THANK YOU

Nachum Dershowitz

Dziękuję

Nachum Dershowitz

Inc. 23

CVDE Inc. 23

Shakespeare

- I can no other answer make but thanks/ And thanks...
- What's to do? Shall we go see the reliques of this town?
- To-morrow, sir: best first go see your lodging.
- I am not weary, and 'tis long to night: I pray you, let us satisfy our eyes/ With the memorials and the things of fame/ That do renown this city.

History

Histories

- Martin Davis
- Wolfgang Bibel
- Peter Andrews
- Ewing Lusk
- ...

Living History
Dick
REWRITING HISTORY
MORRIS

Fossils

Agenda

- Much have I learned from my teachers,
- more so from my colleagues,
- but most of all from my students.

– Talmud

My Teachers

Natural Deduction

Euclid (-400)

Aristotle (-350)

Human Deduction

Zeroth-Order Logic

First-Order Logic

"Everybody Loves My Baby
(But My Baby Loves Nobody But Me)"

-- Jack Palmer
& Spence Williams,
1924

EVERYBODY LOVES
MY BABY

BUT MY BABY
LOVES NOBODY
BUT ME

* CLICK *

SO THIS DUDES HIS OWN BABY, HUH?

Higher Logic

There is no man living who has never looked upon a woman without desire.

There is no man living who has never looked upon a woman without desire.

Robert Lowth
1762

abolished double negatives in English
as "illogical"

You turned out to be the best thing I never had.

And I will always be the best thing you never had.

Polish:
Nikogo nie widziałem
(I didn't see nobody)

Serbian:
Niko nikada nigde ništa nije uradio
(Nobody never didn't do nothing nowhere)

Automated Deduction

Ramon Lull (1274)

Raymondus Lullus

Ars Magna et Ultima

Georg Ferdinand Ludwig Philipp Cantor on Lull

Eine Gemenge von Logik, kabbalistischer und eigener Tollheit, unter welches, man weiss nicht wie einige Körner gesunden Menschenverstandes geraten sind.

Gottfried Wilhelm Leibniz (1666)

The only way to rectify our reasonings is to make them as tangible as those of the Mathematician, so that we can find our error at a glance, and when there are disputes among persons, we can simply say: Let us calculate, without further ado, in order to see who is right.

Ada Lovelace

Many persons ... imagine that because [Babbage's Analytical Engine] give[s] its results in numerical notation, the nature of its processes must ... be arithmetical and numerical rather than algebraical and analytical.

This is an error!

David Hilbert's Entscheidungsproblem

#2. Provide an effective method to determine whether a formula is valid.

David Hilbert's "Lost" Problem

#24. Criteria of simplicity, or proof of the greatest simplicity of certain proofs.

Jules Henri Poincaré

We might imagine a machine where we should put in axioms at one end and take out theorems at the other, like that legendary machine in Chicago where pigs go in alive and come out transformed into hams and sausages.

Jacques Herbrand

1908 - 1931

UNIWERSYTET WARSZAWSKI

DOWÓD OSOBISTY
AKADEMICKI

Student G. *Wydz.* filozof.-matemat.
Presburger Mojżesz
jest zapisan. y *w Albumie Uniwersytetu*
Warszawskiego pod L. 16495
t. cz.
REKTOR

Mojżesz Presburger

1904 - 1943

My Family

You are here (1900)
PREUSSEN
POSEN
POLEN
WARSCHAU
Masovien
Podlachien
GRODNO
BIALYSTOCK
MINSK
WOLHYNIEN
Lubelsk
KRAKAU
GALIZIEN
Lemberg
PODOLIEN
Bukowina
Türk.
Russ.
Böhm.
Mähren
Oestcrr.
UNGARN
Breslau
Posen
Thorn
Danzig
Bromberg
Warschau
Lublin
Radom
Sandomir
Przemysl
Jaroslaw
Brody
Tarnopol
Kamenetz
Chotschin
Mohilew
Minsk
Grodno
Wien
Pesth
Debreczin
Jassy
Lemberg

