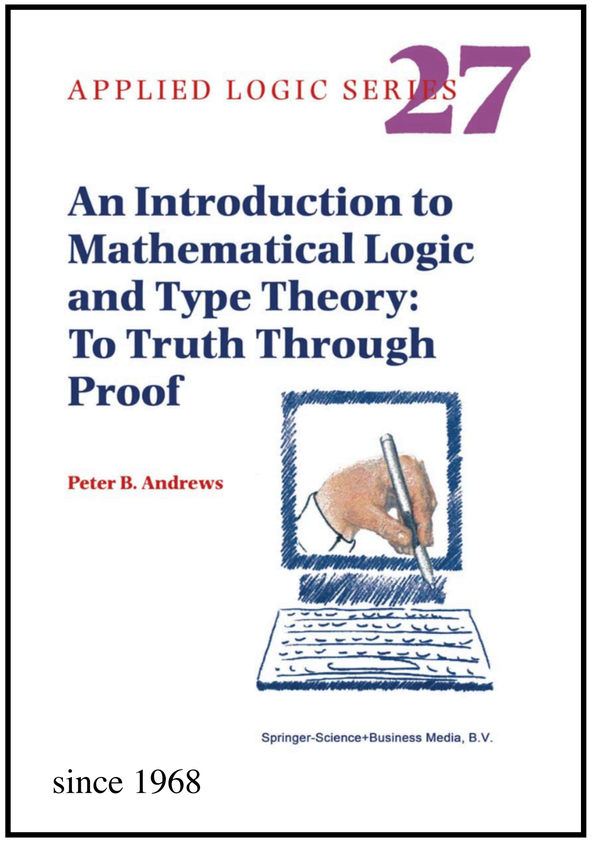
Peter B. Andrews

*** 1 Nov 1937 — † 21 Apr 2025**

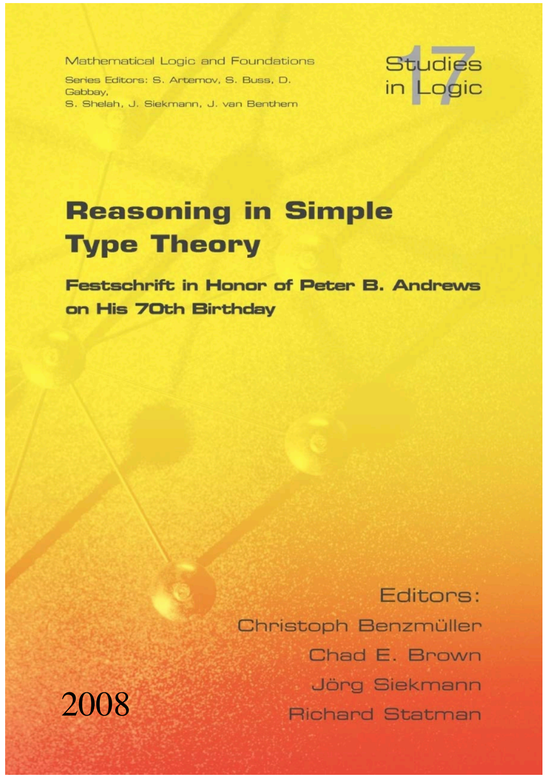
Short Memorial as part of CADE 2025

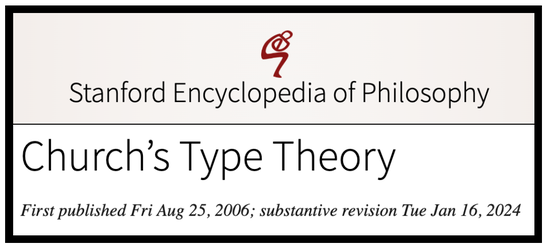
Peter B. Andrews

I took a course with Peter
in 1996/97 on HOL at CMU



since 1968





C. Benzmüller, July 31, 2025

Mathematics Genealogy Project

Peter Bruce Andrews

MathSciNet

Ph.D. Princeton University 1964

Dissertation: *A Transfinite Type Theory with Type Variables*

Advisor: Alonzo Church

Students:
Click here to see the students ordered by family name.

Name	School	Year	Descendants
Taranto, Donald	Carnegie Mellon University	1968	
Fisher, Jr., Edward	Carnegie Mellon University	1970	
Miller, Dale	Carnegie Mellon University	1983	28
Pfenning, Frank	Carnegie Mellon University	1987	71
Issar, Sunil	Carnegie Mellon University	1991	
Kohlhase, Michael	Universität des Saarlandes	1994	14
Bishop, Matthew	Carnegie Mellon University	1999	
Brown, Chad	Carnegie Mellon University	2004	

According to our current on-line database, Peter Andrews has 8 students and 106 descendants.
We welcome any additional information.

