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Record Group/Collection: George H.W. Bush Presidential Records
Collection/Office of Origin: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files

OA/ID Number: 62018
Folder ID Number: 62018-007

Folder Title:
Invitation: Speeches [4 of 7] [1992]

Stack:	Row:	Section:	Shelf:	Position:
	0	0	0	0

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9202227

ORIGINATOR: 02

SPEECH: YES NO

FROM: BOEK, Jean K.: THE COLLEGE OF DEMOCRACY

DATE OF EVENT: 10/14/92 THRU: 10/15/92
TENTATIVE DATES:

LOCATION OF EVENT: WASHINGTON MARRIOTT

TIME OF EVENT:

SUBJECT: AN INVITATION TO ADDRESS THEIR THIRTY SEVENTH
INSTITUTE ON FEDERAL FUNDING FOR R & D FOR COLLEGES
AND UNIVERSITIES.

RSVP: 07/06/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? YES NO

COPIES TO:

REMARKS:

DATE OF LETTER: 06/10/92

DATE RECEIVED: 06/22/92

FILE: P-INVITATION-SPEECH

The College of Democracy

1101 NORTH HIGHLAND STREET ARLINGTON, VIRGINIA 22201-2894
TELEPHONE: (703) 527-4800 FAX (703) 527-1457

2227

RECEIVED

June 10, 1992

02 JUN 22 P 1: 08

OSTP
MAIL ROOM

Board of Advisors College of Democracy

Mr. George W. Abbott
The Honorable V.J. Adduci*
The Honorable John B. Anderson*
The Honorable Kenneth E. Be Lieu*
Dr. Walter E. Boek*
The Honorable Dr. Peter G. Bourne
The Honorable David R. Bowen
The Honorable John H. Buchanan, Jr.
The Honorable Elford A. Cederberg*
The Honorable Anna C. Chennault
Mr. Frank P. Davidson, Esq.
The Honorable B. O. Davis (LtGen USAF ret)
The Honorable John Erlenborn

Mr. Samuel Foggie
The Honorable Bill Frenzel
The Honorable Gilbert Gudo
Mr. David C. Guillermo
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The Honorable Martha Keys
Dr. George W. Koch
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The Honorable Clark MacGregor
The Honorable William S. Malliard
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Mr. Nancy Mendoza
Mr. Walter L. Moss, Esq.*
The Honorable Wilbur D. Mills
The Honorable Alejandro Orfila
The Honorable Howard W. Pollock
The Honorable James M. Quigley
The Honorable John H. Reed*
The Honorable Vincent E. Reed
The Honorable John J. Rhodes
Mr. John T. Roberts
The Honorable John G. Schmitz
The Honorable Hugh Scott
The Honorable Carlton Sickles
The Honorable Henry P. Smith, III
The Honorable Dr. Elmer B. Staats
The Honorable Mick Staton
The Honorable John R. Steelman
Dr. Hatton S. Yoder*
Admiral E.R. Zumwalt, Jr. (USN ret)

* Executive Committee

Board of Governors

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Mr. David S. Gedney
Vice Chairman
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The Honorable Anna C. Chennault
The Honorable B. O. Davis (LtGen USAF ret)
Dr. William Loveless
Mr. Albert S. Mazloom
Emeritus Member
Dr. Joseph Rogers Young

Dr. D. Allan Bromley
Assistant to the President for
Science and Technology
The White House
Washington, DC 20500

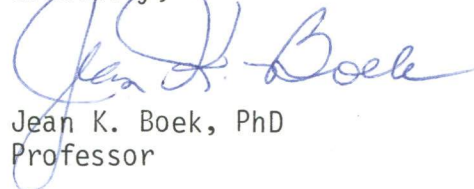
Dear Dr. Bromley:

Our Thirty-seventh Institute on Federal Funding for R&D for colleges and universities is on October 14-15, 1992, at the Washington Marriott at Twenty-second and M. Attending this from around the nation are representatives of universities, medical schools, colleges and other groups interested in meeting and hearing speakers from the 28 Federal agencies who give information on new opportunities for research, development and education.

With this note is the program for the Thirty-sixth Institute to illustrate the pattern of these forums. Purpose of these through the years has been to provide a dialogue between government and academic institutions focused on national research and educational needs. As can be noted, each Institute is opened with comments by a distinguished scientist expressing current concerns that can be addressed through improved and innovative systematic knowledge acquisition and transmission programs.

It would be a privilege and pleasure to hear you on this occasion. Having just returned from a visit to Eastern Europe, we can well appreciate the power of determination to excel despite despair.

Cordially,


Jean K. Boek, PhD
Professor

JKB:ds

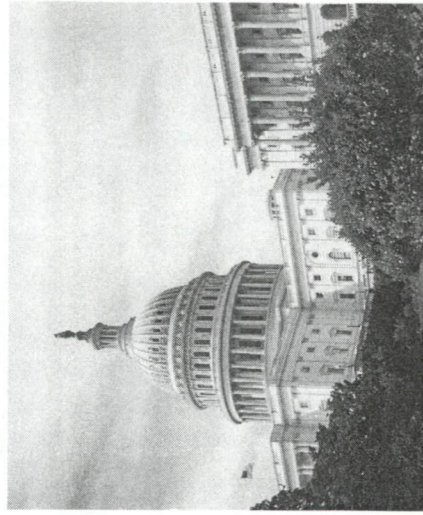
Enclosure

NATIONAL GRADUATE UNIVERSITY

cordially invites you to participate in its

THIRTY-SIXTH INSTITUTE on FEDERAL FUNDING

October 8-9, 1991
Washington, DC



**FY'92 Priorities and Monies for Research,
Development, Education, Technology,
Professional Services and
Other Programs**

for

**Universities, Colleges, Medical Schools,
Hospitals, Laboratories, Professional
and Community Organizations, Firms
and Others Interested in
Grants and Contracts**

1101 North Highland Street
Arlington, Virginia 22201
(703) 527-4800

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9201973

ORIGINATOR: 02

SPEECH: YES NO

FROM: LELBOVICH, Sidney: NATIONAL RESEARCH COUNCIL

DATE OF EVENT: 06/19/92 THRU:
TENTATIVE DATES:

LOCATION OF EVENT: NATIONAL RESEARCH COUNCIL

TIME OF EVENT: 1:30 P.M.

SUBJECT: HE IS WRITING TO INVITE DR. BROMLEY TO SPEAK TO THE
COMMITTEE TO DISCUSS THE DIRECTIONS AND FORCES THAT
HE EXPECTS TO SHAPE THE NATIONAL RESEARCH ENTERPRISE
IN THE NEXT DECADE.

RSVP: 06/10/92

CONTACT PERSON: CAINES, Dana

CONTACT NUMBER: 202-334-2575

INVITATION ACCEPTED? YES

NO

COPIES TO: Pierre Perrolle
Karl Erb
Dr. Wong
Vickie Sutton

REMARKS:

6/8/92 - Regretted to Verna Boyne!
m n

RPB
Conflict
(Canada)

Do letter.

DATE OF LETTER: 05/28/92

DATE RECEIVED: 06/01/92

FILE: P-INVITATION-SPEECH



1973

**NATIONAL RESEARCH COUNCIL
COMMISSION ON ENGINEERING AND TECHNICAL SYSTEMS
2101 Constitution Avenue Washington, D.C. 20418**

**U.S. NATIONAL COMMITTEE
ON THEORETICAL AND APPLIED MECHANICS**

(202) 334-3142

CHAIR

Professor Sidney Leibovich
Sibley School of Mechanical & Aerospace Engineering
248 Upson Hall
Cornell University
Ithaca, New York 14853
(607)255-3477 or -0992 FAX: (607)255-1222

SECRETARY

Professor Phillip G. Hodge, Jr.
107 Ackerman Hall
University of Minnesota
Minneapolis, MN 55455
(612)629-3444 or -8000
FAX: (612)626-1558

March 28, 1991

Dr. D. Allan Bromley
Assistant to the President for Science and Technology
Executive Offices of the President
Washington, DC 20506

FAX: 202-395-3261

Dear Dr. Bromley,

The U.S. National Committee on Theoretical and Applied Mechanics is charged with fostering the health of mechanics in the U.S., and with representing this community in international bodies. The Committee is made up of representatives designated by twelve national technical societies: the American Institute of Aeronautics and Astronautics, the American Mathematical Society, the American Physical Society, the American Society of Civil Engineers, the American Society of Chemical Engineers, the American Society of Mechanical Engineers, the American Society for Testing and Materials, the Society of Engineering Science, the Society for Experimental Mechanics, the Society for Industrial and Applied Mathematics, the Society of Naval Architects and Marine Engineering, and the Society of Rheology. Together, the mission of these societies is central to American industry and to national security. Mechanics is the engineering science base common to the technological and scientific concerns of all of these societies.

There is a perception that Federal support for basic research is undergoing fundamental changes that will naturally be felt in mechanics and related fields in engineering and applied science. FCCSET committees are a part of these changes, and are perhaps the least understood by working scientists. Our committee wishes to gain a better perspective of the changing environment for Federal support of research than the agency level where the direct interaction of our constituency normally takes place. We then will endeavor to convey this perspective to the substantial community of working scientists and engineers whose interests we represent.

With this in mind, I invite you to attend a meeting of the Committee to discuss the directions and forces that you expect to shape the national research enterprise in the next decade. The meeting is scheduled for 1:30 p.m., Friday, June 19, and will be held in room GR104 in the Green Building at the National Research Council location at 2001 Wisconsin Avenue NW.

I think it particularly important to have the viewpoint of OSTP presented at our meeting, and so I especially hope that this can be arranged. Naturally, your own participation is preferred, but if this proves impossible, we very much hope that you will designate an appropriate person from your office to represent OSTP's perspective.

If you have any questions about this request, or need additional information pertaining to it, please contact me (fax: 607-255-1222, telephone: 607-255-3477). I do hope that you will plan to attend, and ask that you let contact Dana Caines of our NRC staff, telephone 202-334-2575, to let her know whether we can expect you to join us.

Sincerely yours,



**NATIONAL RESEARCH COUNCIL
COMMISSION ON ENGINEERING AND TECHNICAL SYSTEMS
2101 Constitution Avenue Washington, D.C. 20418**

**U.S. NATIONAL COMMITTEE
ON THEORETICAL AND APPLIED MECHANICS**

(202) 334-3142

CHAIR

Professor Sidney Leibovich
Sibley School of Mechanical & Aerospace Engineering
248 Upson Hall
Cornell University
Ithaca, New York 14853
(607)255-3477 or -0992 FAX: (607)255-1222

SECRETARY

Professor Philip G. Hodge, Jr.
107 Ackerman Hall
University of Minnesota
Minneapolis, MN 55455
(612)625-3444 or -8000
FAX: (612)626-1558

May 28, 1992

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Assistant to the President for Science and Technology
Executive Offices of the President
Washington, DC 20506

FAX: 202-395-3261

Dear Dr. Bromley,

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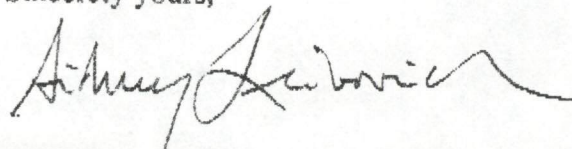
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Sincerely yours,



"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9201875

ORIGINATOR: 02

SPEECH: YES NO

FROM: GUZMAN, Robert C.: THE SOCIETY OF HISPANIC
PROFESSIONAL ENGINEERS

DATE OF EVENT: 06/24/92 THRU: 06/27/92
TENTATIVE DATES:

LOCATION OF EVENT: LOS ANGELES AIRPORT HILTON

TIME OF EVENT:

SUBJECT: AN INVITATION TO DELIVER THE KEYNOTE ADDRESS AT
THEIR CONFERENCE.

RSVP: 06/01/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

YES

NO

COPIES TO: INDUSTRIAL

6/3 mit w/ DAB

REMARKS:



DATE OF LETTER: 05/19/92

DATE RECEIVED: 05/26/92

FILE: P INVITATION-SPEECH



THE WHITE HOUSE
WASHINGTON

June 22, 1992

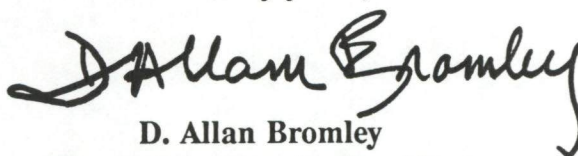
Dear Mr. Guzman:

I am happy to accept your kind invitation to be the keynote speaker at The Society of Hispanic Professional Engineers awards dinner scheduled for June 26, 1992, in Los Angeles, California.

However, I must caution you that occasionally I have to cancel engagements at the last moment due to Presidential requests. I sincerely hope that this does not happen.

I look forward to joining you.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley". The signature is fluid and cursive, with the first name "D. Allan" and last name "Bromley" clearly distinguishable.

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Mr. Robert C. Guzman
National President
The Society of Hispanic Professional Engineers
5400 East Olympic Boulevard, Suite 306
Los Angeles, California 90022

5/27
3:48pm

**Sandra Torres, Society of
Hispanic Engineers, called to
inquire about an invitation to
DAB to address their conference
scheduled for
June 26.....**

203/725-0609

213

Done

Marian

The Society of Hispanic Professional Engineers

National Headquarters: 5400 E. Olympic Blvd., Suite 306 Los Angeles, CA 90022
Tel: (213) 725-3970-2022

May 19, 1992

The Honorable D. Allan Bromley
Assistant to the President and Director
Office of Science and Technology Policy
Old Executive Building
17th Street & Pennsylvania
Room 358
Washington, D.C. 20500

Post-It brand fax transmittal memo 7671		# of pages > 2
To: The Honorable A. Bromley	From: Robert Guzman	
Co.	Co. SHPE National	
Dept. (202) 456-1114	Phone # (213) 725-3970	
Fax # (202) 395-3261	Fax # (213) 725-0316	

Dear Mr. Bromley:

Your participation as Keynote Speaker of one of the major activities in a very special and unique Technical Conference this summer in Los Angeles, California, will do much to ensure the event's success and continued international acclaim as a leading showcase for America's "Technological Excellence."

The Society of Hispanic Professional Engineers (SHPE) 18th Annual National Awards Banquet, Technical Conference & Technology Showcase will be held June 24-27, 1992 at the Los Angeles Airport Hilton & Towers, 5711 West Century Blvd., Los Angeles, California 90045. Over 3,000 engineering and science students and professionals from throughout the United States and Mexico will be in attendance.

The Conference activity for which you would serve as Keynote Speaker would be the Luncheon or Awards Dinner; whichever is most convenient for you. The Luncheon: "America's Competitive Challenge: Technological Excellence" is set for Friday, June 26, 1992 at 11:30 a.m. and the National Awards Dinner will take place Friday, June 26, 1992 at 7:30 p.m. We would, of course, be honored should your schedule permit you to take in the entire four-day event.

Attendees of the Conference will be networking with each other and with corporate participants, discussing career and business opportunities, and learning about recent technological advances. They will also be looking to positive role models, such as yourself, for encouragement and guidance.

As an Honorary Conference Official, you will be viewed as someone who is concerned about cutting edge technological issues such as energy, transportation, and the environment, as these subjects will be among those discussed at Conference Workshops.

More importantly, your participation will demonstrate that you are a strong supporter of efforts designed to ensure that Hispanics throughout the world are given every opportunity to participate in, and contribute to the technological process at all levels.

SHPE CONFERENCE
Page 2

Honorary Conference Officials are each asked to submit a recent photo and brief biography of themselves for inclusion in Conference Brochure. Please submit by June 1, 1992 to the SHPE National Office c/o Javier.

Thank you in advance for your positive consideration of this important request. We look forward to a favorable response at your earliest convenience.

Sincerely,

Robert C. Guzman
Robert C. Guzman
SHPE National President

RG/st

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

May 8, 1992

MEMORANDUM FOR D. ALLAN BROMLEY

THROUGH:

VICKIE V. SUTTON 

FROM:

LIZ RODRIGUEZ

SUBJECT:

PARTICIPATION IN THE 1992 NATIONAL IMAGE
TRAINING CONFERENCE AND CONVENTION

On May 19-23 the 20th National Image, Inc. Training Conference and Convention will be held in Albuquerque, New Mexico. Image is a coalition of Hispanics who work throughout the Federal Government. Attendance is expected to exceed 3000 (includes 1,500 registered participants, 500 high school and college students, and 1000 members of the local community). This year I was appointed Co-chair of the DoD Forum component of the Convention.

Attached is a fax of the Program camera-ready copy for the DoD Forum (the Program will not printed until the week prior to the Convention). As you can see, the guest speaker will be Christopher Jehn, Assistant Secretary of Defense (Force Management and Personnel).

Please feel free to call me if you should have any questions.

