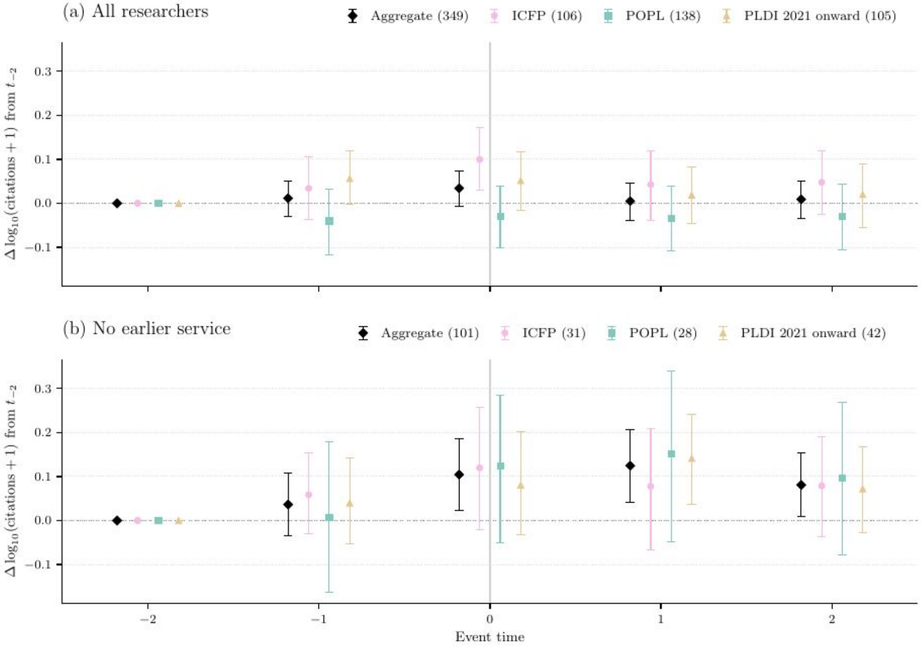


Figure 7: Log scale event study around PC service, relative to $t = -2$.

Table 2: No earlier service aggregate event study ($N = 101$).

event time	$\Delta \log_{10}$	95% CI (log)	% change in (citations + 1)	Δ raw cites	95% CI (raw)
$t = -2$ (ref)	0.000	n/a	0.0%	0.00	n/a
$t = -1$	+0.036	[−0.029, 0.102]	+8.7%	+0.18	[−0.56, 0.95]
$t = 0$	+0.104*	[0.025, 0.183]	+27.2%*	+0.83	[−0.05, 1.74]
$t = +1$	+0.125*	[0.045, 0.201]	+33.2%*	+0.89	[0.00, 1.83]
$t = +2$	+0.081*	[0.010, 0.151]	+20.5%*	+0.78	[−0.07, 1.69]
Year to year change:					
before PC → PC year	+0.068	n/a	+16.9%	+0.65	n/a
PC year → +1	+0.020	n/a	4.8%	+0.06	n/a
+1 → +2	−0.044	n/a	−9.6%	−0.11	n/a

Note: Stars mark log scale estimates whose 95% bootstrap intervals exclude zero. Year to year rows are descriptive point changes and are not separately bootstrapped.