Galicia c. 1880

Kielce
Zawichost
Sandomir
Radomysl
Zamosc
Lublin
Kesmark
Leutschau
Eperies
Tarnobrzeg
Baranow
Rudnik
Tarnogrod
Tomaszow
Bilgoray
Ulanow
Dembick
Mielec
Kolbuczow
Soltolow
Lezajsk
Glogow
Grodzisko
Sieniawa
Oleszyce
Lubaczow
Niemirow
Zolkiew
Kulikow
Rawa
Lubica
Blazow
Augustow
Dobrodwor
Radziechow
Sokal
Poryk
Luskow
Belz
Stojanow
Kozin
Ostrog
Rovno
Lutsk
Włodzimierz
Kremenec
BRODY
Buck
Olesko
Markopol
Nowemiasto
Lanowce
Zaloscz
Wiszgrudek
Zbarasz
Tarnopol
Skalat
Tarnoruda
Grzymalow
Sczanow
Czorikow
Husiatyn
Kopyczynce
Budzanow
Monasterzysk
Mikulince
Trembowla
Janow
Chorostkow
Podhayce
Burshtyn
Bulszowice
Hahez
Bucacz
Uscie
Mariampol
Stanislawow
Tysmienica
Thlmacz
Lisiec
Chochmierz
Otynia
Nadworna
Kolomea
Zabolotow
Smiatyn
Czernowitz
Stroschenetz
Sereth
Suczawa
Radautz
Jacobeny
Kolomyja
Zydaczow
Zarawna
Woynilow
Bolechow
Dolina
Roznatow
Skole
Turka
Stary Sambor
Drohobycz
Boryslaw
Hurnie
Sambor
Stare Miasto (Alt Sambor)
Starasol
Felsztyn
Dobromil
Przemysl
Jaroslaw
Jaworow
Janow
Grodek
Komarno
Mosciska
Sadowa Wisznia
Dubiecko
Lemberg
Gliniany
Zloczow
Gelogory
Zborow
Przemyslany
Pomorzany
Bobrka
Mikolajow
Nawarja
Brzozdowice
Narajow
Kozowa
Bohatyn
Brezany
Chodorom
Zydorow
Tarnow
Pilsno
Czudec
Tyczyn
Rzeszow
Rzepczyce
Dembica
Radomysl
Dombrowna
Opatowiec
Uscie Solne
Niepolomice
Wojnicz
Brzesko
Limanowa
Czchow
Tuchow
Zakliczyn
Brzostek
Frysztak
Jaslo
Dynow
Sanok
Rymanow
Brzozow
Krosno
Riecz
Osiek
Zawigrod
Dukla
Gorlice
Neu Sandec
Alt Sandec
Poprad R.
Jasliska
Swidnik
Bartfeld
Kapi
Sztropko
Jablonka
Homonna
Somos
Varana
Sztara
Szinna
Szobrancz
Ungvar
Munkacs
Kaschau
Rosenau
Tornalja
Moldau
Nemeti
Gonez
Vohito
Satoralja Ujhely
Szerdahely
Szerdnye
Kuszniczia
Volovo
Polyana
Holubina
Turia
Poskoc
Szolyma
Nagy Mihaly
Bereg Szasz
Nagy Ag
Tarna
Bazar
Visk
Tecso
Tiszaluc
Tiszafured
Kis Ilonda
Namenyi
Mada
Jank
Szathmar
Tisza Lok
Nyiregyhaza
Kereszlu
Kereszur
Geszteg
Szikszo
Szanto
Liszko
Szabolcs
Szamos
Bodrog R.
Tisza R.
Theiss
Thur R.
Sajo R.
Bodva R.
Torna R.
Boldva
Tidsocz
Szendro
Putnak
Kaze
Apathfalva
Borsany
Miskolcz
Ujhely
Forro
Sajo Petri
Marton
Verespatak
Bunbo
Bocsko
Trhusa
N. Szigeth
M. Pietrosso
Petrovo
Jakobeny
M. Ruszky
M. Fiume
Kaluznahora
Berezna
Orosz
Dolina
Tarna
Bistrica
Prut R.
Pruth
Dniester
Kolomyja
Zydaczow
Zarawna
Woynilow
Bolechow
Dolina
Roznatow
Skole
Turka
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Szinna
Szobrancz
Ungvar
Munkacs
Kaschau
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Nagy Ag
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Tiszafured
Kis Ilonda
Namenyi
Mada
Jank
Szathmar
Tisza Lok
Nyiregyhaza
Kereszlu
Kereszur
Geszteg
Szikszo
Szanto
Liszko
Szabolcs
Szamos
Bodrog R.
Tisza R.
Theiss
Thur R.
Sajo R.
Bodva R.
Torna R.
Boldva
Tidsocz
Szendro
Putnak
Kaze
Apathfalva
Borsany
Miskolcz
Ujhely
Forro
Sajo Petri
Marton
Verespatak
Bunbo
Bocsko
Trhusa
N. Szigeth
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Jakobeny
M. Ruszky
M. Fiume
Kaluznahora
Berezna
Orosz
Dolina
Tarna
Bistrica
Prut R.
Pruth
Dniester
Kolomyja
Czernowitz
Stroschenetz
Sereth
Suczawa
Radautz
Jacobeny
Czernowitz
Sniatyn
Kolomea
Zabolotow
Zaleszczyki
Grodek
Borodenka
Gwozdziec
Otynia
Nadworna
Tysmienica
Thlmacz
Lisiec
Chochmierz
Stanislaw