**Department of Defense Forum
on**

Hispanic Employment Issues

**"A Millennium
of Possibilities:
Meeting the Challenge"**

May 19, 1992

9:00 a.m. - 12:00 noon

**Albuquerque Convention Center
Albuquerque, New Mexico**

**Office of the Deputy Assistant Secretary of Defense
(Civilian Personnel Policy/Equal Opportunity)**

Human Goals

Special thanks to Ms. Veronica Cruz for her outstanding work in the preparation of this brochure. Ms. Cruz is an Equal Employment Opportunity Specialist in the Affirmative Employment, Clerical Placement & Special Programs Office, Office of the Secretary of Defense/Washington Headquarters Services, The Pentagon, Washinton, D.C.

AGENDA
MAY 19, 1992
9:00 A.M. - 12:00 NOON
ALBUQUERQUE CONVENTION CENTER
ALBUQUERQUE, NEW MEXICO

Theme:
"A Millenium of Possibilities: Meeting the Challenge"

Schedule of Events

Welcome

Dr. Elizabeth Rodriguez, Hispanic
Employment Program Manager, Office of
the Secretary of Defense/Washington
Headquarters Services, Washington, DC

Welcome

Mr. Arthur B. Garcia, Convention Co-
Chairperson, 20th Annual National
Image, Inc. Training Conference

Mr. Thomas Gomez, President,
National Image, Inc.

Introductions

Mr. Claiborne D. Houghton Jr.,
Director of Equal Opportunity,
Office of the Deputy Assistant
Secretary of Defense (Civilian
Personnel Policy/Equal Opportunity)

Keynote Address

Honorable Christopher Jehn,
Assistant Secretary of Defense
(Force Management and Personnel)

Remarks

Ms. Sara Boney Ratcliff
Deputy Assistant Secretary of Defense
(Civilian Personnel Policy/Equal Opportunity)

**PROGRAMS IMPACTING ON THE DOD EQUAL EMPLOYMENT
OPPORTUNITY (EEO) AND HISPANIC EMPLOYMENT PROGRAMS**

Overview of the Panel
Objectives and Introduction
of Panelists:

Ms. Ashyadee Deautnell,
Hispanic Employment Program Manager,
Defense Investigative Service,
Washington, DC

U.S. Marine Corps

Mr. Richard Arellano, Navy Advisory Council
of Hispanic Employees (ACHE) Representative,
Naval Sea Systems Command, Washington, DC
Topic: Navy ACHE

Mr. Rudy Delgado, Hispanic
Employment Program Manager,
U.S. Marine Corps Base
Camp Pendleton, CA
Topic: Marine Corps Base
Camp Pendleton Initiatives

**Defense Investigative
Services**

Mr. Jose A. Alfalla, EEO
Specialist, Defense Investigative
Service, Washington, DC
Topic: HEP COOP Program

Defense Nuclear Agency

Ms. Rhonda Cervantes, Hispanic
Employment Program Manager,
Defense Nuclear Agency, Alexandria, VA
Topic: Community Outreach and
Recognition

Closing Remarks

Ms. Veronica D. Cruz
EEO Specialist, Office of the
Secretary of Defense/Washington
Headquarters Services, Washington, DC

Issues of the Civil Rights Act
and Americans with Disabilities Act

Mr. Richard R. Trujillo, Regional Attorney,
U.S. Equal Employment Opportunity
Commission, Phoenix District Office

Know the Basics
To Be Effective

Mr. Miguel Hernandez, Area Manager,
Albuquerque Area Office, U.S.
Office of Personnel Management

National Association of
Hispanic Federal Executives (NAHFE)
Objectives & Programs

Mr. Manuel Oliveres,
Executive Director, NAHFE
Washington, DC

Providing Accommodations
to People with Disabilities

Ms. Dinah F. B. Cohen, Director,
Computer/Electronic Accommodations
Program, Department of Defense,
Falls Church, VA

Civilian Personnel/EEO
Information Systems Initiatives

Mr. Henry Romero, Associate
Director, Information Systems,
Defense Civilian Personnel Center,
Washington, DC

DEPARTMENT OF DEFENSE HISPANIC EMPLOYMENT PROGRAM INITIATIVES

Overview of the Panel
Objectives and Introduction
of Panelists:

Mr. Harry Salinas,
Hispanic Employment Program Manager,
Defense Information Systems Agency,
Arlington, VA

Department of the Army

Mr. Luther Santiful, Director,
Department of the Army EEO Agency,
Washington, DC
Topic: Army HEP Initiatives

Department of the Air Force

Ms. Marta I. Garcia,
Hispanic Employment Program Manager,
Edwards Air Force Base, CA
Topic: Project Espejo

Department of the Navy

Mr. Adalberto Bernal, EEO Manager,
Naval Sea Systems Command,
Washington, DC
Topic: NAVSEA Project Partnership

Insert
photo
B
@ 33%

CHRISTOPHER JEHN

Christopher Jehn was sworn in as Assistant Secretary of Defense for Force Management and Personnel on November 20, 1989.

A native of Chicago, Mr. Jehn is a graduate of Beloit College and was admitted to Ph.D. candidacy in economics at the University of Chicago, where he was a University Fellow. While still a graduate student at Chicago he was named to the economics faculty at the University of Illinois-Chicago. He then served as assistant professor of economics at The George Washington University before joining the research staff of the Center for Naval Analyses, the Navy Department's independent studies and analysis center, in 1972.

His research at CNA included directing studies of recruiting policy and military pay for the Navy, comparability of military pay for the Third Quadrennial Review of Military Compensation, and the effects of plant closings on earnings of workers for the Department of Labor. In 1977 he became Director of CNA's Institute of Naval Studies, responsible for all CNA projects in manpower, logistics, cost, and resource analysis for the Navy and economic analysis for non-defense agencies of the U.S. government. Then, in 1979, he was named Director of the Marine Corps Operations Analysis Group at CNA, a position he held until he joined the Bush Administration. As Director, MCOAG, he planned and directed all CNA work for the Marine Corps.

Mr. Jehn was named a Vice President of CNA in 1981, and was also the first director of CNA's Resource Analysis Department from 1984 to 1986. When President Bush nominated him for his present position he was serving at CNA as Vice President, Navy-Marine Corps Planning and Manpower Division and Director, MCOAG.

As the Assistant Secretary of Defense (FM&P), Mr. Jehn is the senior manpower official of the Department of Defense. He is responsible for all personnel policy and oversight of the recruiting, training, compensation, support, and management of the Department's three million military and civilian personnel.



FORCE MANAGEMENT
AND PERSONNEL

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301-4000

25 February 1992

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING
ASSISTANT SECRETARIES OF DEFENSE
COMPTROLLER
GENERAL COUNSEL
INSPECTOR GENERAL
DIRECTOR, OPERATIONAL TEST AND EVALUATION
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTORS OF THE DEFENSE AGENCIES
PRESIDENT, UNIFORMED SERVICES UNIVERSITY OF
THE HEALTH SCIENCES
COMMANDER, ARMY AND AIR FORCE EXCHANGE SERVICE
DIRECTOR, OFFICE OF CIVILIAN HEALTH AND MEDICAL
PROGRAM OF THE UNIFORMED SERVICES
CHIEF, NATIONAL GUARD BUREAU
CHIEF, OFFICE OF CIVIL RIGHTS, UNITED STATES
COAST GUARD

SUBJECT: The 20th Annual National Image, Inc., Training
Conference and Convention, May 20-23, 1992,
Hyatt Regency Hotel, Albuquerque, New Mexico

The Department of Defense (DoD) fully supports the objectives of the subject Conference under the Government Employees Training Act of 1958. A DoD forum on employment issues is tentatively scheduled at the Conference site. All participants should ensure that the most cost-effective means of travel and billeting are used. Military and civilian recruiting exhibits at the Image Training Conference and Convention are appropriate.

I encourage you to use this Conference and the DoD forum as training opportunities for cognizant staff. Employees in this category include: personnelists, Equal Employment Opportunity officials, Special Emphasis Program staff, and others associated with the employment and career advancement of Hispanics. Also, please consider training requests from other employees who may benefit from attending the Conference.

Mr. Clay Haughton, Director of Equal Opportunity Policy, of my staff, will coordinate DoD support. He may be reached at (703) 695-0105 or DSN 225-0105.

Christopher Jehn
Christopher Jehn

SARA BONEY RATCLIFF

Mrs. Sara Boney Ratcliff is the Deputy Assistant Secretary of Defense for Civilian Personnel Policy/Equal Opportunity having been named to this political appointment in the Office of the Assistant Secretary of Defense (Force Management & Personnel) in August, 1990.

Prior to Mrs. Ratcliff's DoD appointment, she served the Bush Administration as the Deputy Director of Policy in the Office of the Director of the U.S. Office of Personnel Management. Her primary duties included serving as the agency's audit resolution official, and coordinating clearance of Administration policies on pay reform, executive personnel, recruiting and training.

Mrs. Ratcliff served briefly on the Air Force Air Staff as a Personnel Management and Legislative Specialist. In this capacity, she wrote the "Hiring Act" - a comprehensive legislative package to enhance federal recruitment and retention. She also initiated Air Force's Flexiplace Pilot Program to improve productivity, reduce absenteeism and provide staffing flexibility.

Mrs. Ratcliff has served most of her career in the Legislative Branch where she was a Chief of Staff to a California Congressman, a Senior Legislative Assistant for Rep. Frank Wolf of Virginia and an Associate staff member of the House Appropriations Committee. On Capitol Hill, she developed civil service legislation, policies and regulations including relocation benefits for transferred federal employees, child care in federal buildings, leave sharing for seriously ill civil servants, and merit pay for federal managers. She also wrote the Pornography Report to the President outlining the need for a new pornography commission -- established by Executive Order on May 21, 1984.

Sara Ratcliff received a BS Degree in Biology from the University of North Carolina at Chapel Hill. She and her husband Blake and daughter Virginia Blake Ratcliff reside in Alexandria, Virginia.

photo

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ELIZABETH RODRIGUEZ

Dr. Elizabeth Rodriguez was born and raised in San Benito, Texas. When she was fourteen, her family moved to Las Cruces, New Mexico. Upon graduating from Las Cruces High School she attended New Mexico State University earned her B. S. in Mathematics and her Masters and Ph.D. in Program Management and Development with a minor in Experimental Statistics. Her professional experience includes being a Mathematician with the Pacific Missile Test Center (PMTTC) at Point Mugu, California from October 1980 to October 1984. Her main responsibility was developing math models for tracking. From October 1984 to January 1986 she participated in the Office of Personnel Management's Women's Executive Leadership Program where she worked with the House side of the Committee on Science and Technology and the National Defense Department of the Office of Management and Budget among others. From January 1986 to January 1988, while still an employee at PMTTC, she worked as a Program Manager on space programs at the Strategic Defense Initiative Organization. From January 1988 to August 1990 she was the Suitability Staff Specialist with the Director of Operational Test and Evaluation. In this position she was responsible for ensuring suitability conformance of major defense systems to operational testing policies and procedures. From August 1990 to September 1991 she was a Senior Analyst, Technology Strategy Policy with the Office of the Director of Research and Engineering in the Plans and Resources Directorate. From September 1991 to March 1992 she was a Research Staff Specialist in the office of Basic Research and is also the OSD Hispanic Employment Program Manager. Currently, she is a Senior Policy Analyst with the White House Office of Science and Technology Policy working on issues such as High Performance Computing and Communication and Global Change Research. She is the author of twenty-eight articles, technical notes, and has a manuscript in progress for a book entitled, "Engineering Test Principles for Operational Suitability." She also has twenty-four technical presentations within the United States and abroad.

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CLAIBORNE (CLAY) DOUGLASS HAUGHTON JR.

Mr. Haughton serves as Director for Equal Opportunity Policy for the Department of Defense. He directs the development and coordination of equal opportunity (EO) policies and programs affecting virtually all civilian employees and military personnel within the DoD worldwide, and exercises staff supervision of the Defense Equal Opportunity Management Institute (A 94-member Military Training School dedicated to training equal opportunity personnel, located at Patrick Air Force Base, Florida).

Mr. Haughton began his Federal government career with the Defense Logistics Agency (DLA) in 1967 as a GS-5 Quality Assurance Trainee in Indianapolis, Indiana. In 1972, he changed career fields and became an EO Specialist and Manager at DLA enforcing Federal EO requirements under Executive Order 11246 at contractor facilities in Indiana, Illinois, and Wisconsin. In 1977, Mr. Haughton was appointed as Deputy Director for the nationwide DoD Executive Order 11246 Contractor Employment Compliance Program at the Pentagon, Washington, D.C. In 1979, he assumed the position of Director for Civilian EO Policy in the Office of the Deputy Assistant Secretary of Defense (Equal Opportunity) as a GS-16, and subsequently a Charter Member of the Senior Executive Service. In 1981, he served for nine months as Acting Deputy Assistant Secretary of Defense for Equal Opportunity during the transition between Administrations. Mr. Haughton assumed his current position on November 20, 1990.

He graduated from McKinley High School in Baton Rouge, Louisiana, and received a Bachelor of Arts Degree from Dillard University in New Orleans, Louisiana. He earned the Master of Public Administration Degree from The American University in Washington, District of Columbia. He is a graduate of the Armed Forces Staff College, Norfolk, Virginia, and the Industrial College of the Armed Forces, Washington, District of Columbia.

He has received numerous awards, including the "Arthur Rubloff Memorial Award" from the United Cerebral Palsy Associations, the "National Public Service Award" from the American Society for Public Administration/National Academy of Public Affairs, the "Roy Wilkins Meritorious Service Award" from the National Association for the Advancement of Colored People (NAACP), the "Secretary of Defense Meritorious Service Medal", the "Leadership Award" from the San Antonio Chapter of Alpha Phi Alpha Fraternity, the "President's Award" from Federally Employed Women, Incorporated, the "President's Award" from National IMAGE, Incorporated, and the DoD "Federal Asian Pacific American Employment Program Award." He conceived, edited, and was program manager for the original DoD publications: Black Americans in Defense of Our Nation, Women in America's Defense, Asian-Pacific Americans in the Nation's Defense, and Hispanics in America's Defense. He serves as Chair of the DoD Civilian Equal Employment Opportunity Review Board and Cochair of the DoD Dr. Martin Luther King, Jr., Military Involvement Committee.

He is listed in Who's Who In Government, current edition. He is a member of Pi Alpha Alpha National Honor Society for Public Affairs and Administration, the Development and Public Relations Committee for the United Cerebral Palsy Associations, Alpha Phi Alpha Fraternity, Blacks In Government, the Dillard University Alumni Association, the NAACP, and other community and professional organizations.

He is married to the former Linda Nixon of New Orleans, LA. and they have two sons, Alexis and Akili. The Haughtons reside in Arlington, Virginia.

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ASHYADEE DEAUTRIELL

Ms. Deautriell serves as the Hispanic Employment Program Manager for the Defense Investigative Service (DIS) and is an EEO Specialist in the Affirmative Action and Equal Opportunity Policy Office, Headquarters, Washington, D. C. She formerly served as a Special Agent with DIS in the Miami Field Office, Miami, Florida.

Ms. Deautriell earned Bachelor's and Master's Degrees in Rehabilitation Counseling from the University of Puerto Rico (UPR), Rio Piedras, Puerto Rico. Ms. Deautriell participated as a graduate student in the internship program between the UPR and the New York State Office of Mental Hygiene, Manhattan Psychiatric Center, New York City.

Ms. Deautriell's professional career displays a diverse and extensive employment history, working with diverse groups of persons with physical and emotional disabilities.

Since coming to Headquarters, DIS, Ms. Deautriell has been a volunteer instructor for the Spanish lessons offered at the Pentagon for military and civilian personnel sponsored by the Office of the Secretary of Defense/Washington Headquarters Services. She was one of five DoD employees invited to the White House during the HHM 1990 for the signing of an Executive Order on Education for Hispanic Americans by President George Bush.

Ms. Deautriell is a member of the Washington DC Council for HEP Managers. She also served on the committee for the Pentagon's Hispanic Heritage Month Observance Ceremonies in 1990 and 1991.

She is currently preparing to become a volunteer instructor for the American Red Cross, Community CPR to be offered for the first time in Spanish for the Hispanic community in Arlington, VA.

RICHARD R. TRUJILLO

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Mr. Trujillo graduated from the University of Northern Colorado (then Colorado State College) in Greeley, Colorado, with a BA in Education - History. He received a JD from the University of Wisconsin, College of Law, in 1973, and has been a member of the Wisconsin Bar since then.

He was an Assistant District of Attorney in the Milwaukee County District Attorney's Office in Milwaukee, Wisconsin, from June 1973 through June 1979. He prosecuted criminal cases ranging from ordinance violations to major drug and felony homicide cases, including numerous jury trials. For a year he was the Director of the District Attorney's Crime and Controlled Substances Unit.

He was a Supervisory Trial Attorney for the Equal Employment Opportunity Commission (EEOC) Indianapolis District Office in Indianapolis, Indiana from August 1979 through February 1984.

Richard has served as Regional Attorney for the EEOC Phoenix District Office from March 1984 through present. The Phoenix office is staffed with ten attorneys and is responsible for the Commission's litigation enforcement in Arizona, New Mexico, and Utah of the several Federal statutes prohibiting discrimination in employment.