Appendix - Additional Figures

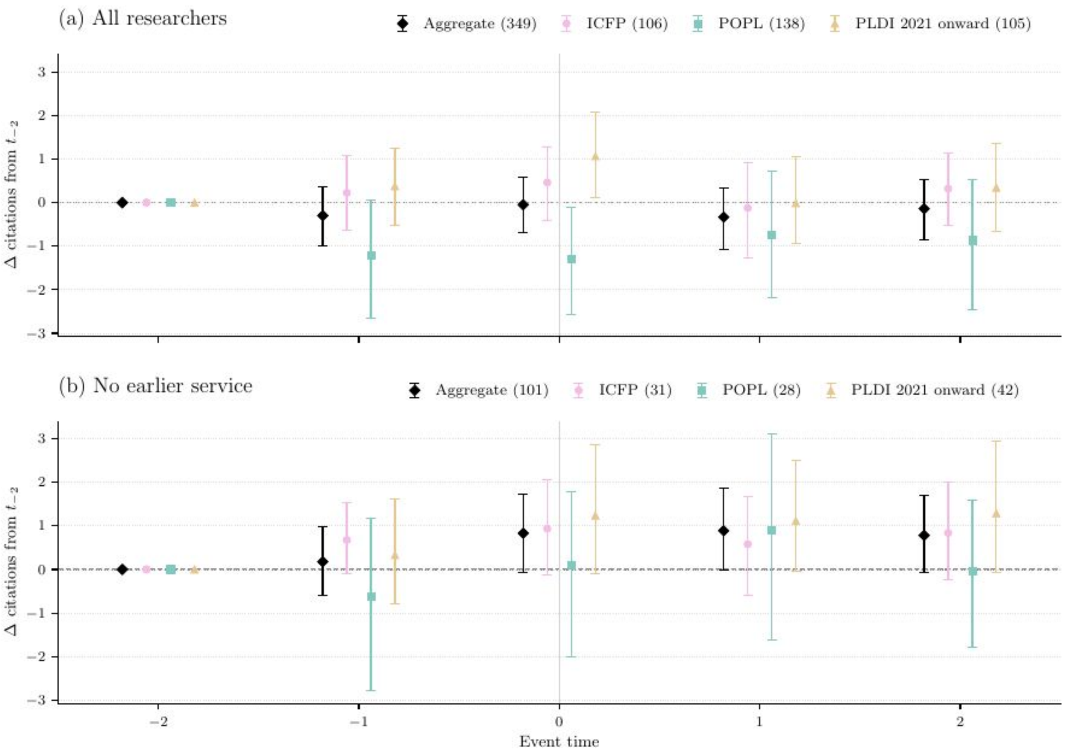
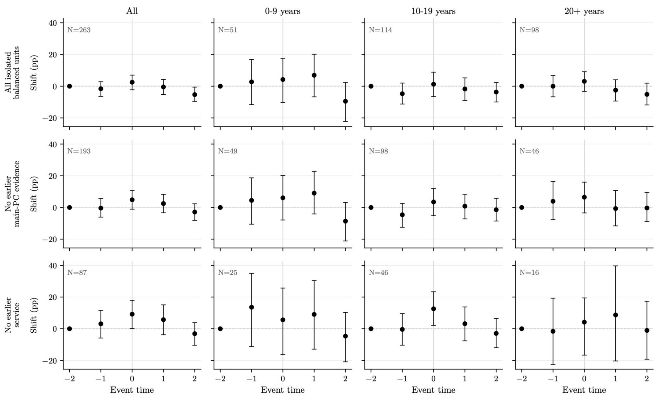


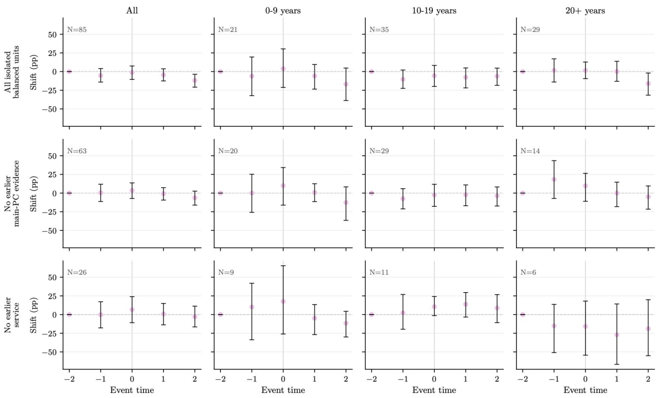
Figure 23: Raw count version of the main text event study figure.

Appendix - Additional Figures

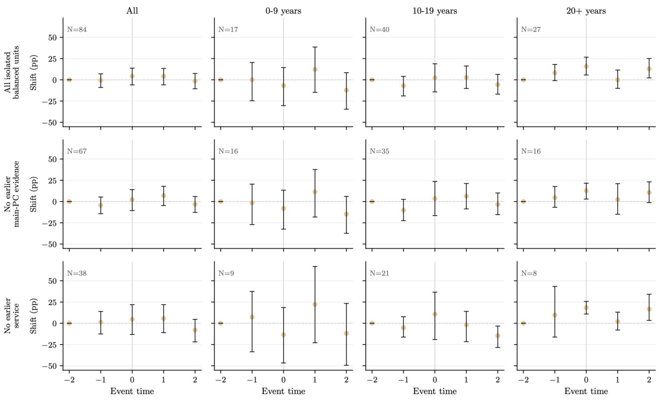
All: citation-source shift by sample (fixed career-age buckets)