1888-1973

1882-1955

Text

45 - 90 " " " " "
90 & over " " " " "
Cities with over 8000 inhab are shown in solid colour in circles proportionate to their population.
The centre of population at each decennial census shown thus + 1890.
IN 1900
English Miles
1900
1890
1880
1870
1860
1850
1840
1830
1820
1810
1800
1925-

1903-1980
1897-1986
Kielce
Zawichost
Sandomir
Radomysl
Zamosc
Lublin
Kovel
Rovno
Poryk
Sokal
Dreskopol
Stojanow
Luskow
Belz
Radziechow
Szczurowice
Augustow
Dobrodwor
Cholojow
Rawa
Kamionka Strumilowa
Zolkiew
Kulikow
Buk
Olesko
Niemirow
Lubaczow
Wielkie Oczy
Jaroslaw
Jaworow
Janow
LEMBERG
Glinany
Gelogory
Przemyslany
Bobrka
Mikolajow
Brzozdowy
Bolshatyn
Brezany
Tarnopol
Skalat
Grzymalow
Janow
Budzanow
Husiatyn
Czernowitz
Stroschenetz
Sniatyn
Sadagora
Kolomea
Stanislau
Tarnow
Dembica
Mielec
Kolbuczow
Dembick
Radomysl
Opatowiec
Dombrowna
Zabno
Uscie Solne
Niepolomice
Wojnicz
Brzesko
Czudec
Rzeszow
Przeworsk
Jaroslaw
Tyczin
Dubiecko
Sanok
Przemysl
Mosciska
Grodek
Komarno
Felsztyn
Sambor
Starasol
Stare Miasto (Alt Sambor)
Drohobycz
Boryslaw
Stryszow
Jaslo
Krosno
Brzozow
Dynow
Rymanow
Dukla
Jasliska
Zawigrod
Osiek
Riecz
Czchow
Limanow
Neu Sandec
Alt Sandec
Gorlice
Tuchow
Brzostek
Frysztak
Zakliczyn
Lipnika
Kesmark
Leutschau
Eperies
Homonna
Bodemer
Szomolnok
Kaschau
Rosenau
Tornalja
Putnok
Szendro
Szikszo
Miskolcz
Gesztely
Kereszlu
Tisza Lok
Bodaly
Szanto
Tiszaeszlar
Nyiregyhaza
Munkacs
Ungvar
Szerdahely
Holubina
Kuszniczka
Volovo
Szolyma
Polyana
Turka
Skole
Bolechow
Dolina
Rozniatow
Smorza
Sziszra
Hunie
Woynilow
Zarawna
Hahez
Bursztyn
Podhajce
Bulszowice
Monasterzyska
Buczacz
Uscie
Tluste
Jezierzany
Korolowka
Grodek
Sadagora
Czernowitz
Stroschenetz
Nagy Szollos
Beregszasz
Vereshmarth
Bazar
Visk
Tiszaluc
Halmi
Nagy Ag
Bumbo
Bocsko
Trebusa
N. Szigeth
M. Pietrosso
Petrovo
Radautz
Jacobeni
Kaschau
Tornalja
Putnok
Szendro
Szikszo
Miskolcz
Gesztely
Kereszlu
Tisza Lok
Bodaly
Szanto
Tiszaeszlar
Nyiregyhaza
Munkacs
Ungvar
Szerdahely
Holubina
Kuszniczka
Volovo
Szolyma
Polyana
Turka
Skole
Bolechow
Dolina
Rozniatow
Smorza
Sziszra
Hunie
Woynilow
Zarawna
Hahez
Bursztyn
Podhajce
Bulszowice
Monasterzyska
Buczacz
Uscie
Tluste
Jezierzany
Korolowka
Grodek
Sadagora
Czernowitz
Stroschenetz
Nagy Szollos
Beregszasz
Vereshmarth
Bazar
Visk
Tiszaluc
Halmi
Nagy Ag
Bumbo
Bocsko
Trebusa
N. Szigeth
M. Pietrosso
Petrovo
Radautz
Jacobeni