He was President of the Arizona Chapter of Federal Bar Association in 1989-1990. Memberships: American Bar Association, including the sections on Litigation and Labor and Employment Law; and Federal Bar and Wisconsin Bar Associations. Contributing Author: "Wisconsin Prosecutor's Trial Manual," 1979; and "Practice and Procedure Before the EEOC," Labor Law for the General Practitioner, published by the Indiana Continuing Legal Education Forum (ICLEF), 1981. Richard has made numerous presentations to bar, civic, constituent, employer, governmental, legislative and educational groups on various issues of litigation and employment law.

Born in Denver, Colorado, Richard has been a valley resident since 1984, residing in Mesa. He is actively involved in youth sports programs with the Mesa American Little League and Dobson Area Soccer League. He conducts training sessions for certification of baseball, softball and soccer, and umpire for softball and referee of soccer.

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MIGUEL HERNANDEZ

Mr. Miguel Hernandez became Area Manager of the Albuquerque Area Office, U.S. Office of Personnel Management, in May 1980 and has held that position to the present. The Office of Personnel Management is the President's Federal personnel management arm. Hence, Mr. Hernandez has personnel authority over 112 Federal agencies and military establishments in New Mexico and El Paso County, Texas. The Jurisdiction of the Albuquerque Area Office includes approximately 35,000 Federal civilian employees.

Prior to assuming his current position, Mr. Hernandez held several personnel-related positions, including that of Manager of the El Paso Branch Office, U.S. Office of Personnel Management.

From October 1, 1988 to September 30, 1989, Mr. Hernandez served as Chairman of the Albuquerque-Santa Fe Federal Executive Board (FEB). In this role, he presided over meetings of a membership constituted of 59 heads of agencies. Mr. Hernandez also presided over meetings of the FEB's Policy Board, a 15-member body composed of agency heads, including 3 members of the Senior Executive Service, 2 Major Generals and several senior level managers. During his tenure, Mr. Hernandez established an interagency employee recognition program and initiated a project aimed at establishing a Federally-sponsored child care facility in the area.

Mr. Hernandez graduated with honors from the University of Texas at El Paso in May 1972, with a bachelor's degree in Physics. He was conferred the OPM Director's Award for Superior Accomplishment in June 1988.

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MANUEL OLIVEREZ

Mr. Oliveriez is the Executive Director of the National Association of Hispanic Federal Executives, serving on an Intergovernmental Personnel Assignment from the Department of Defense. Prior to this assignment, Mr. Oliveriez served as the Deputy Director, Civilian Equal Opportunity Policy, (Black and Hispanic Employment Programs), Office of the Assistant Secretary of Defense (Equal Opportunity). Mr. Oliveriez was born in Colorado City, Texas, to Puerto Rican and Mexican parents. The eldest of 14 children, Mr. Oliveriez left school at an early age but returned after serving three years in the U.S. Marines Corps. He received an A.A. degree from Hartnell Junior College in Salinas, California, a BA degree from San Jose State in 1965, and an M.Ed. in Educational Administration from Antioch in Yellow Spring, Ohio.

In 1969, Mr. Oliveriez was selected for a position on President Nixon's "President's Cabinet Committee on the Spanish-Speaking People". In his five-year tenure with the Cabinet Committee he held various positions to include Executive Director for Program Operation. Mr. Oliveriez left the Committee to become Chief of Equal Employment at the U. S. Air Force Headquarters. Upon leaving the Air Force, he joined the Office of the Secretary of Defense as the DoD Hispanic Employment Program Manager.

In 1987, Mr. Oliveriez was elected President of National Image, Inc., and by acclamation was re-elected on May 27, 1989 for a second term. His work with National Image and the Department of Defense has been closely related, as both organizations pursue the same program objective - to provide opportunity to Hispanic Americans.

DINAH F. B. COHEN

Dinah F. B. Cohen is the Director for the Department of Defense's Computer/Electronic Accommodations Program (CAP). The Department of Defense (DoD) established the CAP office to provide computer and electronics accommodations to employees with disabilities. The program is intended to eliminate a wide variety of barriers for people with disabilities and to increase the representation of disabled individuals in DoD.

Mrs. Cohen received the 1991 Special Emphasis Program Award for her outstanding contribution to the affirmative employment programs from the Office of the Secretary of Defense, Washington Headquarters Services and the Joint Staff.

Ms. Cohen was the Handicap Employment Program and Federal Women's Program Manager at the Agency for International Development. She was responsible for the implementation of program issues affecting women and disabled persons in General Service and in the Foreign service in Washington and over 70 missions around the world.

Before joining A.I.D., Ms. Cohen was the Handicap Program Manager at the Equal Employment Opportunity Commission, where she was responsible for the program at Headquarters and 23 district offices. Prior to joining the EEOC, she served as the Handicap/Hispanic Employment Program Manager at the Naval Research Laboratory (NRL). Under her leadership, the Handicap Program at the Lab was considered one of the most visible in the Navy's research community. Over 130 disabled individuals were recruited, referred and placed in the cooperative education program, summer employment and in a wide variety of permanent positions.

Prior to her joining the federal government, she was the Project Manager and Information Specialist at Mainstream, Inc. As Project Manager, she developed training materials and conducted workshops for employers on issues concerning the employment of disabled people.

Ms. Cohen has extensive experience in vocational and rehabilitation counseling. She became a Certified Rehabilitation Counselor, C. R. C., in October 1980. She received a Master of Science degree in Counseling Psychology with a concentration in Rehabilitation Counseling from the State University of New York at Buffalo. She holds a BS in Social Science/Elementary Education from Russell Sage College in Troy, New York.

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HENRY ROMERO

Henry Romero is currently Associate Director for Information Systems in the Defense Civilian Personnel Center. His responsibilities include management oversight of initiatives to standardize and modernize the Defense Civilian Personnel Data System, and ensure the system's interoperability with standard DOD payroll and cost accounting systems.

Mr. Romero was formerly Director of Operations at Consolidated Civilian Personnel Office, Crystal City - the Department of the Navy's (DON) largest civilian personnel office - where he supervised a staff of 110 providing Staffing, Classification, and Organizational Design services to 13,000 employees in DON'S Systems Commands headquarters organizations.

From October 1988 to October 1991, Mr. Romero was the Director of DON's Office of Civilian Personnel Management, Southwest Region in San Diego, CA. He represented Secretary of the Navy in coordinating the delivery of Civilian Personnel/ EEO programs by 18 personnel offices, covering approximately 50,000 civilians in over 200 Navy and Marine Corps installations in Southern California, Arizona, New Mexico, and Texas. He supervised a staff of 30 responsible for program evaluation, technical guidance, adjudication of classification appeals, investigation of discrimination complaints, and a variety of other training and agency liaison functions.

From April, 1984 to September 1988, Mr. Romero was Civilian Personnel Director at Naval Air Station (NAS), North Island, a major industrial facility in San Diego, CA. Before assuming that position, Mr. Romero had been Deputy Personnel Director, Head of Labor & Employee Relations, and Head of Position Classification at NAS North Island.

Mr. Romero has received several performance and EEO awards, including DON's Meritorious Civilian Service Award, and the NAS North Island EEO Supervisor's award for support of the Federal Women's Program. He served a term on the Board of Governors for DON's Civilian Personnel/ EEO Career Management Program, and was a member of the Deputy Assistant Secretary of the Navy's Advisory Council on Hispanic Employment. Mr. Romero holds a B.S., degree from the University of Texas at El Paso, and a Master's degree in Public Administration from San Diego State University.

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HARRY R. SALINAS

Mr. Salinas is an Equal Employment Opportunity Specialist and the Hispanic Employment Program Manager with the Defense Information Systems Agency (DISA) in Arlington, Virginia.

Throughout his military and Federal Service career, Mr. Salinas served with the Department of the Air Force, U.S. Army Reserves, Defense Contract Audit Agency, Defense Logistics Agency, and Defense Information Systems Agency.

Mr. Salinas is knowledgeable and experienced in Military Resource Management and Civilian Personnel Management Programs. He welcomes the opportunity to work with special areas of recruitment, employment, and career advancement opportunities. As part of his community service and involvement, Mr. Salinas serves as Assistant Executive Director, Membership Affairs for the National Association of Hispanic Federal Executives in Washington, D.C.

Mr. Salinas is a graduate of Central Michigan University and received his Masters Degree in Industrial Management and Supervision. He is also a graduate of the U.S. Army Adjutant General Officers Advanced Course. He is currently pursuing his doctoral degree in Administration and Management at Walden University.

Mr. Salinas resides in Fairfax, Virginia.

LUTHER L. SANTIFUL

Luther L. Santiful joined the Office of the Assistant Secretary of the Army (Manpower and Reserve Affairs) in February 1989, where he serves as Assistant Deputy for Equal Employment Opportunity. He also serves as Director, Equal Employment Opportunity Agency, a field operating agency of the Office of the Assistant Secretary. His major responsibilities are to serve as principal advisor to the Assistant Secretary of the Army (Manpower & Reserve Affairs) on the status of the Army's EEO Program, formulate EEO policies and programs, advise the Army EEO Policy Advisory Council and direct the EEO Agency Staff.

Mr. Santiful previously served as the Director, Equal Employment Opportunity for the U.S. Army in Europe headquartered in Heidelberg, West Germany from May 1981 to February 1989. Prior to that he served as Equal Employment Opportunity Officer for U.S. Army, V Corps headquartered in Frankfurt, West Germany from August 1978 to May 1981. Before his assignment with the U.S. Army in 1978, Mr. Santiful held several positions in EEO, Public Affairs and the production Department with the U.S. Naval Air Rework Facility in Norfolk, Virginia where he began federal service as a four-year machinist apprentice in September 1955.

After completing his apprenticeship, Mr. Santiful received a certificate in Industrial Management from the University of Virginia and later a Bachelor of General Studies from George Washington University. He was appointed by Governor Godwin and reappointed by Governor Dalton, as Vice Chairman, Governor's EEO Committee for the Commonwealth of Virginia.

Mr. Santiful, a native of Waverly, Virginia resides with his wife, Wilhelmina, and son, Eric, in Mitchellville, Maryland.

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ADALBERTO BERNAL

As Command Equal Employment Manager (CEEM), Mr. Adalberto "Beto" Bernal is responsible for management of a multi-faceted civilian Equal Employment Opportunity (EEO) Program for the Naval Sea Systems Command (NAVSEA) and the Naval Supply Systems Command (NAVSUP). Mr. Bernal is a native of Douglas, Arizona. He has attended the University of California at Riverside, California, and the California State College at San Bernardino, California.

Mr. Bernal began his Federal employment in June 1970 as a Service Representative with the Social Security Administration. In July 1971, he was selected as a Personnel Investigator with the U.S. Civil Service Commission where he subsequently served as a Personnel Staffing Specialist, Personnel Management Specialist and, with the creation of the Federal Employee Appeals Authority, as an Assistant Appeals Officer.

In January 1977, Mr. Bernal became an Equal Opportunity Specialist with the National Aeronautics and Space Administration and, from October 1978 to September 1981, was the Deputy EEO Officer for the Naval Weapons Center, China Lake, California. Between September 1981 and April 1984, he was employed with the Defense Logistics Agency where he served as an Equal Opportunity Specialist and Agencywide Hispanic Employment Program Manager.

From April 1984 until February 1987, Mr. Bernal was the Assistant Chief, Civilian Equal Opportunity Division, U.S. Coast Guard. In February 1987, he was named Deputy Director, EEO and Affirmative Action Programs Division in the Department of the Navy's Office of Civilian Personnel Management (OCPM). In February 1988, he was reassigned as Head of the newly created OCPM Affirmative Employment Programs Branch and was subsequently named Director, Affirmative Employment Programs. Mr. Bernal began his work as CEEM, NAVSEA in October 1990 and assumed the additional duty as CEEM, NAVSUP in February 1992.

MARTA I. GARCIA

Marta I. Garcia is a Cost Analyst for the Comptroller, Air Force Flight Test Center, Edwards Air Force Base, California. She is also serving in a collateral position as the Hispanic Employment Program Manager (HEPM) for Edwards Air Force Base.

Ms. Garcia was born August 17, 1946, in Alamo, Texas and graduated from Pharr San Juan Alamo High School in 1965. She earned her Bachelor of Science degree in Business Management from Golden Gate University in 1986 and her Masters in Business Administration in 1989 from Golden Gate University. Ms. Garcia graduated with honors in 1986 from Golden Gate University.

She began her career at Edwards in 1985 as a GS3 Clerk Typist. In 1986 she was promoted to a GS4/5 Clerk Typist. In 1987 she was promoted to the position of Cost Analyst (GS7/12) under the Outstanding Scholars Program. As a Cost Analyst, she has been awarded the designation of Professional Cost Analyst by the Institute of Cost Analysis and the Air Force Institute of Technology. In 1987 she was appointed as the HEPM on a collateral basis. In 1991 she was recognized as Air Force Systems Command HEPM for 1991. Ms. Garcia is the recipient of the 1992 Air Force Distinguished EEO Award for the Hispanic Employment Program.

Ms. Garcia has also been recognized in Who's Who in California and Who's Who in the West.

Ms. Garcia is married to Evaristo Garcia of McAllen, Texas, and they have 3 children: Buddy, David, and Reuben.

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RICHARD J. ARELLANO

Mr. Arellano is currently assigned as the Naval Undersea Warfare Center Division, Keyport, Liaison Officer in the ASW and Mine Warfare Systems Office, Naval Sea Systems Command (NAVSEA). In this position since 1988, he provides assistance to Keyport and NAVSEA management with corporate planning, resource management, programmatic policy, and responding to Congressional inquiries and audits. During this assignment he has had several special tasks including that of providing financial and acquisition management support to the Surface Ship ASW Combat System Program Office (SQQ-89) and support to the Naval Undersea Warfare Center Transition Team.

Prior to his current assignment he has worked at Naval Submarine Base, Bangor, WA, as a Management Analyst, Management Operations Dept. (1978-80); at the TRIDENT Refit Facility, Bangor, WA, as a Budget Analyst, Comptroller Dept. (1980-85); and Naval Undersea Warfare Engineering Station, Keyport, as a Program Analyst, Resources and Planning Dept. (1985-88). His career with the Navy began with selection into the Cooperative Education Program (CO-OP) in 1978.

Throughout his career Mr. Arellano has worked collateral duty assignments in such capacities as EEO Counselor (7 years), Hispanic Employment Program Manager (3 years) and tutor for the NAVSEA Kids Program (3 years). He currently serves as a member on the Department of Navy Advisory Council on Hispanic Employment, an advisory group which reports directly to the Deputy Assistant Secretary of the Navy (CPP/EEO).

A native of San Jose, CA, Mr. Arellano received his B.S. degree from San Jose State University in 1979.

Mr. Arellano and his wife, Nannette, reside in Woodbridge, VA. They are the parents of three children Philip, Charise, and Anthony.

RUDY D. DELGADO

After retiring from the U.S. Marine Corps in 1973 with the rank of Master Gunnery Sergeant, Mr. Delgado attended Mira Costa College in Oceanside, California and earned an A.S. degree in Education and Accounting. He began his civil service career in June 1974 at Marine Corps Base, Camp Pendleton, California.

In 1984, Mr. Delgado was promoted to EEO Specialist/Hispanic Employment Program Manager. In this capacity, he has organized and planned ethnic observances, compiled statistics on Hispanics, women, and other ethnic groups for Marine Corps Base, Marine Corps Tactical System Support Activity, and Defense Commissary Agency (DeCA). He has actively worked to reach the DON goal of five percent (5%) Hispanic representation addressed in SECNAV'S Five Point Program in the local workforce and the DoD two percent (2%) goal of the targeted handicapped program.

Presently he has been instrumental in gaining approval for the first multi-cultural heritage day to be held in the Marine Corps. This event will take place at Marine Corps Base Camp Pendleton, California on June 10, 1992.

Mr. Delgado is a native Texan, married to the former Guadalupe V. Vela of San Antonio, Texas. He has five children, a daughter and four sons. At the present, he has five granddaughters and two grandsons.

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JOSE A. (TONY) ALFALLA

Jose A. (Tony) Alfalla, was born in Canovanas, Puerto Rico, and currently is an EEO Specialist, Office of Affirmative Action and Equal Opportunity Policy (OAA&EOP), Defense Investigative Service (DIS), in charge of plans and policies. He is also the Program Manager for the Barrier Breaker and Other Protected Group Programs, Headquarters DIS Special Emphasis Group Council (SEPC).

Mr. Alfalla has been with DIS since October 1981 and was a former Special Agent-in-Charge (SAC), of a large DIS Field Office in Hanover, MD, a position he held until January 1992. He supervised a staff of up to 55 persons, comprised of Special Agents (investigators), supervisors and secretaries, all of which were involved in the conduct of background investigations for persons who needed security clearances for access to classified information in support of National Security.

From August 1978 to September 1981, Mr. Alfalla was a Special Agent (Criminal Investigator) with the Community Services Administration (CSA), where he conducted investigations of white collar crimes, i.e., fraud, waste and abuse. Additionally, he conducted investigations of discrimination complaints.