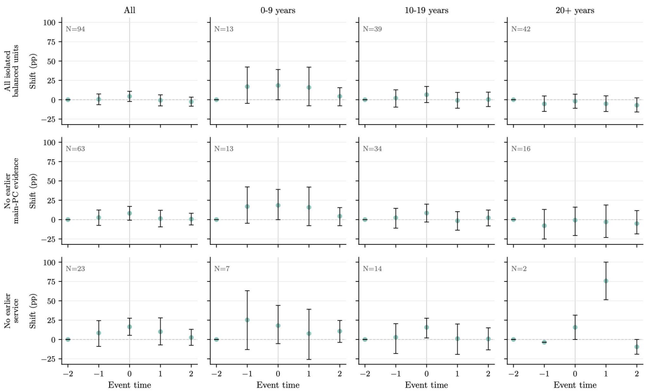
ICFP: citation-source shift by sample (fixed career-age buckets)



PLDI 2021 onward: citation-source shift by sample (fixed career-age buckets)



POPL: citation-source shift by sample (fixed career-age buckets)



Appendix - Additional Figures

Researcher	Selected PC service	OpenAlex career age	Google Scholar career age	$t = -2$	$t = -1$	$t = 0$	$t = +1$	$t = +2$
Clément Pit-Claudel	PLDI 2024	10	8	6	3	13	5	n/a
Clément Pit-Claudel	OOPSLA 2025	11	9	2	2	9	n/a	n/a
Viktor Kunčak	OOPSLA 2020	27	17	5	8	20	10	n/a
Viktor Kunčak	PLDI 2021	28	18	11	7	18	5	7
Peter Thiemann	ICFP 2023	33	28	3	2	8	1	4
Simon J. Gay	ICFP 2023	30	29	2	3	11	0	1
Martin Elsman	ICFP 2024	26	27	0	0	8	1	n/a
Ezgi Çiçek	ICFP 2019	4	5	1	5	7	2	0
Brandon Lucia	OOPSLA 2019	11	10	10	1	24	14	0
Jonathan Immanuel Brachthäuser	POPL 2024	10	10	0	1	16	2	n/a
Fritz Henglein	POPL 2024	39	33	2	0	13	2	n/a
Małgorzata Biernacka	ICFP 2022	18	18	0	0	4	1	0

Table 13: Raw citation counts for the selected PC member examples.

Note: OpenAlex career age is the selected PC year minus the first OpenAlex CS publication year used for that researcher. Google Scholar career age is the selected PC year minus the first visible year in the researcher's Google Scholar citation plot by year.

Researcher	PC service	Raw E	Title E	Dup.	Citing papers	Self E	Co. E
Clément Pit-Claudel	PLDI 2024	13	13	0	9	2	7
Clément Pit-Claudel	OOPSLA 2025	9	9	0	8	0	1
Viktor Kunčak	OOPSLA 2020	20	19	1	11	0	1
Viktor Kunčak	PLDI 2021	18	14	4	6	0	0
Peter Thiemann	ICFP 2023	8	8	0	3	4	4
Simon J. Gay	ICFP 2023	11	11	0	4	2	2
Martin Elsman	ICFP 2024	8	8	0	4	4	4
Ezgi Çiçek	ICFP 2019	7	5	2	2	0	5
Brandon Lucia	OOPSLA 2019	24	23	1	5	13	14
Jonathan Immanuel Brachthäuser	POPL 2024	16	16	0	8	0	1
Fritz Henglein	POPL 2024	13	13	0	8	0	0
Małgorzata Biernacka	ICFP 2022	4	4	0	1	4	4

Table 14: Citation source summary for the selected PC service cases.

Researcher	Checked PC service case	R	Miss.	Extra	Net	Interpretation
Clément Pit-Claudel	PLDI 2024; OOPSLA 2025	22	2	0	+2	OpenAlex misses some checked references.
Viktor Kunčak	OOPSLA 2020; PLDI 2021	38	2	2	0	Missing and extra edges offset.
Peter Thiemann	ICFP 2023	8	4	0	+4	Some missing edges are self citations.
Simon J. Gay	ICFP 2023	11	1	0	+1	The missing edge is a self citation.
Martin Elsman	ICFP 2024	8	3	0	+3	Two missing edges are self citations.
Ezgi Çiçek	ICFP 2019	7	1	0	+1	The missing edge is coauthor mediated.
Jonathan Immanuel Brachthäuser	POPL 2024	16	5	0	+5	Missing edges are not self citations.
Małgorzata Biernacka	ICFP 2022	4	1	0	+1	One missing prior work reference.
Total	Selected manual checks	114	19	2	+17	Small net difference across selected checks.

Table 16: Manual bibliography check summary for selected PC service cases.