ANTIC
CEAN
SWEDEN
FINLAND
NORWAY
ESTONIA
LATVIA
LITHUANIA
THERN
ELAND
GREAT
BRITAIN
IRELAND
DENMARK
EAST
PRUSSIA
(Germany)
NETHER-
LANDS
ENGLAND
POLAND
BELGIUM
GERMANY
LUXEMBURG
SLOVAKIA
FRANCE
AUSTRIA
SWITZ
HUNGA
ANDORRA
YUGOSLA
TUGAL
CORSICA
(France)
ITALY
SPAIN
SARDINIA
(Italy)
TURKEY
SPANISH
MOROCCO
CYPRUS
(Gt. Britain)
LEBANON
ALGERIA
(France)
TUNISIA
MALTA
(Br.)
1932-

1951

My Teachers

[Uribe]

Zohar Manna

MATHEMATICAL THEORY OF COMPUTATION

ARTIFICIAL INTELLIGENCE SERIES
Studies in Automatic Programming Logic
Zohar Manna
Richard Waldinger
with contributions by
Shmuel Katz and Karl Levitt
THE COMPUTER SCIENCE LIBRARY

THE DEDUCTIVE FOUNDATIONS OF COMPUTER PROGRAMMING
ZOHAR MANNA and RICHARD WALDINGER

Zohar Manna
Amir Pnueli
The Temporal Logic of Reactive and Concurrent Systems
•Specification•
Springer-Verlag

Zohar Manna
Amir Pnueli
Temporal Verification of Reactive Systems
•Safety•
Springer

Amir Pnueli
Richard Waldinger

termination ideas

automated deduction

John McCarthy
Don Knuth

AI lab

completion

My Teacher's Teachers

Zohar Manna

CMU 1968

"Termination of Algorithms"

Manna & Pnueli

STeP

Robert W Floyd

Chicago

Zohar's advisor

Loop invariants

Termination

Dave Plaisted was his student

Saul Gorn
U Penn

Bob Floyd

Zohar Manna

Steve Ness

Amir Pnueli

Renato Iturriaga

- addressed termination of rewriting

Gorn's Termination Question On Floyd's CMU Qual Exam

$$Dx \rightarrow 1$$
$$Dy \rightarrow 0$$
$$D(\alpha + \beta) \rightarrow (D\alpha + D\beta)$$
$$D(\alpha \cdot \beta) \rightarrow ((\beta \cdot D\alpha) + (\alpha \cdot D\beta))$$

Alan Jay Perlis
MIT 1950

Zohar's advisor

One man's constant is another man's variable.

A Lisp programmer knows the value of everything, but the cost of nothing.