From June 1976 to August 1978, Mr. Alfalla was a Physical Security Specialist, with the U. S. Army Corps of Engineers, Baltimore District, Baltimore, MD, involving the inspections of sites of dams and reservoirs regarding physical security. He made recommendations of security measures to take in preventing destruction or vandalism in the event of acts of terrorism or sabotage. As a collateral duty, he was the Hispanic Program Manager for the Corps.

From June 1975 to June 1976, Mr. Alfalla was a Special Agent (Criminal Investigator), Office of the Inspector General, U. S. Department of Agriculture, San Juan, Puerto Rico, conducting investigations of white collar crimes.

From the summer of 1972 to May 1975, Mr. Alfalla was the Chief Security Officer, for an American/Spanish Company in London, England, in charge of all security measures of the company. From May 1951 to May 1972, Mr. Alfalla served in the U.S. Air Force and U.S. Army, retiring as a Chief Warrant Officer (Criminal Investigator) in 1972.

Mr. Alfalla has received many awards during his military service as well as performance awards in his career with the Federal Service. He has a B. A. degree from the University of Maryland.

Mr. Alfalla is married to the former Mary Donovan of New London, Connecticut, and they have five children (Lynn, Deborah, Robert, Lenise and Brent). Mr. Alfalla, his wife and youngest son Brent reside in Gambrills, MD.

RHONDA L. CERVANTES

Rhonda L. Cervantes joined the Virginia staff of the Defense Nuclear Agency (DNA) in 1988 and is currently the Program Analyst for the Test Directorate.

Ms. Cervantes previously worked for Field Command, DNA in Albuquerque, NM as a member of the Nuclear Test Personnel Review team responsible for gathering and verifying radiation dosimetry data on U.S. Government atmospheric and underground nuclear test participants. Due to the projects high visibility in congress, Ms. Cervantes was transferred to the D.C. area to continue her research.

In 1990, Ms. Cervantes joined the Arms Control and Test Limitations staff at DNA where her analytical skills supported on-going treaty activities including the Strategic Arms Reduction Talks (START), Conventional Forces in Europe (CFE), and Chemical Weapons (CW) treaties for 2 years.

Ms. Cervantes attended the University of New Mexico, the College of Santa Fe, and is currently enrolled at Marymount University here in Virginia. In 1991 she was nominated as the DNA Hispanic Employment Program Manager and works closely with various Hispanic Organizations including IMAGE, AHFE, and HACU.

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VERONICA D. CRUZ

Veronica D. Cruz is an Equal Employment Opportunity Specialist in the Directorate for Personnel & Security, Office of the Secretary of Defense/Washington Headquarters Services, The Pentagon, Washington, DC. In this capacity, she is responsible for assisting in planning, developing and implementing Affirmative Employment Programs and activities pertaining to Hispanics and Women.

Ms. Cruz was born in Pueblo, Colorado. Upon graduating from Central High School, she enlisted in the U.S. Army and served proudly for twelve years (1976-1988). Ms. Cruz began her military career as a Clerk Typist assigned to the US Army Military Personnel Center, Alexandria, Virginia. In 1979 she was assigned to the 193d Infantry Brigade (Panama), Fort Clayton, Panama where she served as a Passport Agent and subsequently as the Secretary to the Deputy Commander (Operations and Training), 193d Infantry Brigade. Upon assignment in 1982 to Headquarters, III Corps & Fort Hood, Fort Hood, Texas, she assumed the duties of Secretary to the Chief of Staff, III Corps. In April of 1984, she was assigned as an Administrative Noncommissioned Officer in the Military Secretariat, J-5, The Joint Staff, where she served until her separation from active duty in July 1988. During her active duty career she attained the rank of Sergeant First Class and received the following awards: Army Achievement Medal, Army Commendation Medal (2 Oak Leaf Clusters), Army Meritorious Service Medal, the Defense Meritorious Service Medal, and the Noncommissioned Officer Professional Development Ribbon. She is presently a member of the U.S. Army Reserves.

While on active duty, Ms. Cruz attended school during off-duty time and received both A.S. and B.A. Degrees from the University of the State of New York, Albany, NY. She also attended various military leadership courses.

Ms. Cruz began her civil service career as the Administrative Officer for the Directorate for Personnel & Security, Office of the Secretary of Defense/Washington Headquarters Services in October 1988, where she served until assuming her current position in October 1990.

While working in the Affirmative Employment field, she has worked closely with National Hispanic Organizations. She has also developed lesson plans for and conducted two six-week Conversational Spanish Classes for employees at the Pentagon. She has served as a committee member and developed the program brochure for the government portion of the 19th & 20th Annual National Image Conferences as well as the 22d Annual Federally Employed Women's Conference. She also served as a committee member for the DoD-Wide observances of National Hispanic Heritage Month and National Women's History Month. Ms. Cruz is a member of the Washington DC Council of Hispanic Employment Program Managers.

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**SPECIAL THANKS TO THE
DOD FORUM PLANNING COMMITTEE MEMBERS**

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Pictured from left to right: Ms. Veronica D. Cruz, EEO Specialist, Office of the Secretary of Defense/Washington Headquarters Services; Ms. Rhonda Cervantes, HEPM, Defense Nuclear Agency; Mr. Harry R. Salinas, HEPM, Defense Information Systems Agency; Dr. Elizabeth Rodriguez, HEPM, Office of the Secretary of Defense/Washington Headquarters Services; Mr. Jose A. Alfalla, EEO Specialist, Defense Investigative Service; Ms. Mary A. Young, HEPM, Headquarters US Air Force; and Ms. Ashyadee Deautriell, HEPM, Defense Investigative Services. Not available for photo: Mr. Claiborne D. Haughton Jr., Director of Equal Opportunity, DoD; Ms. Dora Diaz Strope, HEPM, Defense Intelligence Agency; and LTC James D. Calandro, HEPM National Guard Bureau.



Notes:

1992

Dates to Remember

June 15 - 18

**The National Council of Hispanic Women
Annual Conference,
Washington, DC**

July 1 - 5

**League of United Latin American Citizens (LULAC)
National Conference,
San Antonio, TX**

July 19 - 23

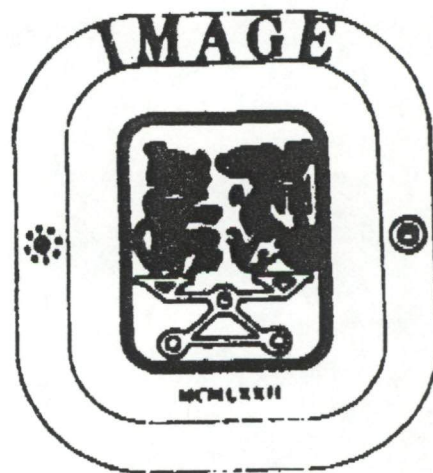
**National Council of La Raza
Annual Conference,
Los Angeles, CA**

September 15 - October 15

National Hispanic Heritage Month

September 27 - 29

**Hispanic Association of Colleges and Universities
(HACU) 6th Annual Conference,
Washington, DC**





NATIONAL *Image* INC.

930 W. 7th Ave., Suite 117-121
Denver, CO 80204
303/534-6534 • FAX 303/595-8977

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Dear Colleagues:

I take great pleasure in welcoming each of you to the 20th Annual National Image, Inc. Training Conference and Convention in the beautiful "Land of Enchantment".

The conference provides us the opportunity for celebrating the noteworthy anniversaries of the Quincentenary of the momentous encounter between the peoples of Europe and the Americas; the twentieth year of National Image, Inc., and the fiftieth commemorative tribute to the thousands of Hispanic men and women who served their country so valiantly during the Bataan Death March.

The conference agenda has been structured so every event is rewarding to all attendees whether representing federal, state or local governments, educational institutions, or the private sector. The training workshops will provide each of you with the most up-to-date information available in the areas of employment, education, human resource development, civil rights and cultural awareness. Merging our student activities into the Conference will also prove invaluable for students, exhibitors and recruiters alike.

It is with great expectations I invite each of you to participate fully in this year's conference and to continue to support the mission of National Image through this year's conference, at your work place and in your day-to-day activities.

Sinceramente,

Mr. Thomas Gomez
National President

**DEPARTMENT OF DEFENSE
HISPANIC EMPLOYMENT PROGRAM BOARD MEMBERS**

CLAIBORNE D. HAUGHTON JR.
Acting Hispanic Employment Program Manager
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Mania -
Please
send & new
DAB bio to
Richard Valentin
@ Argentina.
Done
6/22

Document Originally
Attached to
Following Page

7/28

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9201976

ORIGINATOR: 02

SPEECH: YES NO

FROM: SCHRIESHEIM, Alan: ARGONNE NATIONAL LABORATORY

DATE OF EVENT:

THRU:

TENTATIVE DATES: JUNE, JULY AUGUST 92

LOCATION OF EVENT: ARGONNE NATIONAL LABORATORY

TIME OF EVENT:

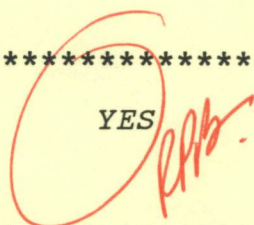
SUBJECT: AN INVITATION TO DELIVER A DIRECTOR'S SPECIAL
COLLOQUIUM TALK.

RSVP: 06/14/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

YES  NO

COPIES TO: PHYSICAL SCIENCES

REMARKS:

DATE OF LETTER: 05/19/92

DATE RECEIVED: 06/01/92

FILE: P-INVITATION-SPEECH

ARGONNE NATIONAL LABORATORY

9700 SOUTH CASS AVENUE, ARGONNE, ILLINOIS 60439 - 4832

1476
Office of the Director

May 19, 1992

Dr. D. Allan Bromley
Executive Office of the President
Office of Science and Technology Policy
Old Executive Office Building
Washington, D.C. 20506

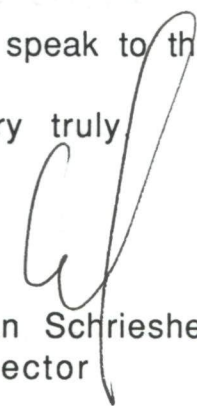
Dear Allan:

Pursuant to our recent conversation in Washington, I want to renew my invitation for you to deliver a Director's Special Colloquium talk to the Argonne staff this summer. But specifically, I'd like to suggest an appearance on June 23, July 9, 16, 17, 20 or 28, or August 20. If you divine that I'm casting a wide net, you are right. We are very eager to have you out and were disappointed when you had to cancel on your previous date.

Rich Valentin, who administers the Director's Special Colloquium series, will be in touch with your office to learn the date that is most convenient to your schedule.

I appreciate your willingness to speak to this group.

Very truly



Alan Schriesheim
Director

AS:Hj

cc: R. Valentin

ARGONNE NATIONAL LABORATORY

9700 SOUTH CASS AVENUE, ARGONNE, ILLINOIS 60439 - 4832

1476
Office of the Director

May 19, 1992

Dr. D. Allan Bromley
Executive Office of the President
Office of Science and Technology Policy
Old Executive Office Building
Washington, D.C. 20506

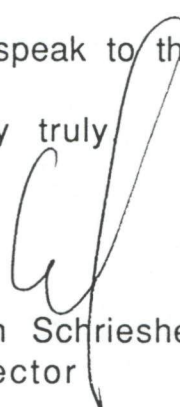
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Rich Valentin, who administers the Director's Special Colloquium series, will be in touch with your office to learn the date that is most convenient to your schedule.

I appreciate your willingness to speak to this group.

Very truly

Yes 6/3/92

Alan Schriesheim
Director

AS:Hj

cc: R. Valentin

*Revised list
of dates
per tel con
w/ Valentin
6-19-92:*

7/28

29

30

8/3, 5, 6

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9201868

ORIGINATOR: 02

SPEECH: YES NO

FROM: OP DEN BROUW, Paul M.: ROYAL NETHERLANDS
UNIVERSITY

DATE OF EVENT: 11/18/92 THRU: 11/20/92
TENTATIVE DATES:

LOCATION OF EVENT: TECHNICAL UNIVERSITY OF DELFT

TIME OF EVENT:

SUBJECT: AN INVITATION TO ADDRESS THE PARTICIPANTS OF THE
ANNUAL DUTCH AI-CONFERENCE.

RSVP: 06/08/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? YES NO

COPIES TO: INDUSTRIAL
INTERNATIONAL

REMARKS: ENCLOSURES TO DR Bromley

DATE OF LETTER: 05/18/92

DATE RECEIVED: 05/26/92

FILE: P-INVITATION-SPEECH

PPB
6/2/92
Do letter.



1868

ROYAL NETHERLANDS EMBASSY

OFFICE FOR SCIENCE AND TECHNOLOGY

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R.C.A. 248336 (NETH. UR.)

YOUR REFERENCE:

OUR REFERENCE: TWA

ENCLOSURES: 1

SUBJECT: Invitation Dutch AI-conference
November 18-20, 1992

Washington, D.C.,
May 18, 1992

Dr. D. Allan Bromley
Executive Office of the President
1600 Pennsylvania Ave, N.W.
Washington, DC 20500

Dear Dr. Bromley,

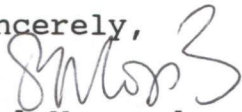
On behalf of the Dutch Society for Artificial Intelligence I herewith send you an invitation to address the participants of the annual Dutch AI-conference on November 18-20 as a keynote speaker.

This year the annual conference will be held at the premises of the Technical University of Delft to celebrate its 150th anniversary. For the past 11 years the Dutch AI society is promoting research and applications of artificial intelligence. Furthermore, it stimulates education and exchange of knowledge in this area. During the upcoming conference forty papers will be presented by university and industry representatives. Also a workshop, nine tutorials and three keynote speeches are scheduled.

Recently an article on your views on international scientific cooperation appeared in the NRC, a Dutch newspaper. There is a growing awareness within the Dutch universities that without applications, no future funding for academic information technology research will be available. On the other hand, the participation of industry in strategic research is still rather low. In close similarity with the management structure of the institutes and programs of NSF, activities in The Netherlands were set up. One of the Dutch programs is the Foundation Knowledge Based System.

This foundation has cooperative agreements with nine universities and fifteen companies. The foundation has been supported by the Department of Economic Affairs and Department of Education and Science. Therefore they would like to hear your views on this topic.

Sincerely,

A handwritten signature in dark ink, appearing to read 'P. M. op den Brouw', written over the word 'Sincerely,'.

Paul M. op den Brouw
Counselor for
Science and Technology

NVKI

NVKI

Nederlandse Vereniging voor
Kunstmatige Intelligentie

Date: May 6, 1992 Ref.: JC 92.036-n
Subject: Dutch AI Conference

Dr. D.A. Bromley
The White House
Washington
USA

Dear Dr. Bromley,

With much delight I remember our meeting in Albuquerque, NM, during the ACM Supercomputer Conference. It was my pleasure to provide you with two issues of the Journal of the International Computer Chess Association (ICCA Journal) during our conversation at the 22nd ACM International Computer Chess Championship in Albuquerque, NM.

Our meeting was a source of inspiration for me to make Dutch researchers acquainted with your ideas on research in the USA, especially with your list of a 10 Grand Challenges. This made people interested and as a result it is on behalf of the Dutch Association for Artificial Intelligence that I have the honour to invite you as our most honoured guest at our Annual AI Conference, which takes place at November 19th and 20th. If your schedule allows it and you are willing to accept this invitation we would like to invite you to give us a keynote address on November 19, 1992, e.g., on the knowledge transfer from Science to Technology.

In Albuquerque you also showed much interest in fundamental research and would like to know more about the role of computer chess in the field of Artificial Intelligence research, especially in combination with the use of supercomputers. As an indication of appreciation from our side I enclose the March 1992 issue of the journal and would like to bring your attention to p. 51. Moreover, I remember quite well that your own ideas on research and supercomputers were received with great enthusiasm, they even impressed the specialists.

I felt it my task and duty, although I was a guest of honour in Albuquerque, to forward your ideas to researchers and research institutes in the Netherlands. Somewhat later you were given the opportunity to project some of your ideas in research through an interview by Alexander Hellemans in our prestige daily paper *NRC Handelsblad*. This, in my opinion, strengthened our research ties again.

I have been in contact with our Ministries of Economic Affairs, and Science and Education, who both expressed considerable interest, should you be able to come, in some formal exchange of views. I have also been in touch with the President of the Dutch Royal Academy of Science who reacted positively and suggested that, should you be able to come, they would be very pleased to receive you at the Royal Academy.

I look forward to hearing from you, I remain,

yours sincerely,



Professor H.J. van den Herik
Chairman of the Dutch Association for AI

Chairman of the Computer Science Dept.
University of Limburg
P.O. Box 616
6200 MD Maastricht
The Netherlands

Encl.: ICCA Journal, Vol. 15, No. 1.

THE WHITE HOUSE

WASHINGTON

June 9, 1992

Dear Mr. op den Brouw:

Thank you for your kind letter of May 18 inviting me to address the annual Dutch A-1 Conference scheduled for November 19, 1992 at the Technical University of Delft.

Because my schedule has become increasingly consumed with election year activities as well as my regular duties, I must regretfully decline.

Thank you for thinking of me. With best wishes.