Appendix - Additional Figures

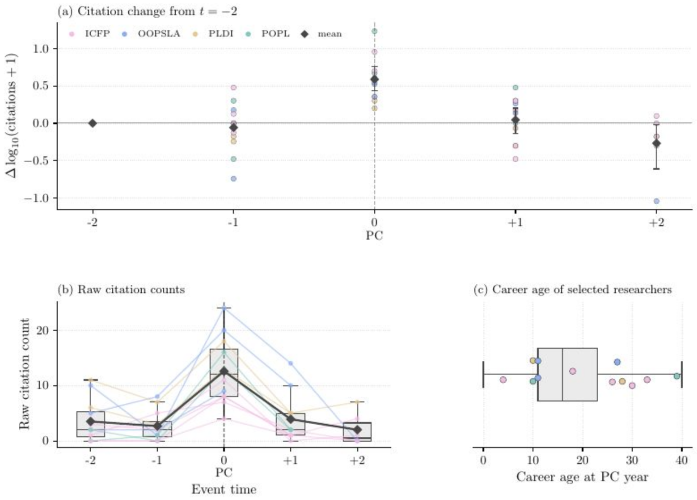


Figure 9: Selected PC member event study examples.

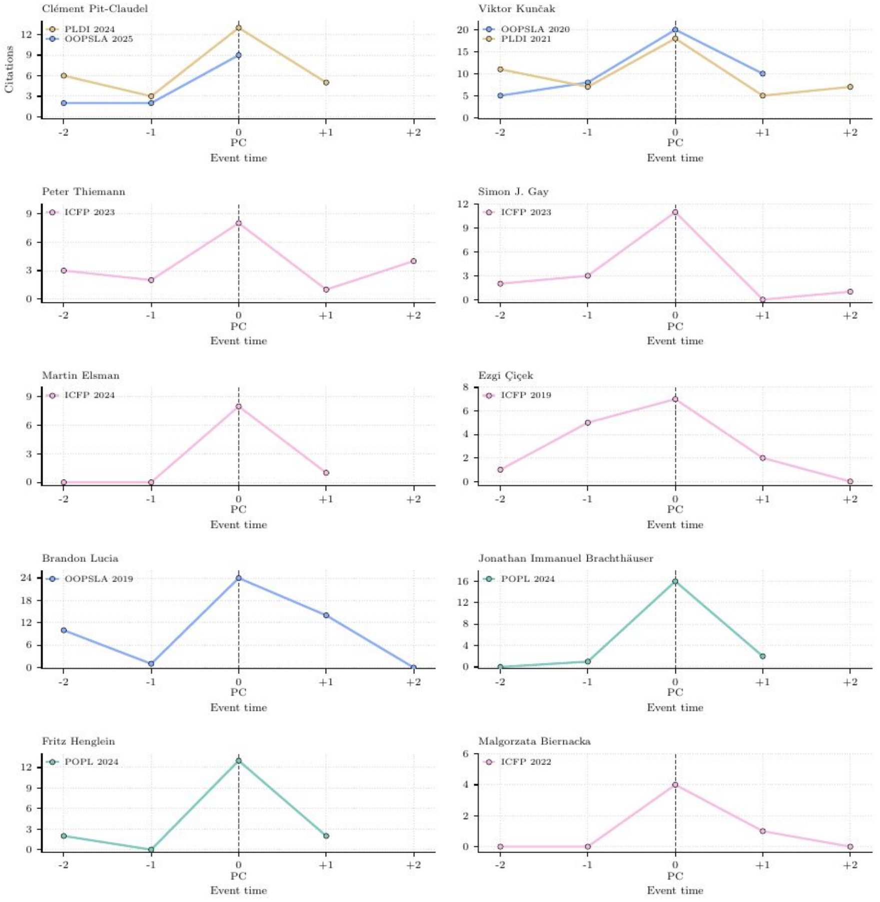


Figure 10: Selected PC member raw citation examples.