Herbrand Award

Larry Wos (1992)
Woody Bledsoe (1994)
J. Alan Robinson (1996)
Wen-Tsun Wu (1997)
Gérard Huet (1998)
Robert S. Boyer and J Strother Moore (1999)
William W. McCune (2000)
Donald Loveland (2001)
Mark E. Stickel (2002)

Peter B. Andrews (2003)

Harald Ganzinger (2004)
Martin Davis (2005)
Wolfgang Bibel (2006)
Alan Bundy (2007)
Edmund Clarke (2008)
Deepak Kapur (2009)
David Plaisted (2010)
Nachum Dershowitz (2011)
Melvin Fitting (2012)
Greg Nelson (2013)
Robert L. Constable (2014)
Andrei Voronkov (2015)
Zohar Manna and Richard Waldinger (2016)
Lawrence C. Paulson (2017)
Bruno Buchberger (2018)
Nikolaj Bjørner and Leonardo de Moura (2019)
Franz Baader (2020)
Tobias Nipkow (2021)
Natarajan Shankar (2022)
Moshe Vardi (2023)
Armin Biere (2024)
Aart Middeldorp (2025)

Herbrand Award

... for his seminal contributions and pioneering research in type theory, mating-based theorem proving, automated deduction in higher-order logic, proof presentation, logic education, and many other contributions to the field of automated reasoning.

Presented at CADE-19, August 1, 2003

Peter, as a young student, detected an error in Herbrand's thesis

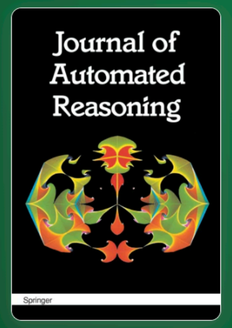
Home > Journal of Automated Reasoning > Article

Herbrand Award Acceptance Speech

Published: October 2003

Volume 31, pages 169–187, (2003)

Cite this article



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Aims and scope →

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Peter B. Andrews

WAlnut 1-9534
116 Linden Lane
Princeton, New Jersey
1962 April 9

Professor Burton S. Dreben
Philosophy Department
Harvard University
Cambridge 38, Massachusetts

Dear Professor Dreben,

My thesis advisor, Professor Church, has suggested that I write to you about what I believe is a mistake in Herbrand's thesis, Recherches sur la Theorie de la Demonstration. I have spent a considerable amount of time and effort trying to justify Herbrand's argument or to find an alternative finitary argument proving the same result, and have not thus far succeeded. I therefore would be most grateful if you would tell me whether you believe my objections to Herbrand's argument are valid, and if so, whether you see any way the proof may be patched up. If you do not regard my objections as valid, I hope you will point out to me what I have overlooked.

Peter, as a young student, detected an error in Herbrand's thesis

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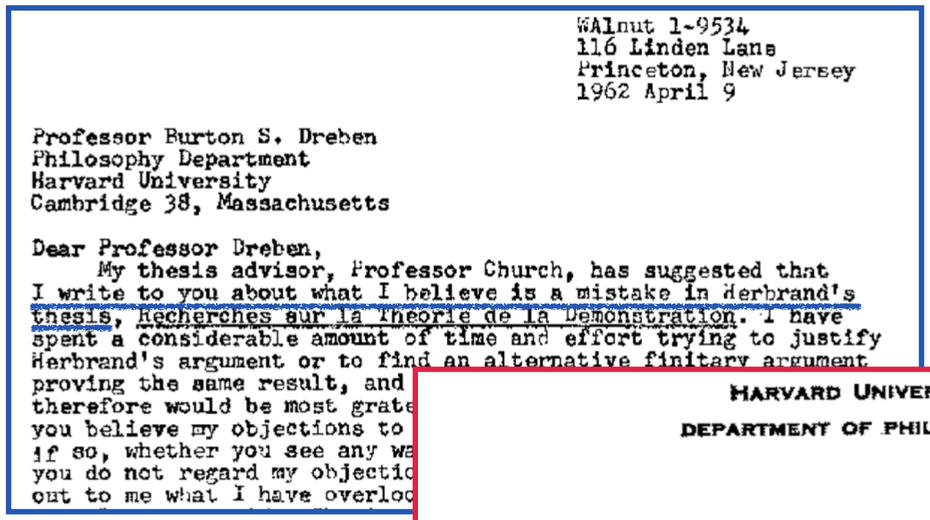