Sincerely yours,

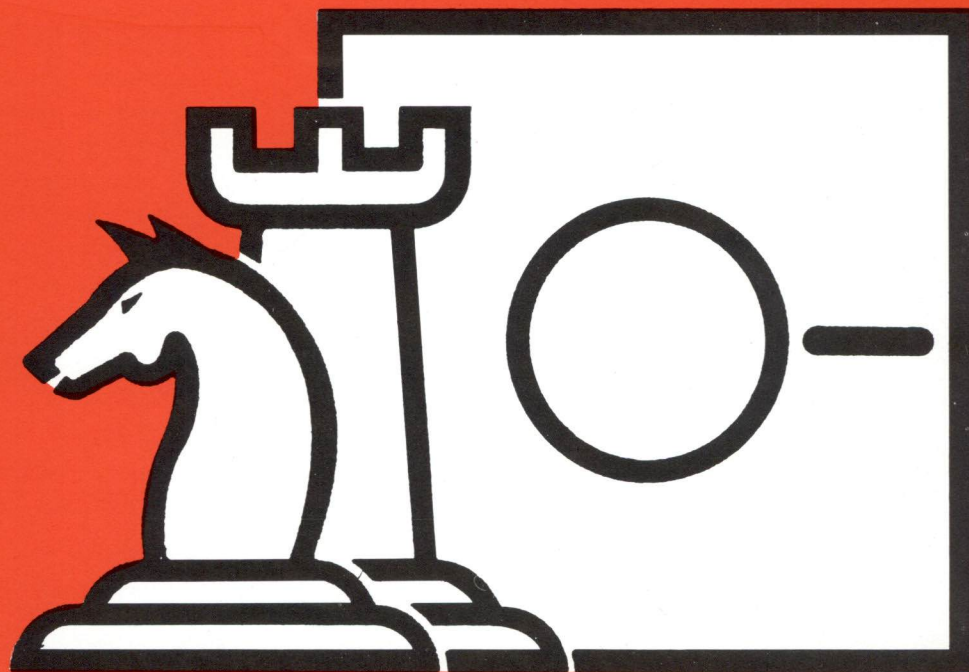
A handwritten signature in dark ink, appearing to read "D. Allan Bromley". The signature is fluid and cursive, with the first name "D. Allan" and last name "Bromley" clearly distinguishable.

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Mr. Paul M. op den Brouw
Counselor for Science and Technology
Royal Netherlands Embassy
4200 Linnean Avenue, N.W.
Washington, D.C. 20008

ICCA JOURNAL

INTERNATIONAL COMPUTER CHESS ASSOCIATION



1

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Contributions

J.-C. Weill:
The NegaC* Search.

J.W.H.M. Uiterwijk:
The Countermove Heuristic.

Notes:
L. Stiller:
KQNKRR.

B. Gosling:
Chess Computers and Endgame Studies.

I. Althöfer:
On Asymmetries in Chess Programs.

Reports on Endgames:
Timman-Speelman (Linares, 1992).
Lengyel-Levy (Cienfuegos, 1972).

SOME INFORMATION ABOUT THE INTERNATIONAL COMPUTER CHESS ASSOCIATION (ICCA)

The ICCA was founded in 1977 and represents the Computer Chess World vis-à-vis Computer Science Organizations, such as ACM and IFIP, and also vis-à-vis the International Chess Federation (FIDE).

World-wide membership is some 500 and comprises individuals as well as university and industrial members.

The activities of the ICCA are:

- (i) to publish a quarterly Journal;
- (ii) to hold a triennial Computer Chess World Championship;
- (iii) to strengthen ties and promote cooperation among computer-chess researchers;
- (iv) to introduce computer chess to the chess world;
- (v) to support national computer-chess organizations and computer-chess tournament organizers.

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The setting of the copy for this issue was performed at the University of Limburg. The benevolence of the University Authorities is recognized, so is our indebtedness to SWOL (Stichting Wetenschappelijk Onderwijs Limburg), IBM Nederland N.V., Mephisto (Hegener + Glaser AG) and Saitek Ltd. (SciSys-W Ltd.) for sponsoring part of the secretarial staff.

Most of the chess games have been processed by the NICBASE program, made available by INTERCHESS BV, Alkmaar, The Netherlands, the generosity of which is gratefully acknowledged.

We have found by experience that setting the copy is greatly facilitated whenever we receive authors' contributions by Email (for addresses see above) or on a 5.25 inch floppy disk. Contributors are encouraged to read the **Information for Contributors**.

A SECOND HELPING

Surely, research is often somewhat Olympian. In one popular conception researchers dwell in ivory towers and discuss among themselves problems of such divine abstraction that we, the common breed who are footing the bill after all, despair. Indeed, it is rumoured that there is not even discussion, just a soliloquy within the ivory-housed researchers. It is also bruited about that when they descend from snow-bound Olympus they are certain to misinterpret mortal affairs or overclaim the impact of their cogitations on the common lot of humanity.

The previous century offers luscious examples. In 1828 one Wöhler found that urea, considered to be organic because you and I excrete it, could be synthesized from its inorganic isomer, ammonium cyanate. He promptly burst forth: "I reserve the field of organic synthesis from inorganics to myself in perpetuity."

Not so our database researchers. True, they have pursued their labours in perfect disregard of applicability, which, incidentally, they have not even claimed. Driven by curiosity and nothing much else, these Olympians have solved, in etherial abstraction and with mundane thoroughness, such inapplicable questions as *Can two Bishops win against a Knight?* One suspects that the question was at least as fascinating to them as many others because its applicability was so limited. Searching the literature from Wöhler's time to ours has brought to light less than a handful of potential applications of Ken Thompson's Olympian research into KBBKN.

But even Olympian knowledge, once it is known to exist, is bound to percolate to the humdrum human level. Indeed, the very fact that some Olympian literally knows *all* about an endgame database may tempt a human master into reducing his own game to a position decidable by such an endgame. When considering doing so, he is a prey to conflicting emotions: while he may gain advance knowledge of the predestined outcome between perfect players, which may cheer him when he is *assured* a win, he is also, being human, awed by the Olympian knowledge and wonders whether he can play up to the Olympian standard. Those folks on Olympus have their own way of moving which we, poor mortals, cannot hope to assimilate.

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Our fable applies to Ken Thompson, an Olympian if ever there was, a world-class tournament and Jan Timman. Ken Thompson, a true dweller on high, had chucked his database at an unsuspecting and possibly largely incurious world, had it not been for Roycroft who tried to find rhyme and reason in the convolutions of Ken's researches and duly published them.

Now when Jan Timman, definitely sympathetic to computer aid, found himself in a position to reduce his board to a pure instance of KBBKN, the wires started humming. From Linares to your Editor-in-Chief a request for facts was transmitted, answered promptly by as much information as Timman requested and possibly somewhat more. It was all duly processed: not that Timman, by his own confession, had absorbed all of its nitty-gritty, but, we are proud to state, he had at least assimilated as much knowledge as would stand him in very good stead when resuming his adjourned game against Speelman.

Speaking on behalf of the International Computer-Chess Community, we claim modestly that Timman had some help from Thompson, Roycroft and your Editor-in-Chief. For the very least, the assistance thus provided was the equivalent of the thoughtful ministrations of a second. Moreover, we believe the second in question was altruistic to a fault and objective to perfection. And what can be wrong, ethically, with such a second helping? Surely as little as poor Oliver Twist can be faulted for requiring his. A second helping should be allowed when fair is fair.

Bob Herschberg
Jaap van den Herik

Owing to circumstances beyond computer control, the coordinates of the Editor-in-Chief and his secretarial staff are in a state of flux.

As from May 6, 1992 the telephone number is

+31 43 883477, or

+31 43 883485 if the above should fail to answer,

the residential address remaining at Bredestraat 24, 6211 HC Maastricht.

As from October 1, 1992 there is a change of venue, the new premises being

Kapoenstraat 2
6211 KW Maastricht
The Netherlands

It is consoling to record that the Fax number and the Email address will remain unchanged as

+ 31 43 252392

icca@cs.rulimburg.nl

THE NEGAC* SEARCH

Jean-Christophe Weill

Université Paris 8 - Vincennes
Département d'Informatique - Institut d'Intelligence Artificielle

ABSTRACT

Minimizing windows demonstrably improves the alpha-beta tree-search algorithm. This paper, after stating an enhanced version of the NegaC* search, operationally compares it to three other algorithms. In the comparison the enhancement turns out to have several favourable features.

1. INTRODUCTION

The use of minimal windows provides an improvement to the alpha-beta tree-searching algorithm (Knuth and Moore, 1975). This stems from the fact that search with a window (α_0, β_0) , totally contained within a window (α_1, β_1) , only searches nodes in a subtree of the tree searched by the window (α_1, β_1) . Hence, a minimal window searches a minimal subtree.

The search-with-minimal-window idea originally appeared in the Scout Algorithm by Pearl (1980). Subsequently as far as we are aware, there have been three other applications: the C* search (Coplan, 1982), the Principal-Variation Search (Marsland and Campbell, 1982) and NegaScout (Reinefeld, 1983).

This paper compares the negamax approach to the C* search, also known as the NegaC* search algorithm (Weill, 1989), with α - β , SSS* (Stockman, 1979) and the Partially-Informed NegaScout (PNS) as described in Reinefeld *et al.* (1985).

2. THE NEGAC* SEARCH

Coplan (1982) proposed the C* search in order to compute the minimax value of a game tree. In this section the negamax approach of the C* search is defined and some previous results are listed.

2.1. Definition

If we assume that the value returned by the evaluation function is within (min, max) , using a minimal window with a fail-soft alpha-beta (Fishburn, 1983), we can compute the negamax value of the root by repeated bisection. Figure 1 shows the resultant algorithm in pseudo-C.

```
int NegaCstar(position P, int min, int max)
{
    int v, t;
    while (min != max) {
        v = int((min + max) / 2);
        t = fail_soft_alpha_beta(P, v, v+1);
        if (t > v) min = t; else max = t;
    }
    return t;
}
```

Figure 1: The NegaC* algorithm.

2.2. Previous results

1. The union of the subtrees visited by the NegaC* algorithm is contained within the subtree visited by an α - β search (Coplan, 1982; Weill, 1990).
2. The expected complexity of the NegaC* search for a uniform tree of width w and depth d and a number of possible values M returned by the evaluation function is bounded by

$$\lceil 2 \log(M) \rceil \times \left(\frac{\zeta_w}{1 - \zeta_w} \right)^d$$

where ζ_w is the smallest positive root of $x^d + x = 1$ (Weill, 1989; Weill, 1990).

3. Hence, the NegaC* algorithm is asymptotically optimal over the class of directional game-searching algorithms (Weill, 1989).

2.3. Enhancements

NegaC* can be enhanced to exploit information from the search of previous iterations. When so enhanced it will be referred to as Informed NegaC*. For each node visited, we keep a record of the results obtained from searching each descendant subtree. It can be shown easily that if a beta cut-off occurs at a node, it is not necessary for subsequent searches to explore left siblings of that node (Coplan, 1982; Reinefeld *et al.*, 1985).

The fail-soft alpha-beta procedure thus modified is shown in the Appendix.

3. COMPARISON WITH SSS*, α - β AND PNS

In this section, we experimentally compare the Informed NegaC* search with α - β , SSS*, and PNS, a Partially-Informed NegaScout (Reinefeld *et al.*, 1985).

The figures on the next pages show the number of terminal nodes searched by each algorithm, normalized by division by the asymptotic branching factor of the α - β search to the power of the depth d (cf. item 2 of Section 2.2). Each data point represents an average over 30 runs. For some graphs, use is made of both random trees, where each descendant has an equal probability of being best, and strongly ordered trees (Marsland and Campbell, 1982) where the first descendant has a 0.7 probability of being best.

Figure 2 shows that for random trees, the informed NegaC* visits fewer nodes than SSS* at odd depths, but that at even depths, NegaC* is still competitive compared to SSS*. For strongly ordered trees, minimal-window techniques are favoured, but for large depths, PNS, NegaC* and SSS* give nearly equal results.

Figure 3 shows that at even depths, both PNS and NegaC* can outperform SSS* for large widths.

Figure 4 shows that at odd depths, NegaC* visits fewer nodes than other searches. Noting that widths from 20 to 60 are typical for the game of Chess, then, even at even depths, NegaC* is a very attractive choice.

Figure 5 shows the influence of the number of different leaf values on the complexity of the algorithms. It can be seen that the performance of NegaC* is invariant with respect to this value.

4. CONCLUSIONS

These results all show that NegaC* is an attractive search method. While it has not been explicitly argued, it is also true that NegaC* is most suitable for time control, due to its iterative nature. This fact can be exploited in a chess program when an iteratively deepening search has reached its final depth.

5. ACKNOWLEDGEMENTS

I would like to thank Jonathan Schaeffer for supplying me with the source code to produce arbitrarily-ordered trees and Marc-François Baudot for proof-reading this paper.

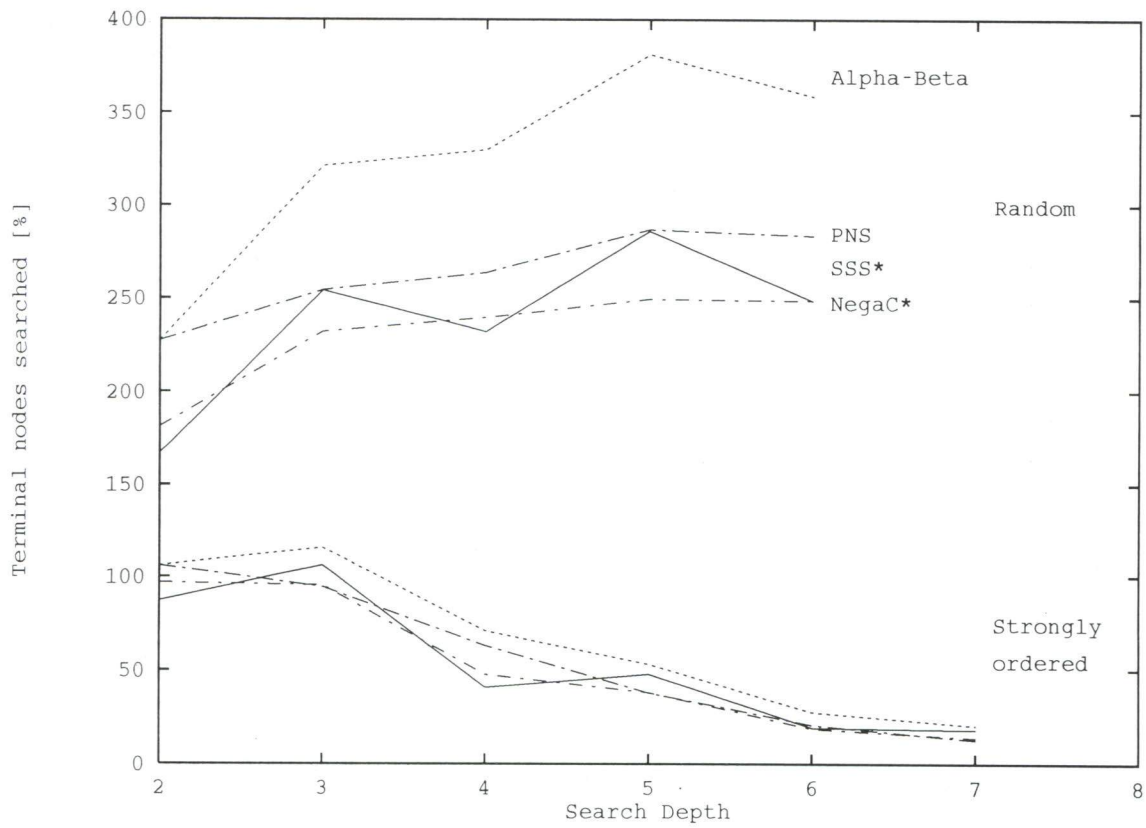


Figure 2: Comparison to asymptotic branching factor ($w = 15$).