CONTRIBUTIONS TO MECHANICAL MATHEMATICS

by

Renato Iturriaga

May 27, 1967

DIGITAL COMPUTER
LABORATORY
LIBRARY

Perlis' student

Carnegie-Mellon University
Pittsburgh, Pennsylvania

A MARKOV ALGORITHM FOR TRANSFORMING LOGICAL FORMULAE INTO DISJUNCTIVE NORMAL FORM

```
001:  11002    BEGIN FORM A, B, C, R, X;
002:  11016    SYMBOL S,Y1;
003:
004:  11023    Y1←/[OPERATOR:∧][COMM:TRUE];
005:  11053    A←A:ANY; B←B:ANY; C←C:ANY;
006:
007:  11104            S ← [[
008:  11107            ¬ (A ∧ B)    →    ¬.A ∨ ¬.B,
009:  11144            ¬ (A ∨ B)    →    ¬.A ∧ ¬.B,
010:  11202            ¬ A ¬= B     →    .A  = .3,
011:  11234            ¬ A  = B     →    .A ¬= .3,
012:  11266            ¬ A ¬< B     →    .A  < .3,
013:  11320            ¬ A  < B     →    .A ¬< .3,
014:  11352            ¬ A ¬> B     →    .A  > .3,
015:  11404            ¬ A  > B     →    .A ¬> .3
016:  11417            ],
017:  11440            (A∨B) |Y1| C  →  .A∧.C ∨ .3∧.C ];
018:
019:  11517    R ← ¬(¬(X<8∧X>-10)∧X=5)∧¬(X¬<15);
020:  11576    PRINT( R, R.↓S);
021:  11606    END
```

Philip Franklin
Princeton 1921

Perlis' advisor

"The four color problem"

Oswald Veblen

Chicago 1903

"A system of axioms for geometry"

Veblen ordinals

Alonzo Church

student of Veblen

Peter Andrews
Martin Davis
Leon Henkin
Stephen Kleene
Michael Rabin
Hartley Rogers
John Rosser
Dana Scott
Raymond Smullyan
Alan Turing
...

Eliakim Hastings Moore

Yale 1885

Veblen's advisor

"Extension of certain theorems of Clifford and Cayley in the geometry of n dimensions"

George Birkhoff was his student

Hubert Anson Newton

Yale 1850

Mathematician

Astronomer

Meteors

Comets

Michel Chasles
Polytechnique 1814

"Historical view of the origin and development of methods in geometry"

Acquired thousands of forged letters from Aristotle, etc.

Chasles' Descendants

H. A. Newton

E. H. Moore

Oswald Veblen

Philip Franklin

Alan Perlis

Zohar Manna

*

Gaston Darboux

C. Emile Picard

Ernest Vessiot

Herbrand

Simeon Denis Poisson

Polytechnique 1800

Poisson's equation

Definite integrals

Poisson spot

Poisson distribution

Joseph Louis Lagrange

Giuseppe Lodovico Lagrangia

Mathematics

Mechanics

Astronomy

Lagrange inversion

Leonhard Euler

Basel 1726

Mathematics

- Function
- Calculus

Astronomy

Graph theory

Logic

- Euler diagrams

Johann Bernoulli

Basel 1694

Catenary

Jacob Bernoulli

Basel

e

Gottfried Leibniz

Altdorf 1666

Calculemus!

Christiaan Huygens
Leiden 1655

Discovered Titan

Invented pendulum clock

Wave theory of light

Frans van Schooten

Leiden 1635

Popularized Descartes

Jacobus Golius

Leiden 1621

Arabic and Persian lexicons

Taught math to Descartes

Willebrord Snell van Royen

Leiden 1607

Willebrord Snellius

Mathematician

Discoveries by telescope

Rediscovered law of refraction

Rudolph Snellius
Ruprecht Karls, Heidelberg 1572

Humanist

Taught Logic

Professor of Hebrew

Valentine Naibod

Luther U., Halle-Wittenberg

Mathematician

died on account of his astrological prediction of his own demise

Erasmus Reinhold

Luther U., Halle-Wittenberg 1535

Gerhard Gerhards

Satirist

Renaissance scholar

Jakob Milich
Wien 1524

Professor of math

Commentator on Pliny the Elder

Desiderius Erasmus

Turin 1506

"Prince of the humanists"

Encomium Moriae
(The Praise of Folly)