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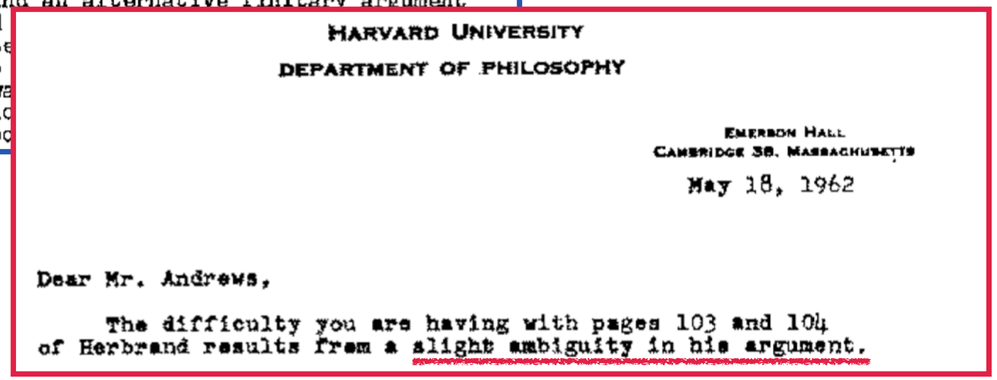

HARVARD UNIVERSITY
DEPARTMENT OF PHILOSOPHY

EMERSON HALL
CAMBRIDGE 38, MASSACHUSETTS

May 18, 1962

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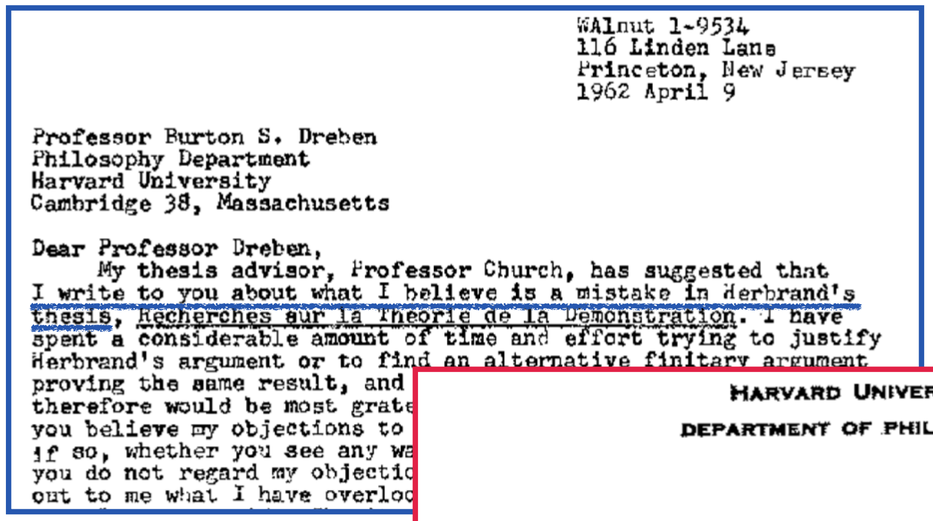

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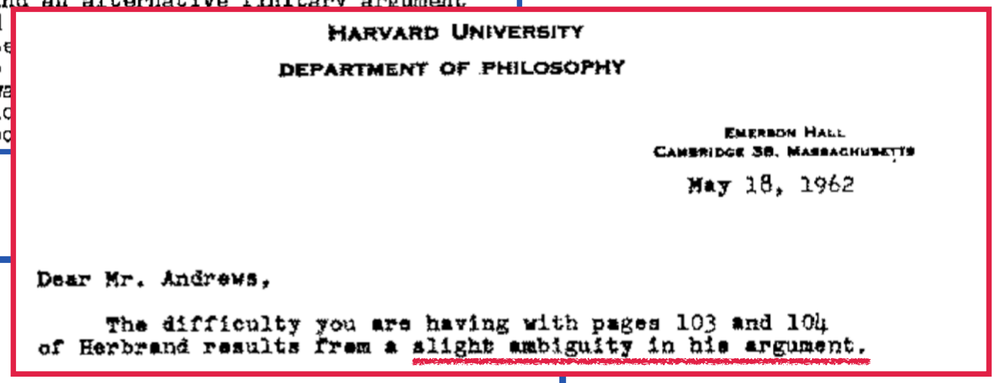