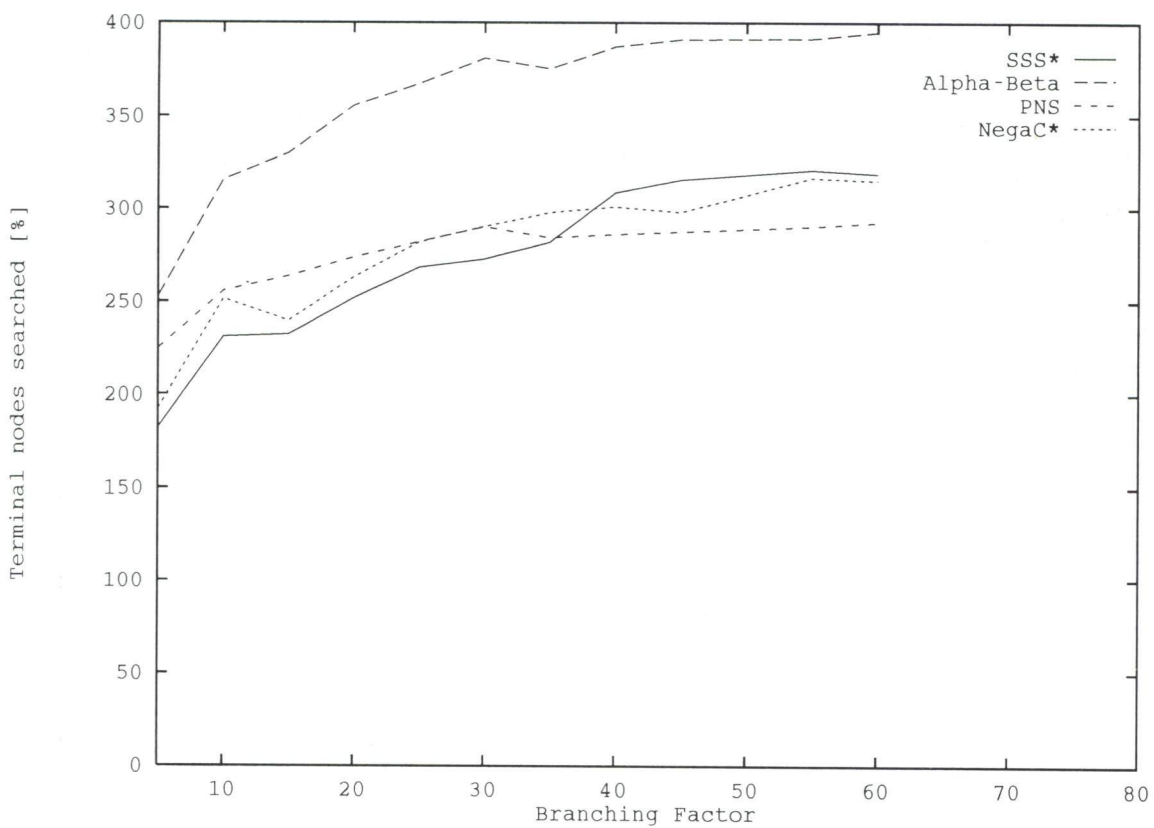


Figure 3: Comparison to asymptotic branching factor ($d = 4$).

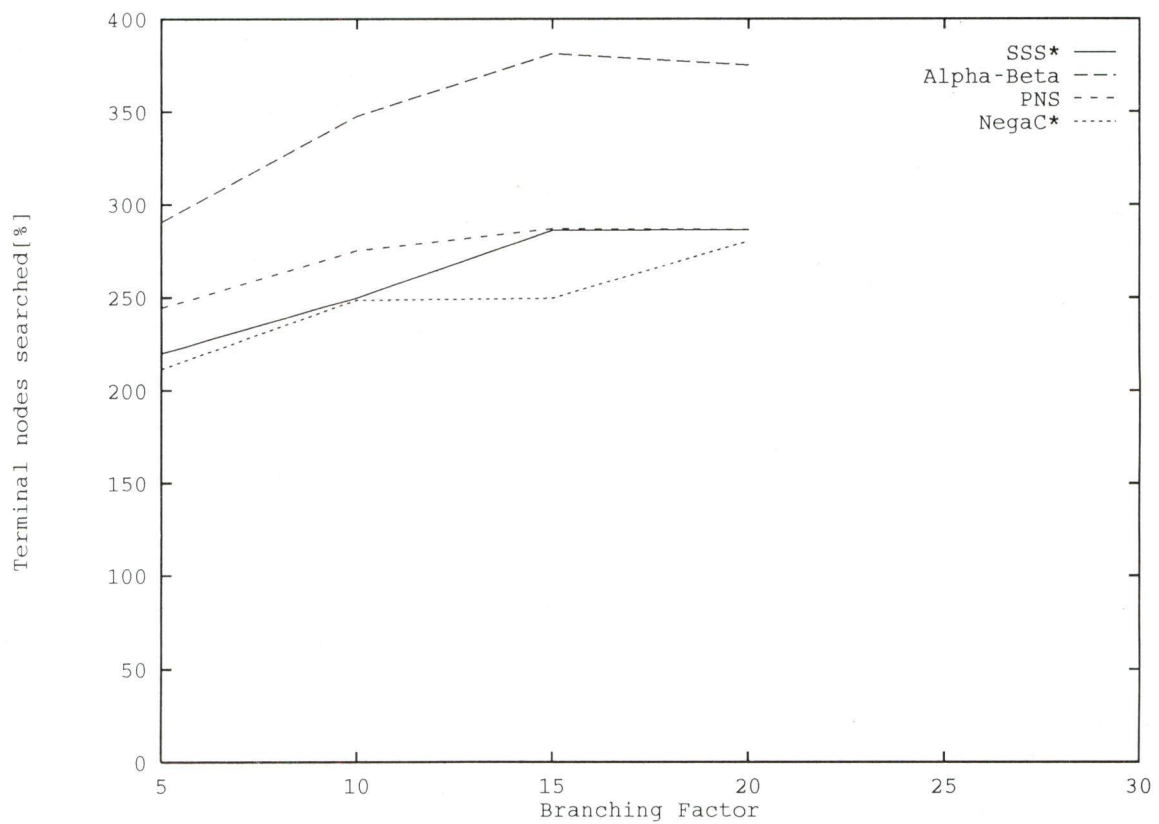


Figure 4: Comparison to asymptotic branching factor ($d = 5$).

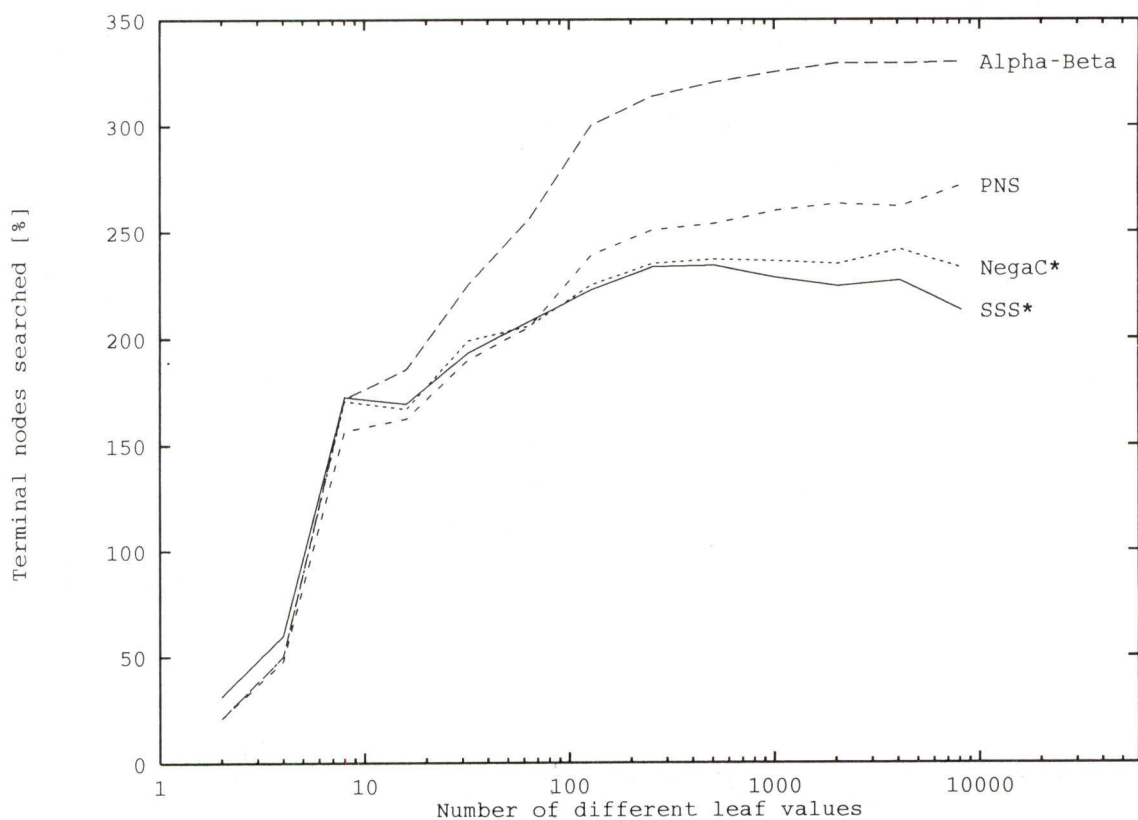


Figure 5: Comparison to asymptotic branching factor ($w = 15$, $d = 4$).

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APPENDIX: THE INFORMED FAIL-SOFT ALPHA-BETA PROCEDURE

```

int ifsab(position P, int depth, int alpha, int beta) {
    int i, value, a;

    if (P.min > alpha) alpha = P.min;
    if (P.max < beta)  beta = P.max;
    if (alpha >= beta) return (beta);
    if (P.min == P.max) { detach sons of P; return P.min }

    if (depth == 0) { return staticvalue(P) }

    if (first_visit(P)) {
        P is being expanded;
        attach the successor positions P1, ..., Pw to P;
        P.min = -infinity; P.max = +infinity;
    }

    a = -infinity;
    for (Pj attached to P) {
        value = -ifsab(Pj, depth-1, -beta, -MAX(a,alpha));
        if (value > a) a = value;
        if (value >= beta) {
            P.min = value;
            detach Pi where i < j;
            return (value);
        }
    }
    P.max = a;
    return (a);
}

```

Figure 6: The Informed Fail-Soft Alpha-Beta procedure.

THE COUNTERMOVE HEURISTIC

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ABSTRACT

A new move-ordering method is introduced: the *countermove heuristic*. It shows similarities with some previously described techniques, but differs sufficiently for a test of its effectiveness to be undertaken. The technique is based on the assumption that many moves have a "natural" response, irrespective of the actual position in which the moves occur.

Results of the use of the countermove heuristic are given and compared with similar results when using some other techniques. It appears that the countermove heuristic yields some 20% reduction in computation time for single positions. When used in game fragments, this reduction may even rise to some 50%, depending on nominal search depth. The countermove heuristic therefore seems to be a valuable element in move ordering.

1. INTRODUCTION

In the development of computer-chess techniques, many ideas for dynamically re-ordering the moves at interior nodes in a search tree have been worked out. Among these, such techniques as the *killer heuristic* (Gilligly, 1972; Slate and Atkin, 1977; Birmingham and Kent, 1977), the *refutation heuristic* (Marsland, 1982), and the *history heuristic* (Schaeffer, 1983) should be mentioned. Results reported show that such techniques may yield speedups of 50% or better over more naive approaches (Marsland, 1986).

In this article, an alternative method will be described, called the *countermove heuristic*. For comparison purposes, we briefly describe the three competing heuristics above, stating the data structures necessary for each.

The killer heuristic

The *killer heuristic* is originally proposed by Huberman (1968). When searching the game tree, it stores the best move found at each depth. Whenever operating at a given depth, it first proposes the move so stored. The idea is that in many positions the same move of one's opponent will be his best move after *any* move. Such a move is known as a *killer move*.

More than one killer move may be stored (e.g., two in CHESS 4.5, see Slate and Atkin, 1977) and killer moves at lower depths may be propagated (e.g., 2 plies deeper in CHESS 4.5, *ibid*). Broadly speaking, pruning by the killer heuristic is mostly due to information gathered at the same level in the same search subtree.

The heuristic is cheap: for k moves at n plies, its memory cost is $k \times n$ entries in a move table.

A typically successful application is in Diagram 1 (cf. Slate and Atkin, 1977, p. 105). Assume that Black considers 1. ... e5, then a program finds 2. Nc7 to be at a premium because of the fork against Rook and Queen. At the level of the second move in the game tree it now is advantageous to consider 2. Nc7 as the first move after *any* Black move.

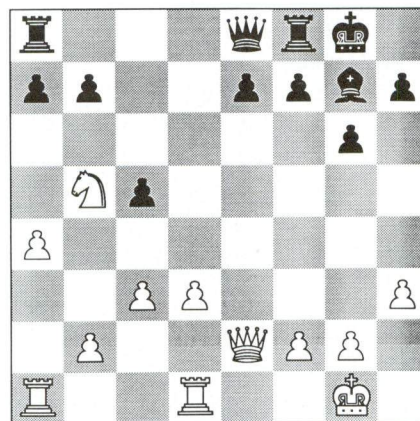


Diagram 1: Black to move.

The refutation heuristic

The *refutation heuristic* first described by Akl and Newborn (1977) is a technique applied in conjunction with the method of *iterative deepening* (Slate and Atkin, 1977). If a search of depth d is performed, the d moves in the main lines of all variations are stored in a *refutation table*. In the next iteration the main line of each variation is tried first. Thus, on an iteration to depth $d+1$, there exists a d -ply sequence that is tried immediately (Marsland, 1982). Although the *principal variation* will always be searched fully and the alternate variations need not, the main lines in the alternates, when searched, may give rise to additional cutoffs.

If the maximum of refutation moves is set to k for an arbitrary chess position and refutation lines are stored to a maximum depth of n plies, the memory cost for this technique is given by the size of a move table of $k \times n$ entries. Although the value of k in the refutation heuristic need not be the same as that for the killer heuristic, the refutation heuristic is roughly as cheap in memory as the killer one.

Incidentally, we note that the terms *killer move* and *refutation* are unfortunately not used in the literature with distinct meanings. We cite three clear instances of confusion. Gillogly (1972): "The killer heuristic is also used; if a move is a refutation for one line, it may also refute another line, so it should be considered first if it appears in the list of legal moves". Slate and Atkin (1977): "The killer heuristic [...] is basically an inexpensive attempt [...] to find a quick refutation move". Hartmann and Kouwenhoven (1991): "When a move is able to cut off (part of) the remaining sub-tree, that move is said to be a *killer-move* [their italics] to the previously played one". In what follows *refutation* and *killer*, when qualifying a heuristic, will be exclusively used as defined above.

The history heuristic

The *history heuristic* (Schaeffer, 1983) maintains a record of the "goodness" of every legal move. For this purpose, two *history tables* are used (one each for White and Black), accommodating all possible moves. Their entries are set to zero at the start of each new search process. At every interior node in the search tree the history-table entry for the best move found (either the best move possible or one causing a cutoff or both) is incremented by some specified amount (Schaeffer used 2^d , where d is the depth of the subtree searched under the node). When a new interior node is investigated, the program first re-orders the moves by descending order of their scores.

Since it is impractical to reserve only table space for *legal* moves, the history tables are usually defined as two tables with 4K entries each ($64_{from_squares} \times 64_{to_squares}$), whether these moves are feasible, legal or not. Maintaining them for both sides incurs a memory cost of 8K integers.

A somewhat similar heuristic has been described by Hartmann (1988) as the *butterfly heuristic*, proposing to record *all* moves in a search. Two similar tables as used in the history heuristic are needed for this technique, the name of which springs from the appearance of these tables when legal and illegal moves are distinguished. For reasons of its being thought unlikely to be better than the history heuristic, the butterfly heuristic was denied implementation by its proposer.

2. THE COUNTERMOVE HEURISTIC

The countermove heuristic is based on the observation that in many different positions a particular move is best responded to by some particular opposing move, a kind of "natural" *countermove*. This gives rise to the following heuristic.

The *countermove heuristic*, for each non-terminal node by a side, records the move estimated to be best, available to the opposing side. After any potential move the table so constructed is consulted; if a countermove is found and found to be legal, it is given first trial.

As does the history heuristic, the countermove heuristic uses two tables (one each for White and Black) of 4K entries each. Unlike the history tables, the *countermove tables* are filled with moves. The total memory cost for this heuristic is therefore given by the memory requirement of 8K moves.

The nature of the countermove heuristic renders it complementary to the killer heuristic. In the latter, whenever the position for a player has occurred before, the same response by his opponent is tried first. In the former, substitute 'move' for 'position', meaning that whenever a side plays the same move, the opponent's stored response is tried first regardless of his position.

If several moves compete for a single entry in one of the countermove tables, several replacement schemes are possible. It is simplest to store whatever best response is found, regardless of, e.g., position or depth of search. At the cost of simplicity, but possibly in the interest of quality, one may favour countermoves at higher levels over lower-level ones (similar to the weights used by Schaeffer (1983) in recording history information) or countermoves in the principal variation over ones in side variations, since the former might have a larger expected cutoff.

It is posited that countermoves are most appropriate, i.e., estimated best, when found during some previous iteration or, failing that, within the current iteration at the current level in the search tree. In this respect, the countermove heuristic presents similarities with the refutation and killer heuristics in the order named. Moreover, one may employ countermoves found during the current iteration at lower levels, propagating them downward. Which (possibly mixed) strategy to choose depends entirely on the scheme by which the countermove tables are being updated by replacement.

A typical position in which the countermove heuristic works well is given in Diagram 2, adapted from Reinfeld (1960, p. 20). In this position, black moves fall naturally in classes; within such a class, White's countermove is identical. E.g., after any move by Nb7, White's Nb6 checkmates; pushing the black c-Pawn invokes a checkmate by Qxd6; any move by Nh5 causes a checkmate by White's Nf6; moving the e-Rook to f7, g7 or e5 is followed by Ne5 checkmate. Similarly, many classes of white moves are best responded to by the identical specific black countermoves.