Appendix - Additional Figures

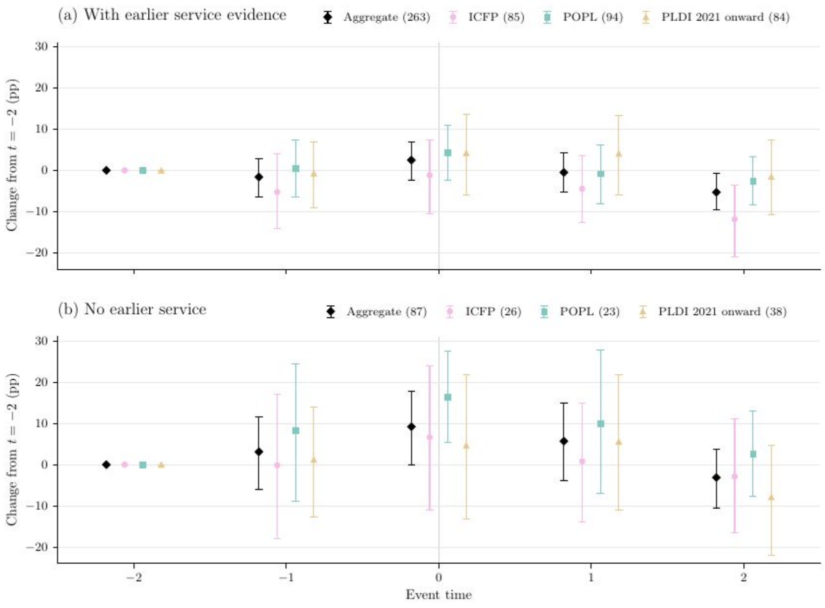


Figure 11: Citation source shift around PC service.

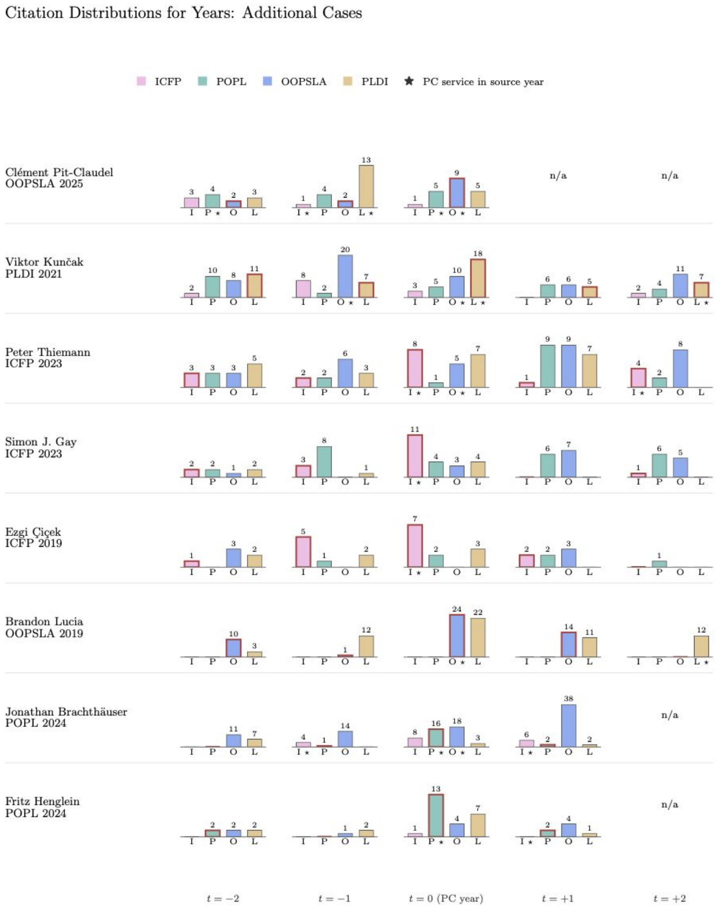


Figure 39: Selected citation source concentration examples.

Appendix - Additional Figures

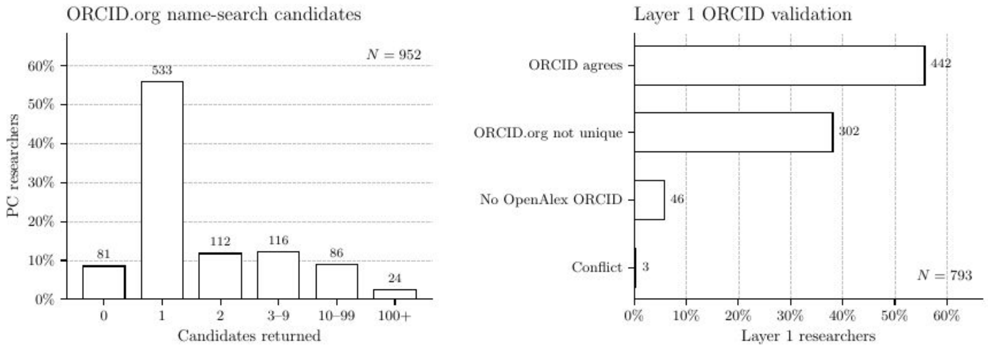


Figure 20: ORCID.org validation checks for PC researchers.