1 DESIDERIUS ERASMUS (b. 1467)
Ulrich Zasius
Jakob Milich
Erasmus Reinhold
Valentine Naibod
Rudolph Snellius
Ludolph van Ceulen
Willebrord Snellius
Jacobus Golius
Marin Mersenne
Frans van Schooten
Jan Jansz Stampioen Jr.
5 CHRISTIAAN HUYGENS (1629)
Bartholomäus Leonhard Schwendendörffer
6 GOTTFRIED WILHELM LEIBNIZ (1646)
Nicolas Malebranche
7 JACOB & JOHANN BERNOULLI (1654, 1667)
8 LEONHARD EULER (1707)
Giovanni Battista Beccaria
9 JOSEPH-LOUIS LAGRANGE (1736)
Jean-Baptiste Joseph Fourier
Simeon Denis Poisson
Karl Christian von Langsdorf
11 MARTIN OHM (1792)
Peter Gustav Lejeune Dirichlet
Rudolf Otto Sigismund Lipschitz
Christian Felix Klein
Jean Le Rond d'Alembert
10 PIERRE-SIMON LAPLACE (1749)
12 CARL FRIEDRICH GAUSS (1777)
Christian Ludwig Gerling
Julius Plücker
2 NICOLAUS COPERNICUS (1473)
3 GEORG JOACHIM RHETICUS (1514)
4 GABRIELE FALLOPPIO (1523)
Valentin Otto
Sebastian (Theodoricus) Dietrich
Caspar Peucer
Hieronymus Fabricius
Andreas Schato
Salomon Alberti
Melchior Jöstel
Ernestus Hettenbach
Ambrosius Rhodius
Christoph Notnagel
Johann Andreas Quenstedt
Michael Walther Jr.
Johann Pasch
Johann Andreas Planer
Christian August Hausen
Abraham Gotthelf Kästner
Georg Christoph Lichtenberg
Bernhard Friedrich Thibaut
Johann Tobias Mayer
Enno Heeren Dirksen
Carl Gustav Jacob Jacobi
Otto Hesse
Friedrich Julius Richelot
Carl Gottfried Neumann
William Edward Story
Solomon Lefschetz
Albert William Tucker
13 SEYMOUR AUBREY PAPERT (1928)
14 MARVIN LEE MINSKY (1927)
15 GERALD JAY SUSSMAN (1947)

Alexander Hegius

1474

Humanist

Generous to a fault

Rudolph Agricola
Ferrara 1478

Introduced dialectics

Humanist

Hebrew scholar

Pioneer in teaching the deaf

Theodoros Gazes

Mantova 1433

Translated Aristotle

Vittorino da Feltre

Padova 1416

Educator

School field trips

Guarino da Verona

Rome 1408

Collected manuscripts

Manuel Chrysoloras
~1390

Μανουὴλ Χρυσολωρᾶς

Translated Greek classics

Demetrius Cydones
~1340

DEMETRII CYDONII
DE CONTEMNENDA MORTE
ORATIO
HENRICUS DECKELMANN
LIPSIAE

When someone comes along and says the Pope is in error and everyone ought to abjure such error, we really have been given no proof for such an allegation, and it makes no sense for anyone to pass judgment on what has first to be proven.

Nilus Cabasilas

Salonika ~1320

Νεῖλος Καβάσιλας

90,373 descendants

Nilus Cabasilas
Salonika ~1320

Νεῖλος Καβάσιλας

90,373 descendants

Read about him in Polish

My Peers

Larry Wos (1992)

Resolution proofs

Set of support

"We don't just prove theorems. We look at conjectures, we design circuits, we solve puzzles, we prove properties of other programs."

Woody Bledsoe (1994)

Non-resolution theorem-proving

Inequalities

"It taught me that 'if we have to do it, then we DO IT.' Nothing seems to have delayed me much since that day, even some very challenging times when we crossed the Rhine River."

Alan Robinson (1996)

Resolution principle

Unification

"Part of the point... of the logical analysis of deductive reasoning has been to reduce complex inferences, which are beyond the capacity of the human mind to grasp as single steps, to chains of simpler inferences, each of which is within the capacity of the human mind to grasp as a single transactiom."