The strength of the countermove idea is that these specific responses to moves are not only the best at the topmost two levels of the search tree, but mostly are also strong at deeper levels.

For this particular position a reduction by up to some 75% in nodes evaluated is achieved. This reduction is better than that achievable in regular game-playing positions; Diagram 2 is to some extent an artefact.

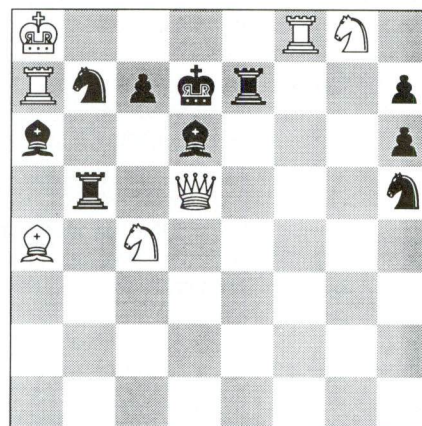


Diagram 2: Black to move.

Independently of the current work, Hartmann and Kouwenhoven (1991) reported on the technique of *butterfly-board moves*, being different from the butterfly heuristic. The technique shows similarities to the countermove heuristic. So far, an analysis of its effectiveness is lacking.

Summing up, we note that all four heuristics impose an ordering on moves to be investigated. Only the history heuristic effects a complete ordering at all interior nodes. In this respect, it is much stronger than the other three contenders which only suggest a priority for a single move or at best a few of them, while the remainder is left without benefit of reordering. Moreover, it is reasonable to expect the history heuristic to be strongly dominant over the other techniques, since any good move, whatever techniques it has been arrived by, will tend to occur frequently and hence be favoured by the history heuristic.

3. SOME RESULTS

In an attempt to test the effectiveness of the countermove heuristic, it was included in the author's TOUCH program. It served as a testbed rather than as a high-speed program. Therefore, all results are relative only and absolute rates are meaningless. With suitable hardware and software, all experiments performed iterative principal variation search (PVS) to a depth fixed in advance. In order to obtain

effectiveness measures for realistic use, quiescence searches were included at terminal nodes. However, for fairness of comparison, no other techniques were allowed to interfere with those ordering moves.

The test set was the familiar though obsolescent Bratko-Kopec (B-K) test (Kopec and Bratko, 1982), worked at depths up to 6 ply, reporting the total number of nodes, these being proportional to computation time. In the Tables 1-5 (see Appendix), the number of nodes visited for nominal depths of 2-6 ply are given by B-K-position number in six columns standing, in the order named, for the absence of dynamic move ordering (NH), for the killer heuristic (KH), the refutation heuristic (RH), the history heuristic (HH) and two versions of the countermove heuristic (CH and CH'). The first countermove heuristic (CH) just works as described above, on the assumption that the tables are cleared between moves. The second countermove heuristic (CH') does not clear the tables in between, meaning that suggested moves to be tried first are derived from previous searches. This of course is only profitable in move fragments and not in a set of independent positions such as the Bratko-Kopec set. In order to obtain an estimate of the effect of retaining the countermove information, all experiments with CH' were performed by running each test position twice, one immediately after the other, and recording only the node counts of each second test.

In the experiments all implementations were as described above. For the killer heuristic only one killer at each level was stored. The amounts to be added to the tables in the history heuristic were chosen as in Schaeffer (1983): 2^d , d being the depth of the subtree searched under the node. On reordering moves according to the history information, priority is given to capturing moves over non-capturing moves (regardless of the values in the tables). All tables were cleared between moves except for the CH' heuristic. As a replacement scheme for the two countermove heuristics, the choice was made to replace stored countermoves only by countermoves not deeper in the tree. Consequently, there is an upward propagation of countermoves in the tree. All heuristics have been applied singly.

The relative performances of the various techniques are given in Figure 1.

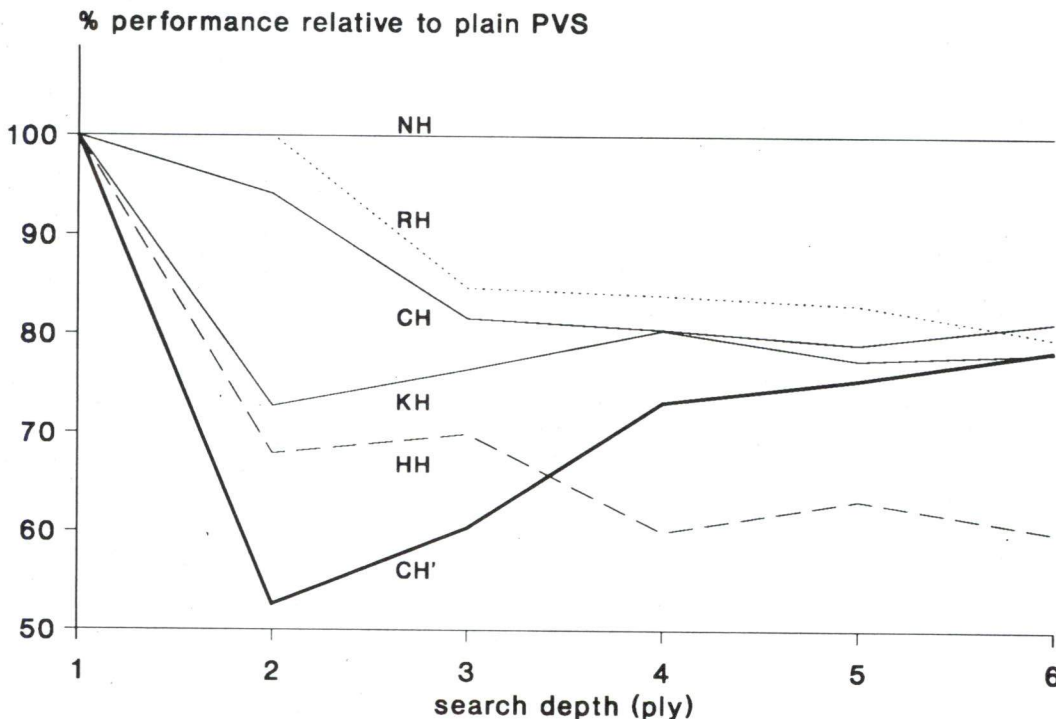


Figure 1: Comparison of move-reordering techniques.

Note that RH has no impact at two ply. It takes at least two plies to determine a refutation. The slight improvement in CH at two ply seems paradoxical, since CH equally needs two plies to determine a countermove. The paradox is resolved by noting that CH was also applied during the quiescence search, whereas RH was not.

Crudely summarizing the results, and bearing in mind their exploratory nature, we may state that, relative to *no* reordering of moves, the *countermove* heuristic provides a reproducible reduction by some 20% of nodes visited. (In other preliminary experiments in which every best response found was stored, i.e., the "simple" replacement scheme, similar reductions for the countermove heuristic only amounted to some 10-15%.) As such, it is inferior to the history heuristic. It would appear that as a move-reordering technique the countermove heuristic is roughly at a par with the killer and refutation heuristics.

The countermove heuristic with retrieval of moves (CH') has an even better potential, especially for the shallow search trees. For a 2-ply nominal search, this heuristic even has the best performance of the techniques compared, being an improvement of 47%. This improvement decreases with increasing search depth, approaching the CH results at a 6-ply search. The reason that, at greater search depths, CH' approaches CH stems from the iterative nature of the search process: the countermove information from some depth d approaches that from depth $d+2$ for increasing d , especially due to the replacement scheme in use (favouring moves higher in the tree).

4. CONCLUSIONS AND FUTURE WORK

The countermove heuristic turns out to be an easy-to-implement method, which for single positions seems to yield an effective reduction in total number of nodes investigated (and thus in computation time) of some 20% compared to plain PVS searches. In game fragments, when retaining the recorded countermove information between successive moves, the enhancement rises to some 50%, depending on the nominal depth of search reached. It therefore seems a valid alternative for the killer and the refutation heuristics.

In the present study several issues worth exploring have not been touched upon. First it would seem appropriate to combine the countermove heuristic with some of the other techniques mentioned. Since the killer heuristic and the refutation heuristic only suggest a first move to be tried, as does the countermove heuristic, the best candidate is probably the history heuristic. In such a combined heuristic, the countermove (if present and legal) is tried first; after this (if still necessary, i.e., if no cutoff has occurred) the remaining moves are ordered according to their "goodness" by the history tables. Second, as suggested above, more powerful replacement schemes may yield better results, for instance giving more priority to countermoves in the principal variation.

5. ACKNOWLEDGEMENT

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APPENDIX

In Tables 1-5 the data of the experiments for search depths of 2-6 ply are gathered. Note that the 6-ply results for test position #1 are identical to the 5-ply results. This is due to the fact that the chess program disables deeper searches after detection of a forced checkmate (which happens to occur at a 5-ply nominal search).

As a side remark we state that if no absolute priority to capture moves is given when reordering moves using the history heuristic, the performance of this heuristic drastically decreases at deep nominal searches, yielding figures of some 82 and 162(!) % for 5- and 6-ply nominal-depth searches.

B-K position			# of nodes visited		CH	CH'
	NH	KH	RH	HH		
1	806	620	806	805	701	450
2	999	445	999	505	1007	600
3	534	594	534	534	532	335
4	338	382	338	338	338	335
5	13037	5733	13037	6373	13810	4441
6	237	217	237	198	233	162
7	2412	2233	2412	2499	2167	2138
8	155	128	155	120	154	116
9	2402	2200	2402	2013	2552	1694
10	1265	1343	1265	1265	1286	887
11	842	577	842	773	830	372
12	653	636	653	508	661	574
13	508	529	508	482	507	402
14	1095	1234	1095	1117	1102	1054
15	1260	1183	1260	979	1183	750
16	387	665	387	375	409	363
17	1252	1315	1252	1026	1286	694
18	2143	1552	2143	1655	1743	753
19	963	931	963	783	1085	601
20	1282	947	1282	914	1524	855
21	8887	5524	8887	3803	6186	3834
22	1623	1795	1623	1554	1306	713
23	1087	823	1087	706	1014	571
24	1414	1530	1414	1414	1293	1282
total	45581	33136	45581	30739	42909	23976
percentage	100.0	72.7	100.0	67.4	94.1	52.6

Table 1: Results for a 2-ply nominal search of the Bratko-Kopec test positions.

NH, KH, RH, HH, CH, and CH' stand for no heuristic (i.e., without dynamic move-ordering technique), killer heuristic, refutation heuristic, history heuristic, countermove heuristic singly applied, and countermove heuristic applied after a trial run had established the table values, respectively.

B-K position	# of nodes visited					
	NH	KH	RH	HH	CH	CH'
1	2350	2012	2097	2439	2014	1614
2	3206	2629	2602	2061	2627	2208
3	2489	2580	2239	2227	2230	1605
4	2677	2963	2673	2602	2672	2608
5	37038	17060	27248	17247	24772	10620
6	1713	978	1528	999	1479	878
7	6882	7359	5929	7047	6107	5401
8	536	499	450	407	442	391
9	6653	5238	5179	5171	5113	4223
10	5379	5918	5003	5475	5151	4490
11	5403	5594	4784	4884	4815	4795
12	3151	3071	3175	3116	3485	3308
13	3977	3671	3535	3106	3546	3080
14	2914	3052	2648	2956	2640	2981
15	3935	4743	3163	2779	3141	2624
16	3331	3465	3291	3026	3288	2939
17	20361	13982	19031	14027	19353	17226
18	8415	7734	7646	8161	7420	5170
19	3448	3405	2817	3270	2977	2213
20	8446	4607	4258	3720	4973	3739
21	27489	18111	25112	13959	21411	11879
22	7567	6397	6725	6556	5907	4701
23	3846	3443	3368	3056	3373	2899
24	4946	6066	4783	4865	4878	4825
total	176152	134577	149284	123156	143814	106417
percentage	100.0	76.4	84.7	69.9	81.6	60.4

Table 2: Results for a 3-ply nominal search of the Bratko-Kopec test positions.

For legend, see Table 1.

B-K position	# of nodes visited					
	NH	KH	RH	HH	CH	CH'
1	15982	13443	14500	16921	14767	14577
2	25292	26136	21219	14161	20271	17756
3	21538	16981	17781	19273	15182	12865
4	17171	17018	12862	13060	16214	16164
5	403556	246252	329140	162778	294840	272783
6	6507	4727	5072	3382	4636	3852
7	96057	91263	93521	81514	88573	85722
8	2980	2149	2430	1486	2119	1500
9	71105	78497	54651	53434	49035	43997
10	54256	53800	56135	46092	56859	48919
11	45233	25677	36725	34856	33897	32031
12	18236	10633	12654	12562	18395	15601
13	23526	20402	20992	16666	20145	19521
14	14647	14546	13493	11651	12822	12593
15	14378	21955	14837	11273	14413	13734
16	18822	20012	15825	18253	14015	13220
17	57372	39174	38046	39863	45831	39431
18	59894	79922	51475	50169	50708	46983
19	34749	26838	32816	24076	27917	26847
20	112318	67272	75461	44648	73666	71966
21	156335	106827	147192	72854	124634	105106
22	82032	81313	68363	40200	83008	70143
23	38826	39792	33410	35689	31656	27295
24	27322	35441	22000	25727	28526	24177
total	1418134	1140070	1190600	850588	1142129	1036050
percentage	100.0	80.4	84.0	60.0	80.5	73.1

Table 3: Results for a 4-ply nominal search of the Bratko-Kopec test positions.

For legend, see Table 1.

B-K position	# of nodes visited					
	NH	KH	RH	HH	CH	CH'
1	82940	80619	61868	77123	79306	77047
2	91446	93271	67959	60532	70238	68371
3	120260	80056	76893	92338	94911	85649
4	125561	122829	105849	118102	122077	119807
5	1464465	897411	1295442	744629	1193887	1172421
6	29747	21676	20735	17393	20549	19310
7	277710	254952	248107	228419	230665	223507
8	12955	9738	7445	7171	7300	6625
9	383259	299036	302870	225840	288099	251792
10	345779	420357	422229	343462	427073	393902
11	171812	128334	131703	136671	136548	132204
12	126777	86720	51210	60863	110847	107649
13	172378	145919	155480	133672	148018	146321
14	62974	66237	63564	54411	56109	54859
15	42169	65485	48689	36107	41681	41030
16	273460	210559	313320	188797	218721	213215
17	198800	151889	91901	122617	106072	99552
18	228397	276432	213518	189381	180853	174462
19	116015	89785	102991	90878	93496	92040
20	477698	292942	258544	169088	242363	239456
21	648029	381361	467088	254790	434883	410955
22	303071	194262	280308	206714	212375	181404
23	169908	169592	116873	148553	150339	146749
24	117854	135435	113899	115308	107114	102748
total	6043464	4674897	5018485	3822859	4773524	4559776
percentage	100.0	77.4	83.0	63.2	79.0	75.4

Table 4: Results for a 5-ply nominal search of the Bratko-Kopec test positions.
For legend, see Table 1.

B-K position	# of nodes visited					
	NH	KH	RH	HH	CH	CH'
1	82940	80619	61868	77123	79306	77047
2	493710	499132	569830	437356	508357	475721
3	734967	501179	489437	544561	473233	437486
4	475373	508455	474205	472458	455882	452166
5	9524714	5784192	7701507	3989046	7983561	7395444
6	128121	100308	84549	67436	82515	77751
7	3665201	3192883	4047524	2620967	3817518	3817825
8	63161	40912	40830	35349	42233	41613
9	3911103	2494082	1973764	1509565	2273117	2227985
10	1881643	2015045	1397345	1358600	1434700	1304974
11	1952291	1208570	1741937	1257786	1593232	1533214
12	675471	444119	284473	329642	454453	451974
13	1162507	1103802	939720	932530	963517	923459
14	372479	400336	343982	309729	334856	333990
15	218924	402181	301786	199789	260296	259787
16	1467409	1298561	1113553	796003	1048936	1046853
17	1032916	916442	725213	578293	762232	761172
18	2283785	2905408	2005679	1775197	2281897	2210631
19	685408	497483	595026	461682	587998	584786
20	4457266	2658987	2734064	1989864	2594990	2590954
21	1686119	1513748	1583580	1233635	1581022	1559295
22	2043992	1395741	1767643	1581154	1949646	1816789
23	1387197	1319770	1071912	1384141	1244546	1241277
24	832424	947299	792195	778496	689968	689797
total	41219121	32229254	32841622	24720402	33498011	32309126
percentage	100.0	78.2	79.7	60.0	81.3	78.4

Table 5: Results for a 6-ply nominal search of the Bratko-Kopec test positions.
For legend, see Table 1.

NOTES

KQNKRR

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Here are some results from a run on KQNKRR under the conversion metric. The max-to-win value is 153. The counting conventions, hardware and software are described in Stiller (1991a, 1991b) and Stiller *et al.* (1991). Some earlier work is in Ströhlein (1970), Thompson (1986), Komissarchik and Futer (1974), Van den Herik and Herschberg (1985) and Stiller (1989).