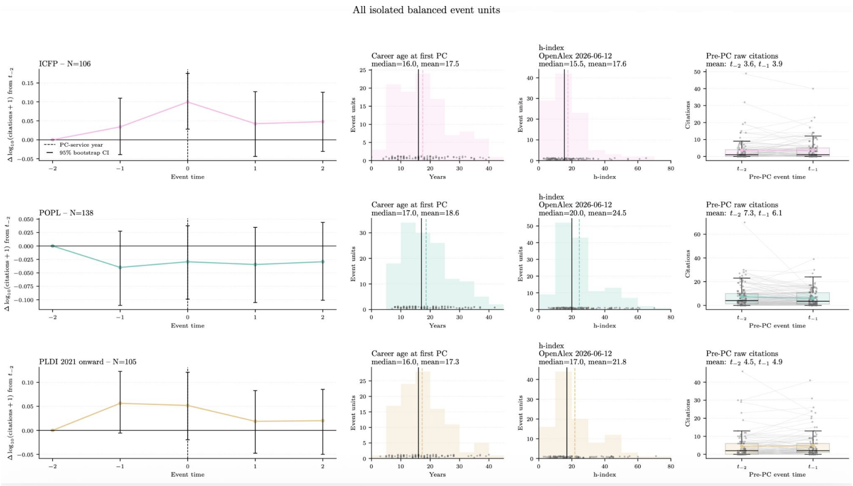
Match basis	N	Share	Use in citation counting
Single OpenAlex author ID	793	83.3%	The mapped PC name appears in the cited author data and points to one OpenAlex author ID.
Manual alternate name accepted	51	5.4%	Manual review accepts a different cited author name as the same researcher and uses that accepted match for citation counting.
Ambiguous name match	84	8.8%	The PC name appears in the cited author data, but it points to multiple OpenAlex author IDs, so citation counts are kept with an ambiguity flag.
Name only match	14	1.5%	The researcher appears in cited author names, but there is no stable OpenAlex author ID behind the match.
Unresolved	10	1.1%	No reliable OpenAlex evidence is accepted, so these researchers stay in the panel with missing citation outcomes.

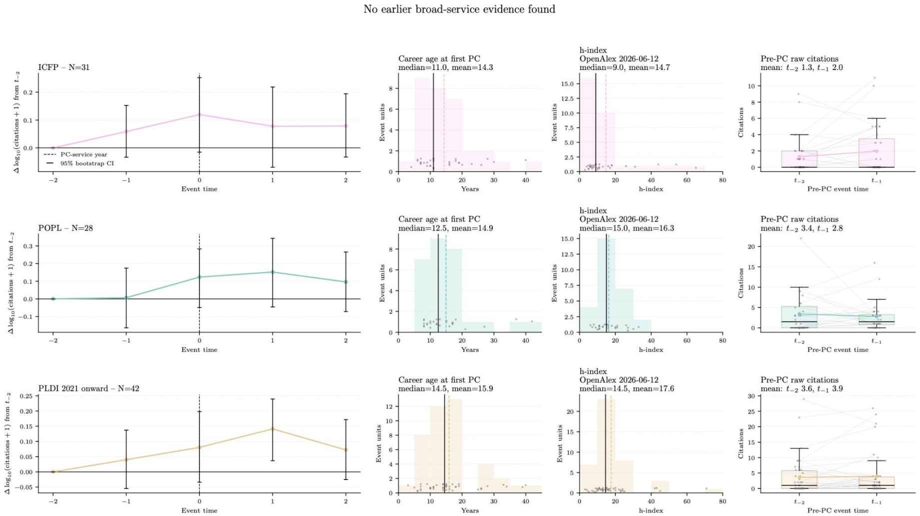
Table 8: How citation counts are assigned for the 952 PC researchers.
Note: The rows sum to all 952 PC researchers. Only the unresolved cases remain in the panel without citation outcomes.

Table 9: Unresolved PC researchers kept in the panel with missing citation outcomes.