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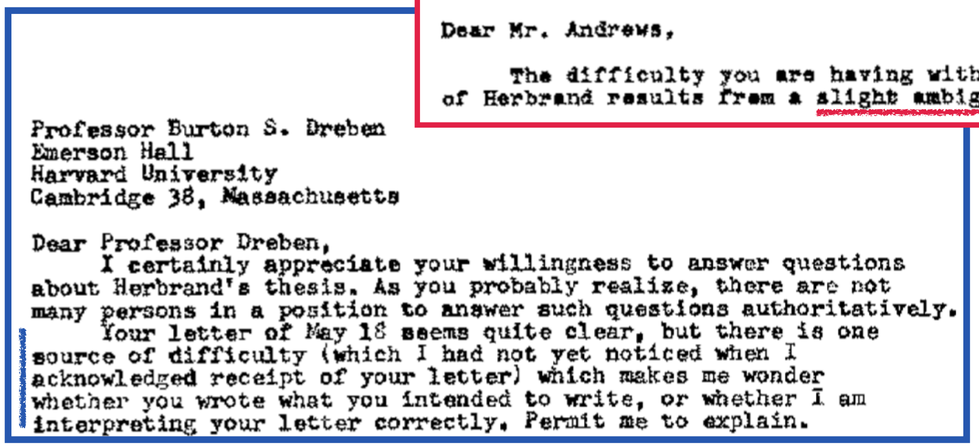

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Harvard University
Cambridge 38, Massachusetts

Dear Professor Dreben,
I certainly appreciate your willingness to answer questions about Herbrand's thesis. As you probably realize, there are not many persons in a position to answer such questions authoritatively.
Your letter of May 18 seems quite clear, but there is one source of difficulty (which I had not yet noticed when I acknowledged receipt of your letter) which makes me wonder whether you wrote what you intended to write, or whether I am interpreting your letter correctly. Permit me to explain.

C. Benzmüller, July 31, 2025

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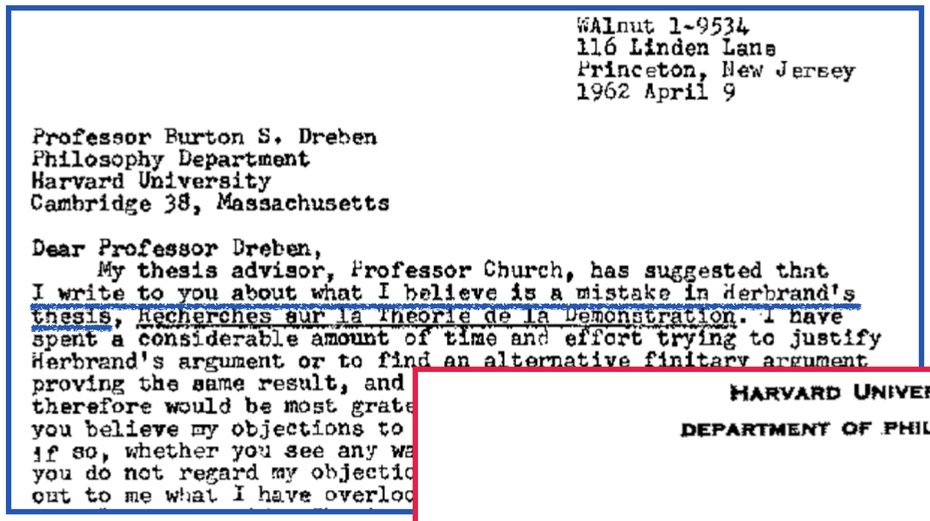

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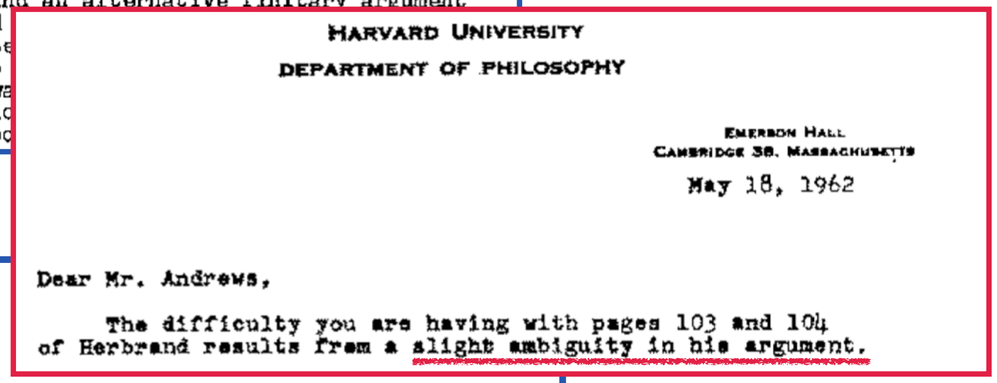