Wen-Tsun Wu (1997)

Geometry as algebra

"During the cultural revolution I was sent to a factory manufacturing computers. I was initially struck by the power of the computer.... I began to understand what Chinese ancient mathematics really was.... It was under such influence that I investigated the possibility of proving geometry theorems in a mechanical way."

Gérard Huet (1998)

Rewriting theory

Higher-order unification

"Le traitement de la langue naturelle, ce qu'on nomme linguistique computationnelle, se situe au carrefour entre la linguistique, la logique et l'informatique."

Bob Boyer & J Moore (1999)

Induction

Generalization

"With the aid of automatic theorem-provers, it is now often practical to do mathematics formally."

Bill McCune (2000)

Otter & EqP

Indexing

Robbins' Conjecture

"In a sense, I have a feeling that the computer has been creative."

Don Loveland (2001)

DPLL

Model elimination

"The most grandiose applications, such as full program synthesis, the mechanized mathematician, or the general reasoning machine, are not yet within view.... However, such automated deduction applications clearly can and will be developed, and they will be enormously beneficial."

Mark Stickel (2002)

Unification

Indexing

PTTP

"Automated deductive program synthesis has been studied for many years but has never been used in practice."

Peter Andrews (2003)

Higher-order

TPS

Mating

"Logical reasoning plays such a fundamental role in the spectrum of intellectual activities that advances in automating logic will inevitably have a profound impact on many intellectual disciplines."

Harald Ganzinger (2004)

Superposition

Conditional rewriting

"Developers of state-of-the-art SAT solvers would need relatively little work to turn their solvers into DPLL(X) engines."

Martin Davis (2005)

Davis-Putnam

"How can we ever exclude the possibility of our being presented, some day (perhaps by some extraterrestrial visitors), with a device or "oracle" that "computes" an uncomputable function?"

Wolfgang Bibel (2006)

Applications of first-order proving

Connection method

"Those who transformed from Logic to Informatics... became sort of banned, in any case kept in low regard."

Alan Bundy (2007)

Induction heuristics

"[A review] is something that will ruin your day."

Ed Clarke (2008)

Incremental model checking

"We found several errors that had been previously undetected. Apparently, this is the first time that formal methods have been used to find nontrivial errors in an IEEE standard."

Deepak Kapur (2009)

Algebra & Geometry

Equational

Invariants

"We analyze the perceptions of male and female CS/CE undergraduate students with regard to gender-related issues and show how they are articulated."

Dave Plaisted (2010)

Strategies

Abstraction

Instance-based

"We are interested in the sizes of the search spaces produced by clause form refutational theorem proving strategies for first-order logic. This interest is different from that of most logicians who are interested in provability or the length of proofs."

My Students
(of deduction)

G Sivakumar

Charles Hoot

Naomi Lindenstrauss

Jieh Hsiang

Leo Bachmair

Subrata Mitra

Alan Josephson

Yuh-jeng Lee

Fei-Pei Lai

Ely Pinchover

Iddo Tzameret

Alex Nadel

Daher Kaiss

Mitch Harris

Jacob Katz

Yulik Feldman

My Circles

E. Costado Ellerman
Zohar Manna
Andrea B
Yuri Gurevich
Jacob Katz
Yehoshua Sagiv
Alexander Nadel
Edward M. Reingold
Alexander Serebrenik
Shmuel Zaks
Udi
Yuhjeng Lee
Naomi Lindenstrauss
Ziyad Hanna
Nachum Dershowitz
Yaacov Choueka
Daher Kaiss
Ido Tsamoret
David A. Plaisted
Leo Bachmair
G. Sivakumar
Subrata Mitra
Guanghiong Huang
Jieh Hsiang
Mitsuhiro Okada
Mario Paolo Bonacina
Jean-pierre Jouannaud
N. Alan Josephson
Claude Kirchner
Stéphane Kaplan
Jan Willem Klop

CADE cfp

- Logics of interest include, but are not limited to
  - propositional, first-order, equational, higher-order, classical, description, modal, temporal, many-valued, intuitionistic, other non-classical, meta-logics, logical frameworks, type theory and set theory.
- Methods of interest include, but are not limited to
  - saturation, resolution, tableaux, sequent calculi, natural deduction, term rewriting, decision procedures, model generation, model checking, constraint solving, induction, unification, proof planning, proof checking, proof presentation and explanation.
- Applications of interest include, but are not limited to
  - program analysis and verification, hardware verification, mathematics, natural language processing, computational linguistics, knowledge representation, ontology reasoning, deductive databases, functional and logic programming, robotics, planning, and other areas of AI.