PC name
Alexey Loginov, Angelica Moreira, Dalal Alrajeh, Frank Fu, Julien Verlaguet, Kristóf Marussy, Marie Kerjean, Neha Agarwal, Suparna Bhattacharya, Vaishnavi Sundararajan

Appendix - Additional Figures





Appendix - Additional Figures

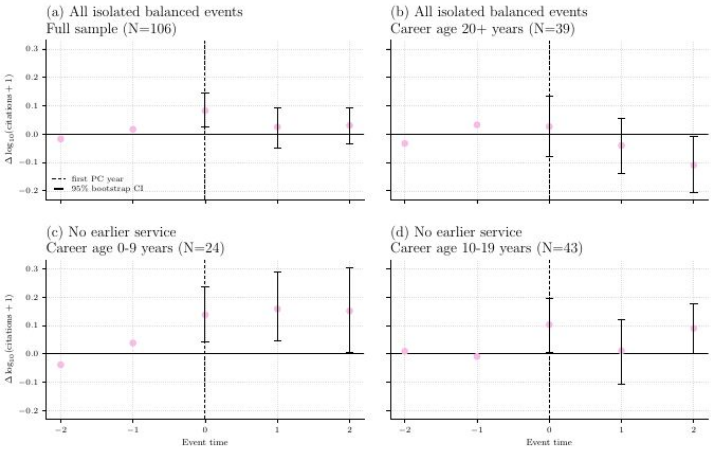


Figure 32: ICFP robustness check with an average baseline before PC service.

Table 1: Accepted papers with at least 100 OpenAlex references.

Conference	Year	References	Paper title
POPL	2020	157	Pointer life cycle types for lock-free data structures with memory reclamation
POPL	2024	143	Programming-by-Demonstration for Long-Horizon Robot Tasks
OOPSLA1	2022	140	Functional collection programming with semi-ring dictionaries
OOPSLA	2021	126	Reachability types: tracking aliasing and separation in higher-order functional programs
POPL	2021	126	Provably space-efficient parallel functional programming
OOPSLA1	2025	126	IncIDFA: An Efficient and Generic Algorithm for Incremental Iterative Dataflow Analysis
OOPSLA	2020	124	Scaling exact inference for discrete probabilistic programs
OOPSLA2	2024	124	On the Expressive Power of Languages for Static Variability
OOPSLA	2018	114	BioScript: programming safe chemistry on laboratories-on-a-chip
PLDI	2019	113	Cost analysis of nondeterministic probabilistic programs
OOPSLA	2019	112	Asphalion: trustworthy shielding against Byzantine faults
PLDI	2024	112	Equivalence by Canonicalization for Synthesis-Backed Refactoring
POPL	2024	108	Calculational Design of [In]Correctness Transformational Program Logics by Abstract Interpretation
POPL	2024	108	Deadlock-Free Separation Logic: Linearity Yields Progress for Dependent Higher-Order Message Passing
PLDI	2021	107	Fluid: a framework for approximate concurrency via controlled dependency relaxation
PLDI	2025	107	Programming by Navigation
POPL	2024	106	Regular Abstractions for Array Systems
OOPSLA	2018	105	AnyDSL: a partial evaluation framework for programming high-performance libraries
PLDI	2018	105	High-coverage, unbounded sound predictive race detection
POPL	2020	103	The next 700 relational program logics
OOPSLA2	2023	103	A Cocktail Approach to Practical Call Graph Construction
OOPSLA2	2025	103	Reasoning about External Calls
PLDI	2021	102	RefinedC: automating the foundational verification of C code with refined ownership types
PLDI	2022	101	Bind the gap: compiling real software to hardware FFT accelerators
POPL	2024	101	SimuQ: A Framework for Programming Quantum Hamiltonian Simulation with Analog Compilation
OOPSLA1	2025	101	Unveiling Heisenbugs with Diversified Execution
POPL	2025	101	Symbolic Automata: Omega-Regularity Modulo Theories
POPL	2025	101	Compositional Imprecise Probability: A Solution from Graded Monads and Markov Categories

Appendix - RQ1, RQ2 Methods

For RQ1, I ask whether $Y_{r,c,y}$ changes around PC service. I first restrict to researcher and conference pairs with usable author identity information and career age metadata, because the event study figures also report career age and h-index composition checks.
For each researcher and conference pair (r, c):