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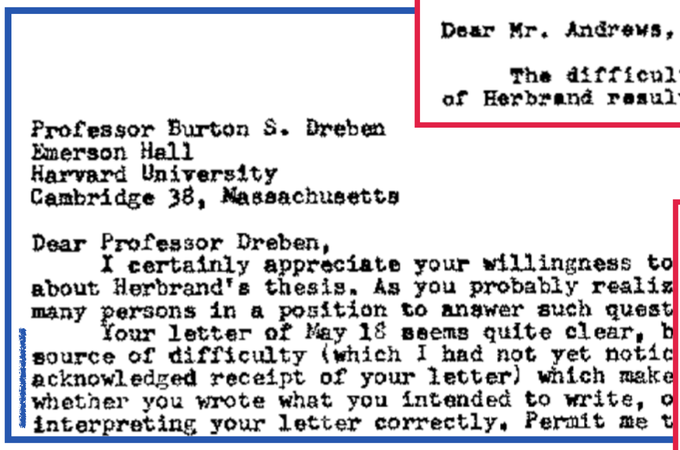

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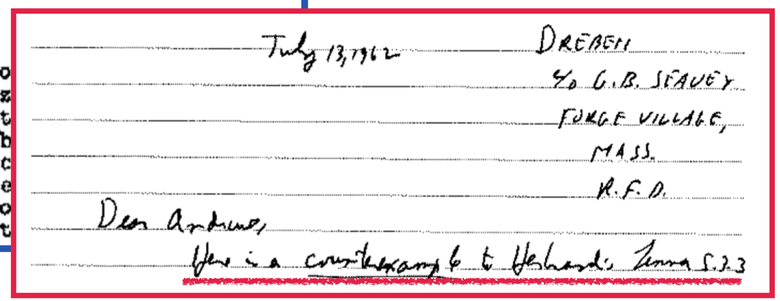

July 13, 1962
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MASS.
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Journal of Automated Reasoning

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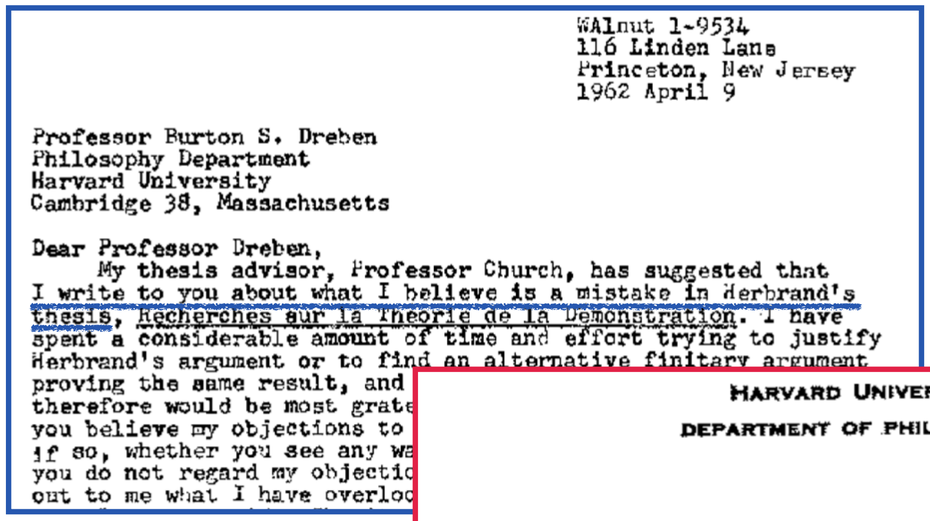