CADE cfp

- Propositional
- Equational
- Term rewriting
- Unification
- Saturation
- Program verification
- Functional & logic programming
- Synthesis

Propositional

- Alex Nadel
- Ziyad Hanna
- Yulik Feldman
- Guan-Shieng Huang
- Daher Kaiss
- Jieh Hsiang
- Mitch Harris

Rewriting

- Leo Bachmair
- Jieh Hsiang
- G Sivakumar
- J-P Jouannaud
- David Plaisted
- Alan Josephson
- Stephane Kaplan
- Naomi Lindenstrauss
- Mitsu Okada
- Jan Willem Klop
- Leo Marcus
- Andrzej Tarlecki
- Ralf Treinen

Saturation

- Leo Bachmair
- Claude Kirchner
- Jieh Hsiang
- Maria-Paola Bonacina
- David Plaisted
- Mitsu Okada

Unification

- Subrata Mitra
- G Sivakumar
- Claude Kirchner
- Alan Josephson

Verification

- Zohar Manna
- Jay Jayasimha
- Jacob Katz
- Seungjoon Park
- Ziyad Hanna

Termination

- Zohar Manna
- Charles Hoot
- G Sivakumar
- Subrata Mitra
- Mitsu Okada
- Georg Moser
- Leo Bachmair
- Jieh Hsiang
- Naomi Lindenstrauss
- Shuki Sagiv
- Alex Serebrenik
- Iddo Tzameret
- Ed Reingold
- Castedo Ellerman

Programming & Synthesis

- Zohar Manna
- Uday Reddy
- David Plaisted
- Alan Josephson
- Yuh-jeng Lee
- Ely Pinchover
- Naomi Lindenstrauss

Surveys & Problems

Circles & Stars

Shmuel Zaks
Technion

coauthored

"Patterns in trees"

Paul Erdős

"Minimum-diameter cyclic arrangements in mapping data-flow graphs onto VLSI arrays"

Peter Salamon

San Diego

"The solution to a problem of Grunbaum"

Lars Kai Hansen

TU Denmark

"Neural network ensembles"

Nicholas T. Lange
McLean Hospital (Harvard)

"Plurality and resemblance in fMRI data analysis"

Bruce M. Cohen

McLean Hospital (Harvard)

"Structural brain magnetic resonance imaging of limbic and thalamic volumes in pediatric bipolar disorder"

Abigail A. Baird
Dartmouth

"Functional magnetic resonance imaging of facial affect recognition in children and adolescents"

Natalie Hershlag
Harvard

"Frontal lobe activation during object permanence: Data from near-infrared spectroscopy"

Natalie Portman

Harvard

"Frontal lobe activation during object permanence: Data from near-infrared spectroscopy"

Freedom

Intellectual

Academic

Mikołaj Kopernik

Systema maximarum mundi partium, quibus totam rerum vniuersitatem connexam esse tradiderunt communiter authores.

Systema vniuersitatis de sententia summi viri Nicolai Copernici Torinensis.

Systema maximarum vniuersitatis partium ex sententia Martiani Capellæ.

Naibod

Boaz Trakhtenbrot

"Idealist of the Carnap Species"

Bad Reviews

Theory conference:

But where's the implementation?

Applications conference:

But there are no theorems!

Review of Toby Walsh

I don't find the phase transition experiments of much value at this stage. So, there may be a phase transition, so what?

Motto

One good definition
is worth three theorems.

– Alfred Adler
"Mathematics and creativity"
The New Yorker (1972)

In Memoriam

Millions in WWII
Stéphane Kaplan
Ron Book
Harald Ganzinger
Bob Floyd
Amir Pnueli
Bill McCune