1. Look across the panel rows for (r, c), and find the years in which $P_{r,c,y} = 1$. These are the observed years in which researcher r is listed on conference c's research paper PC.
2. If researcher r is never observed on conference c's PC, drop the pair. Otherwise, let y_0 be the first observed PC year for this researcher and conference pair, and set this year as event time $t = 0$.
3. Use the event window
$$t \in \{-2, -1, 0, +1, +2\}.$$
For each event time t, the corresponding calendar year is $y_0 + t$.
4. Keep the pair only if all five calendar years $y_0 - 2, \ldots, y_0 + 2$ are observed in the panel.
5. Drop the pair if the researcher is listed again on conference c's PC at $t = +1$ or $t = +2$. This prevents the window after PC service from being mixed with another PC service year for the same researcher and conference. Repeated service outside these two years after PC service is allowed.
6. Define the service history sample. For the all researcher sample, keep every pair that passes the filters above. For the no earlier service sample, keep only pairs where the available public history checks found no earlier review service evidence in the same conference before y_0. This filter is based on public records, not proof that the researcher never served earlier.
7. For each remaining pair and event time, take the citation count from the panel:
$$Y_{r,c,y_0+t}.$$
This is the number of citations from accepted papers in conference c, in year $y_0 + t$, to researcher r's earlier work.
8. Transform the citation count:
$$x_{r,c,t} = \log_{10}(Y_{r,c,y_0+t} + 1).$$
I use $+1$ so that observations with zero citations remain in the analysis.
9. Use $t = -2$ as the reference year. For each event time, compute the change within each pair:
$$d_{r,c,t} = x_{r,c,t} - x_{r,c,-2}.$$
10. Average $d_{r,c,t}$ across the included researcher and conference pairs, separately for each event time.
11. Compute 95% bootstrap intervals by resampling researcher and conference pairs with replacement. In each bootstrap repetition, keep each selected pair's full trajectory across the five event times together and recompute the average change at each event time. The interval is the 2.5th and 97.5th percentiles of the 2,000 bootstrap averages.

This analysis uses the same panel with one row per researcher, conference, and year, but replaces the main citation count outcome with citation counts broken down by citing conference. In a panel row (r, c, y), $P_{r,c,y}$ records whether researcher r served on conference c's research paper PC in year y. For any citing conference s, $Y_{r,s,y}$ records citations from accepted papers in conference s, year y, to researcher r's earlier work.
For each researcher and conference pair (r, c):

1. Look across the panel rows for (r, c), and find the years in which $P_{r,c,y} = 1$. These are the observed years in which researcher r is listed on conference c's research paper PC.
2. Keep the pair only if researcher r is observed on conference c's PC exactly once. If the researcher is never observed on conference c's PC, or is observed in multiple PC years in the same conference, drop the pair. Otherwise, let y_0 denote the unique PC service year, and set this year as event time $t = 0$.
3. Use the event window
$$t \in \{-2, -1, 0, +1, +2\}.$$
For each event time t, the corresponding calendar year is $y_0 + t$.
4. Keep the pair only if all five calendar years
$$y_0 - 2, \ldots, y_0 + 2$$
are observed in the panel.
5. Define the service history sample. For the all researcher sample, keep every pair that passes the filters above. For the no earlier service sample, keep only pairs where the available public history checks found no earlier review service evidence in the same conference before y_0. This filter is applied after the requirement of one PC year.
6. For each remaining pair and event time, compute the number of citations coming from the event conference:
$$n_{r,c,t} = Y_{r,c,y_0+t}.$$
This is the number of citations from accepted papers in conference c, in year $y_0 + t$, to researcher r's earlier work.
7. Let $\mathcal{C}$ be the set of conferences in the analysis, and let s index one conference in this set. Compute the total number of citations from all conferences in the analysis:
$$m_{r,c,t} = \sum_{s \in \mathcal{C}} Y_{r,s,y_0+t}.$$
8. Define the event conference citation share:
$$q_{r,c,t} = \frac{n_{r,c,t}}{m_{r,c,t}}$$
whenever $m_{r,c,t} > 0$. If $m_{r,c,t} = 0$, set $q_{r,c,t}$ to missing.
9. If the baseline share $q_{r,c,-2}$ is missing, the event unit is still counted in the sample size, but its source share changes are undefined. This happens when the researcher received no citations from any conference in the analysis in the reference year. I keep these units in the bootstrap sampling frame because they are part of the eligible event window sample. If such a unit is drawn, it contributes no value to the mean for that event time.
10. Use $t = -2$ as the reference year. For each event time, compute the change in citation share within the pair:
$$d_{r,c,t} = 100\,(q_{r,c,t} - q_{r,c,-2}).$$
This is measured in percentage points. If $q_{r,c,t}$ is missing, then $d_{r,c,t}$ is also missing.
11. Average $d_{r,c,t}$ across the included researcher and conference pairs, separately for each event time:
$$\hat{\delta}_t = \text{mean}\{d_{r,c,t} : d_{r,c,t} \text{ is defined}\}.$$
By construction, $\hat{\delta}_{-2} = 0$.
12. Compute 95% bootstrap intervals separately at each event time by resampling eligible researcher and conference event units with replacement. If a drawn event unit has undefined $d_{r,c,t}$, it contributes no value to that draw's mean for that event time. The interval is the 2.5th and 97.5th percentiles of the 2,000 bootstrap averages.