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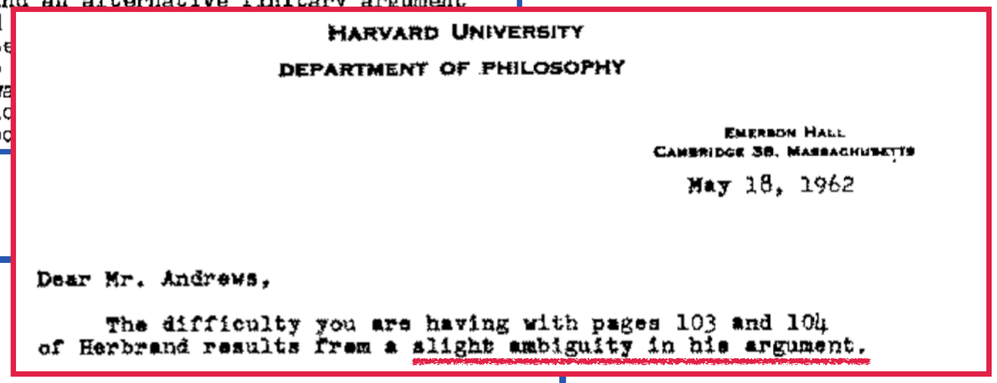

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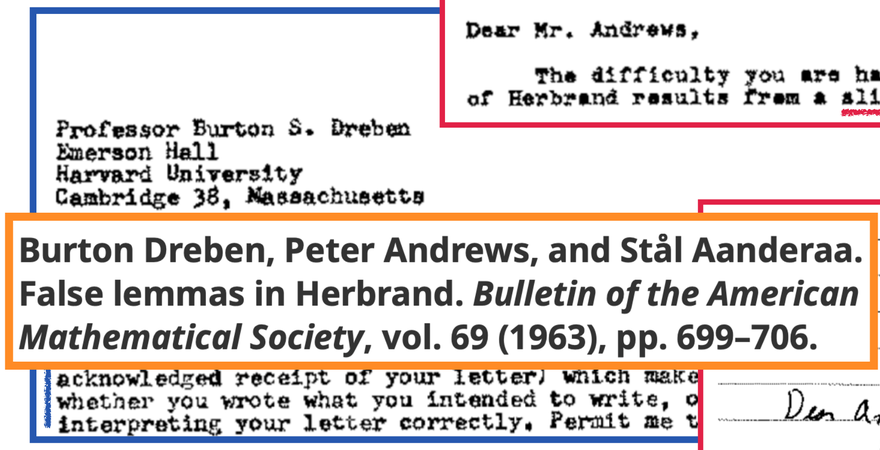

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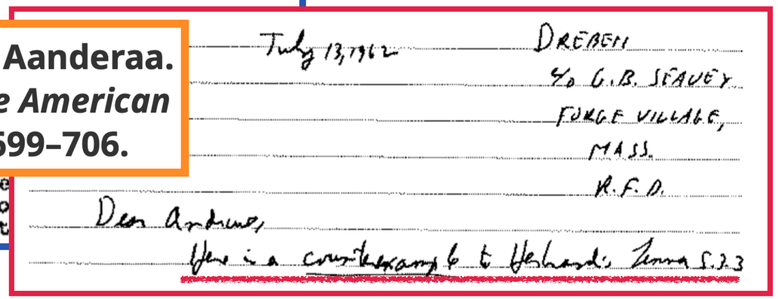

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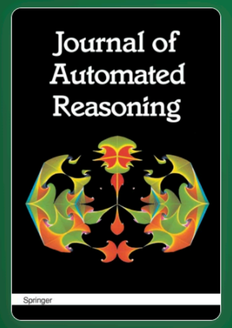

Journal of Automated Reasoning

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Peter B. Andrews

...

One sees over and over again that mistakes do occasionally occur in mathematical reasoning, and we can look forward to the day when this community builds tools which will make it practical for serious mathematical proofs to be checked routinely.

...

I'd like to conclude by emphasizing what a wonderful field this is to work in. Logical reasoning plays such a fundamental role in the spectrum of intellectual activities that advances in automating logic will inevitably have a profound impact in many intellectual disciplines. Of course, these things take time. We tend to be impatient, but we need some historical perspective. The study of logic has a very long history, going back at least as far as Aristotle. During some of this time not very much progress was made. It's gratifying to realize how much has been accomplished in the less than fifty years since serious efforts to mechanize logic began. We're making very satisfying progress.

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Foundations of Church's Type Theory

Systems and Tools for ITP and ATP

Selection of papers:

Peter B. Andrews:
Resolution in Type Theory. J. Symb. Log. 36(3): 414-432 (1971)

Peter B. Andrews:
General Models, Descriptions, and Choice in Type Theory. J. Symb. Log. 37(2): 385-394 (1972)

Peter B. Andrews:
General Models and Extensionality. J. Symb. Log. 37(2): 395-397 (1972)

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Peter B. Andrews:
Theorem Proving via General Matings. J. ACM 28(2): 193-214 (1981)

...

Matthew Bishop, Peter B. Andrews:
Selectively Instantiating Definitions. CADE 1998: 365-380

Peter had 10 papers at CADE

Detected another "flaw", now in Henkin's notion of general models.

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Systems and Tools for ITP and ATP

TPS project since the 70's

- TPS: ATP based on mating search

Journal of the ACM

ARTICLE

Theorem Proving via General Matings

Author: Peter B. Andrews | Authors Info & Claims

Journal of the ACM (JACM), Volume 28, Issue 2 • Pages 193 - 214
https://doi.org/10.1145/322248.322249 1981

Published: 01 April 1981 Publication History | Check for updates

Home › Journal of Automated Reasoning › Article

TPS: A theorem-proving system for classical type theory

Research Article | Published: June 1996
Volume 16, pages 321–353, (1996) Cite this article

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Journal of Automated Reasoning
Aims and scope →
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Peter B. Andrews, Matthew Bishop, Sunil Issar, Dan Nesmith, Frank Pfenning & Hongwei Xi

THM5 (Cantor's Theorem for Sets. The power set of a set has more members than the set.)

$$\sim\exists G_{o\iota}\,\forall F_{o\iota}\,\exists J_{\iota}\cdot[G_{o\iota}J_{\iota}] = F_{o\iota} \quad \text{(11 seconds)}$$

1981

```
1 theory Cantor imports Main
2 begin
3 typedecl i
4 theorem SurjectiveCantor: "¬(∃F::i⇒i⇒bool. ∀G::i⇒bool. ∃X::i. F X = G)"
5   sledgehammer sledgehammer[instantiate] oops
6 end
```

☑ Proof state ☑ Auto hovering ☑ Auto update Update Search:

```
Sledgehammering...
e found a proof...
e: One-line proof reconstruction failed: by metis
Done
```

2025

C. Benzmüller, July 31, 2025

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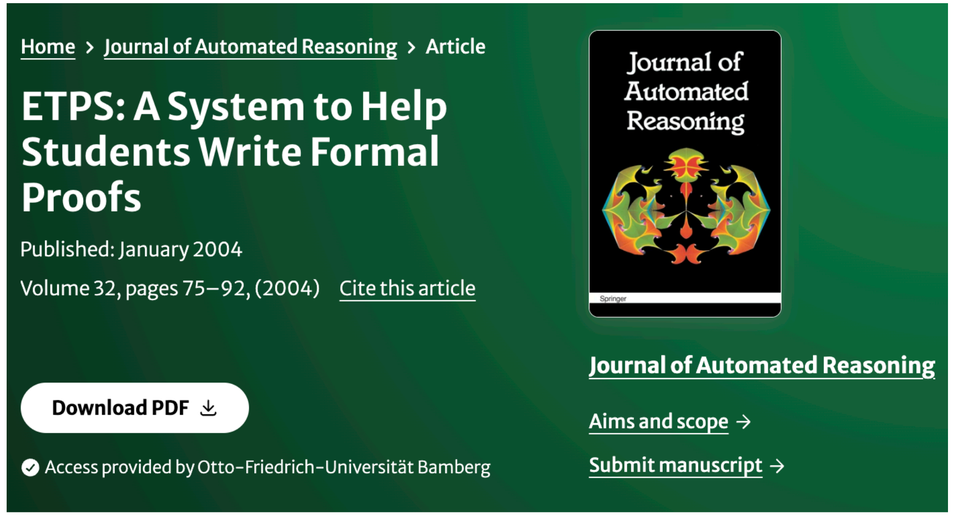
Systems and Tools for ITP and ATP

TPS project since the 70's

- TPS: ATP based on mating search
- ETPS: Educational ITP based on ND



Peter B. Andrews, Chad E. Brown, Frank Pfenning, Matthew Bishop, Sunil Issar & Hongwei Xi

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- ETPS: Educational ITP based on ND
- Expansion Proofs in-between

Peter B. Andrews:
Transforming Matings into Natural Deduction Proofs. CADE 1980: 281-292

PROOFS IN HIGHER-ORDER LOGIC

Dale A. Miller
October 1983
Tech Report: MS-CIS-83-37

Systems and Tools for ITP and ATP

TPS finds proof

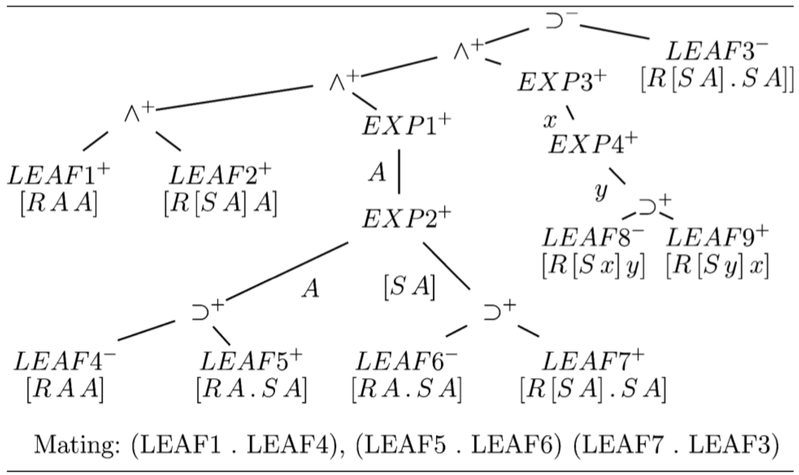

Fig. 2. Expansion tree and mating for THM634.

(1)	$1 \vdash$	$R_{o\iota\iota}\,A_\iota\,A \wedge R[S_{\iota\iota}\,A]A \wedge \forall x_\iota \forall y_\iota [R\,x\,y \supset Ry.S\,x]$ $\wedge\, \forall x \forall y.R[S\,x]y \supset R[Sy]x$	Hyp
(2)	$1 \vdash$	$R_{o\iota\iota}\,A_\iota\,A$	RuleP: 1
(3)	$1 \vdash$	$\forall x_\iota \forall y_\iota . R_{o\iota\iota}\,x\,y \supset Ry.S_{\iota\iota}\,x$	RuleP: 1
(4)	$1 \vdash$	$\forall y_\iota . R_{o\iota\iota}\,A_\iota\,y \supset Ry.S_{\iota\iota}\,A$	UI: A_ι 3
(5)	$1 \vdash$	$R_{o\iota\iota}\,A_\iota[S_{\iota\iota}\,A] \supset R[SA].SA$	UI: $[S_{\iota\iota}\,A_\iota]$ 4
(6)	$1 \vdash$	$R_{o\iota\iota}\,A_\iota\,A \supset RA.S_{\iota\iota}\,A$	UI: A_ι 4
(7)	$1 \vdash$	$R_{o\iota\iota}[S_{\iota\iota}\,A_\iota].SA$	RuleP: 2 5 6
(8)	$\vdash$	$R_{o\iota\iota}\,A_\iota\,A \wedge R[S_{\iota\iota}\,A]A \wedge \forall x_\iota \forall y_\iota [R\,x\,y \supset Ry.S\,x]$ $\wedge\, \forall x \forall y[R[S\,x]y \supset R[Sy]x] \supset R[SA].SA$	Deduct: 7

Fig. 3. Natural deduction proof of THM634.

TPS project since the 70's

- TPS: ATP based on mating search
- ETPS: Educational ITP based on ND
- Expansion Proofs in-between

Peter B. Andrews:
Transforming Matings into Natural Deduction Proofs. CADE 1980: 281-292

PROOFS IN HIGHER-ORDER LOGIC

Dale A. Miller
October 1983
Tech Report: MS-CIS-83-37

Systems and Tools for ITP and ATP

TPS project since the 70's

Eve Longini Cohen	1974–1980
Dale A. Miller	1978–1983
Frank Pfenning	1980–1986
Sunil Issar	1984–1990
Carl Klapper	1984–1987
Dan Nesmith	1987–1991
Hongwei Xi	1992–1995
Matthew Bishop	1992–1999
Chad E. Brown	1999–2004

Peter B. Andrews

* 1 Nov 1937 — † 21 Apr 2025

I asked ***Cate Andrews***, his wife, last weekend whether she wanted to pass on a message to the CADE community.
She wrote back to me that ***Peter did not enjoy travel. The big exception was to go to CADE conferences. Travel was not easy for him. For him to go to as many CADE conferences as possible is testament to how much he valued attending***.

Peter ***loved teaching and research*** and he always maintained this non-compromisable passion for details (also in private life ...).

> ***Peter, you are missed! We will always remember your humble and kind smile — also your humble and more critical smile.***

C. Benzmüller, July 31, 2025