KQNKRR max-to-win

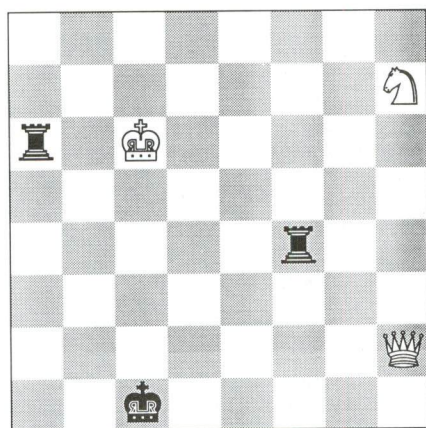


Diagram 1: A maximin KQNKRR position (WTM).

1. Kc6-d5 Ra6-a5 2. Kd5-e6 Rf4-e4 3. Ke6-f7 Ra5-a7
4. Kf7-g6 Ra7-a6 5. Kg6-f5 Re4-c4 6. Qh2-g1 (Qh2-
h1) Kc1-b2 (Kc1-c2) 7. Qg1-f2 (Qg1-g2) Kb2-a3
(Kb2-b3) 8. Qf2-f3 Ka3-b4 (Ka3-a4) 9. Qf3-b7 Kb4-a5
10. Qb7-d5 Ka5-b4 11. Qd5-d2 Kb4-b5 12. Qd2-b2
Rc4-b4 13. Qb2-e5 Kb5-a4 14. Qe5-e8 Ka4-a3 15.
Qe8-e7 Ra6-a5 16. Kf5-g6 (Kf5-f6) Ra5-a6 17. Kg6-
g7 Ka3-b3 18. Nh7-f8 Rb4-b6 19. Nf8-d7 Rb6-g6 20.
Kg7-f7 Rg6-h6 21. Qe7-e3 Kb3-c2 22. Qe3-c5 (Qe3-
e4) Kc2-b3 23. Qc5-d4 Kb3-c2 24. Kf7-e8 Ra6-e6 25.
Ke8-d8 Re6-d6 26. Qd4-e3 Rh6-g6 27. Kd8-c7 (Kd8-
c8 Qe3-f2 Qe3-e4) Rd6-c6 28. Kc7-b7 Rc6-e6 29.
Qe3-f2 Kc2-c3 30. Kb7-b8 (Qf2-f4) Rg6-h6 31. Qf2-f4
Kc3-c2 32. Qf4-c4 Kc2-d2 33. Nd7-c5 Re6-b6 34.
Kb8-a7 Rb6-g6 35. Qc4-d3 (Qc4-d4) Kd2-c1 36. Qd3-
c3 Kc1-d1 37. Ka7-b8 (Ka7-a8) Rg6-b6 38. Kb8-a8
Rb6-g6 39. Qc3-b2 Rg6-f6 40. Qb2-d4 (Qb2-b3 Qb2-
b1) Kd1-e2 (Kd1-c2) 41. Qd4-d3 Ke2-e1 42. Qd3-e3

Ke1-d1 43. Nc5-d7 Rf6-e6 44. Qe3-f2 Re6-e8 (Re6-c6 Rh6-h8) 45. Ka8-b7 (Ka8-a7) Re8-e6 46. Kb7-b8 Re6-
e8 (Rh6-h8) 47. Kb8-c7 Re8-e6 48. Qf2-g2 Re6-g6 49. Qg2-b2 Rg6-a6 50. Kc7-b8 (Kc7-c8) Ra6-g6 51. Kb8-
b7 Kd1-e1 52. Kb7-c8 Rg6-g8 53. Kc8-c7 Rg8-g6 54. Kc7-d8 Rg6-a6 55. Qb2-c2 Ra6-d6 56. Qc2-c1 Ke1-e2
57. Qc1-f4 Ke2-d1 58. Kd8-e8 Rd6-e6 59. Ke8-f8 Kd1-c2 60. Qf4-b4 Rh6-h8 61. Kf8-g7 Rh8-h6 62. Nd7-e5
Re6-f6 63. Kg7-g8 Rf6-d6 64. Ne5-g4 Rh6-g6 65. Kg8-f7 Kc2-c1 66. Qb4-b3 Rd6-b6 67. Qb3-c3 Kc1-b1 68.
Ng4-e5 Rg6-h6 69. Qc3-e1 Kb1-a2 70. Qe1-f2 Ka2-b3 (Ka2-b1 Ka2-a1) 71. Qf2-f3 Kb3-a2 (Kb3-b4) 72. Qf3-
g2 Ka2-b3 73. Qg2-d5 Kb3-b4 74. Qd5-d4 Kb4-b5 75. Qd4-c4 Kb5-a5 76. Qc4-a2 (Qc4-c3) Ka5-b5 77. Qa2-b3
(Qa2-e2) Kb5-a6 78. Qb3-a4 Ka6-b7 79. Ne5-d7 Rb6-c6 80. Qa4-d4 Kb7-c7 81. Nd7-c5 Rc6-g6 82. Qd4-d5
Kc7-b6 83. Qd5-c4 Rg6-f6 84. Kf7-e8 Rf6-d6 85. Ke8-e7 Rd6-g6 86. Nc5-d7 Kb6-a5 87. Qc4-a2 Ka5-b4 88.
Qa2-b2 Kb4-a4 89. Nd7-c5 Ka4-a5 90. Qb2-e5 Ka5-b4 91. Nc5-d3 Kb4-c4 92. Qe5-e4 Kc4-b3 93. Qe4-b4
Kb3-c2 94. Qb4-c4 Kc2-d2 95. Nd3-e5 Rg6-a6 96. Qc4-c5 Rh6-e6 97. Ke7-f7 Kd2-e2 98. Qc5-c4 Ke2-e3 99.
Qc4-h4 (Qc4-b4) Re6-f6 100. Kf7-g8 Rf6-e6 101. Qh4-b4 Ra6-a8 (Re6-e8) 102. Kg8-f7 Ra8-e8 103. Qb4-c3
Ke3-f2 (Ke3-e2) 104. Qc3-d2 (Qc3-c2) Kf2-f1 105. Qd2-d1 Kf1-f2 106. Ne5-g4 Kf2-g2 107. Qd1-c2 (Qd1-d2
Qd1-d5 Ng4-f6) Kg2-f3 108. Ng4-f6 Re8-e7 109. Kf7-g6 Re6-e5 110. Qc2-d3 Kf3-g2 111. Nf6-d5 Re7-e6 112.
Kg6-f7 Re6-e8 113. Nd5-f4 Kg2-f2 114. Nf4-h3 (Kf7-g6) Kf2-e1 115. Nh3-g5 Re5-e2 116. Qd3-c4 (Qd3-c3)

Re2-e3 (Re8-e3) 117. Qc4-d4 Ke1-e2 118. Kf7-g7 Re3-g3 119. Qd4-b2 (Qd4-c4) Ke2-e1 120. Qb2-b4 Ke1-f2 121. Kg7-f6 Rg3-d3 122. Ng5-e4 Kf2-f3 123. Ne4-d6 Re8-f8 124. Nd6-f7 Rd3-d8 125. Kf6-g5 Rf8-g8 126. Kg5-h4 Rd8-a8 127. Qb4-d2 (Qb4-e1) Kf3-e4 128. Nf7-g5 Ke4-e5 129. Qd2-e3 (Qd2-c3) Ke5-d5 130. Qe3-d3 Kd5-c5 131. Ng5-e4 Kc5-b4 132. Qd3-c3 Kb4-a4 133. Qc3-b2 Rg8-h8 134. Kh4-g4 Ra8-b8 135. Ne4-c3 Ka4-a5 136. Qb2-a3 Ka5-b6 137. Nc3-d5 Kb6-c6 138. Nd5-e7 Kc6-b7 (Kc6-b5 Kc6-b6) 139. Qa3-b4 Kb7-a6 140. Qb4-a4 Ka6-b6 141. Qa4-c4 Rh8-f8 (Rh8-d8) 142. Qc4-c6 Kb6-a7 (Kb6-a5) 143. Qc6-c5 Ka7-a6 144. Ne7-d5 Rf8-g8 145. Kg4-f5 Rb8-f8 (Rg8-f8) 146. Kf5-e4 Rf8-b8 147. Qc5-a3 Ka6-b7 (Ka6-b5) 148. Qa3-b4 (Qa3-b3) Kb7-c6 (Kb7-a6) 149. Qb4-c4 Kc6-b7 150. Qc4-b5 Kb7-c8 (Kb7-a7) 151. Qb5-c6 (Qb5-a6 Qb5-c5 Nd5-e7) Kc8-d8 152. Qc6-c7 (Qc6-d6)

KQNKRR Histogram

In Table 1 the distribution of WTM win-in- n positions is exhibited.

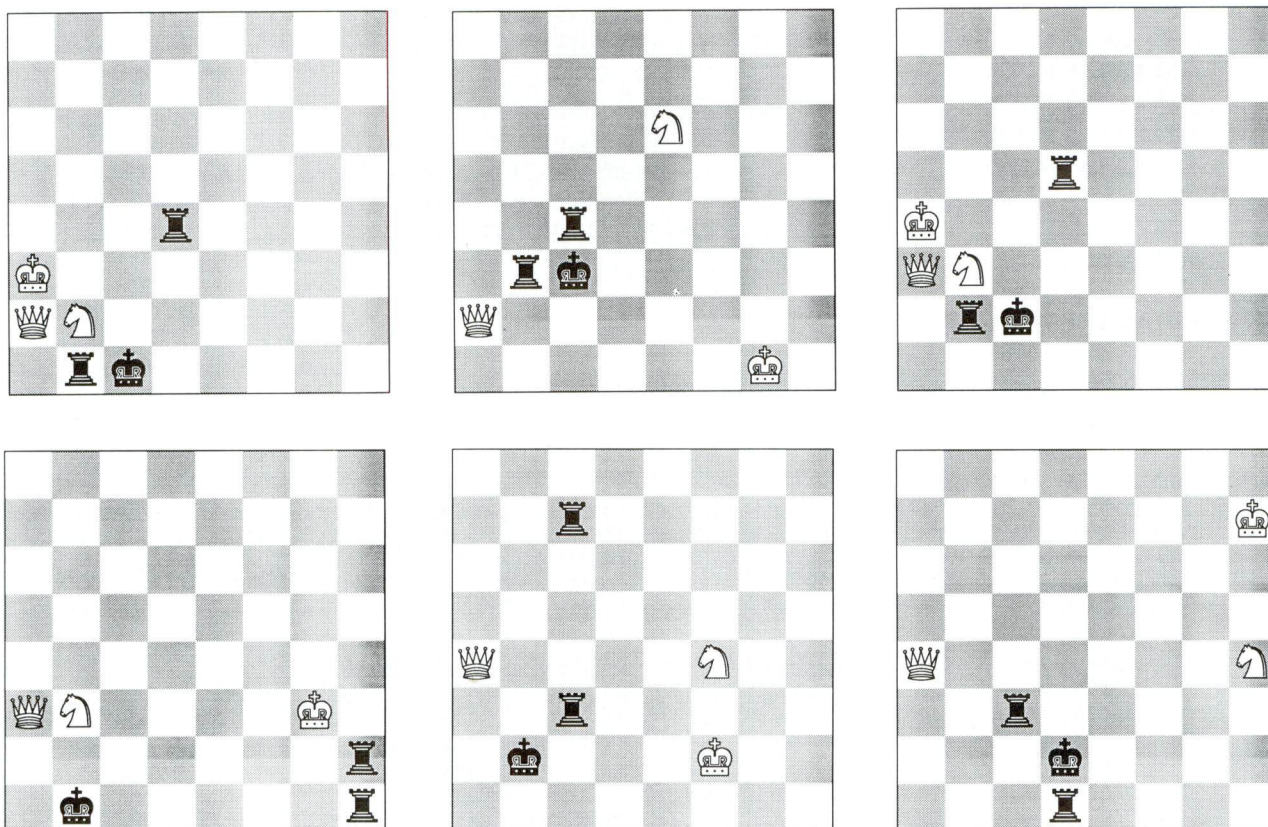
Move	Count	Move	Count	Move	Count	Move	Count
1	4198433734*	40	8774496	79	1888214	118	48126
2	339745116	41	8626836	80	1888122	119	43254
3	96746686	42	8473694	81	1947432	120	36640
4	51419966	43	8342656	82	2105064	121	30514
5	33532182	44	8227638	83	2376292	122	26038
6	24426906	45	8049230	84	2686382	123	21682
7	19623016	46	7736218	85	2931666	124	18968
8	16837786	47	7304698	86	3070932	125	19006
9	15221112	48	6873926	87	3133640	126	18756
10	14144854	49	6457956	88	3154954	127	19330
11	13335692	50	6022514	89	3215498	128	19498
12	12721226	51	5564544	90	3318306	129	18916
13	12221980	52	5114892	91	3309364	130	17386
14	11865358	53	4658286	92	3212216	131	17828
15	11573230	54	4217630	93	3015384	132	17172
16	11366812	55	3804430	94	2806616	133	17284
17	11132356	56	3481898	95	2632884	134	17028
18	10859396	57	3262500	96	2494976	135	14170
19	10586180	58	3108020	97	2332132	136	12166
20	10331720	59	2985790	98	2131560	137	9680
21	10138092	60	2910222	99	1901416	138	6576
22	10026502	61	2807560	100	1639548	139	4850
23	9942386	62	2698790	101	1378652	140	3700
24	9862292	63	2622724	102	1140988	141	2804
25	9841556	64	2603726	103	925804	142	2278
26	9828200	65	2600900	104	759368	143	1862
27	9858192	66	2569190	105	632574	144	1412
28	9930522	67	2507316	106	528572	145	926
29	9952022	68	2411174	107	438826	146	670
30	9868812	69	2308916	108	352214	147	466
31	9682594	70	2219056	109	286298	148	454
32	9451012	71	2154544	110	230370	149	360
33	9255420	72	2129878	111	188558	150	228
34	9102538	73	2150658	112	155000	151	66
35	9000722	74	2177652	113	128722	152	10
36	8928250	75	2161358	114	105824	153	14
37	8941750	76	2084202	115	84364	154	0
38	8947032	77	1993340	116	67282		
39	8880398	78	1918548	117	55964		

Table 1: The distribution of WTM win-in- n positions.

* This figure includes Black in check.

Certain mutual zugzwangs

The following page shows some different mutual zugzwang positions.



Diagrams 2a-f: Six mutual zugzwang positions.

Acknowledgements

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CHess COMPUTERS AND ENDGAME STUDIES

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Over the last decade a revolution has been taking place which will have a profound effect on the way we play chess. Someone reading a chess magazine for the first time can be forgiven for thinking he has picked up the wrong magazine, for page after page is about computers and databases. I, like many chess-players, have mixed feelings about this new development. Where will it lead? Will it kill the enjoyment of the game?

Well, recently I put my doubts behind me and I acquired a Fidelity Excel Mach III 68000 chess computer. This model has been around for a few years and is by no means the most expensive or the most powerful computer that one can buy. I chose this model because it was within my price range and offered good problem-solving ability. I wanted to see how useful it would be in my work as an adjudicator in checking analysis and giving a second opinion. To ascertain how good the 68000 was in endgame analysis one had to have a graded standard to which to compare it. The standards I chose were the graded studies in Livshits' and Speelman's (1988) book *Test Your Endgame Ability*. So over the next few months I analysed 60 studies taken from all fields of endgame theory. They covered the complete ability range. The results and some of the discoveries were quite surprising.

No analyst, composer or author is free from the occasional written error. So these occurred also in my studies. If it was possible to correct the errors in the analysis then this was done. Very few, if any, of the studies were removed from the tests because they could not be corrected. Essentially, my work was an error-free base of known results.

Let us now look at some of the interesting positions that came to light during the project.

Study 1

A year after this study (Diagram 1) was composed the Platovs became famous by winning the 3rd composing tourney in the *Rigaer Tageblatt*. The prize-winning study was a particular favourite with Lenin. In both studies the Knight played a central role. The Platovs' solution to the above study is 1. g5+ Kxg5 (1. ... Bxg5 2. Nc7 Bf6 3. Ne6 d5 4. a6 d4 5. Ke2 wins) 2. Nc5! Bd4 (Bd8) 3. Ne6 wins. The a-Pawn cannot be stopped from queening.

The computer did not like the move 1. g5+. Instead it played 1. Nc7 Bd4 2. Ke2 Ba7 3. Kf3 Kg5 with no clear outcome. Why was this? Was the solution too difficult for the computer or was the study flawed?

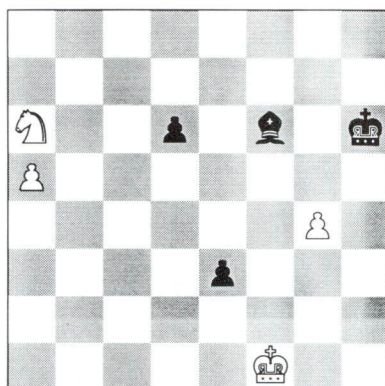


Diagram 1: White to move wins (V. and M. Platov, 1908).
No. 295 Livshits/Speelman (1988).

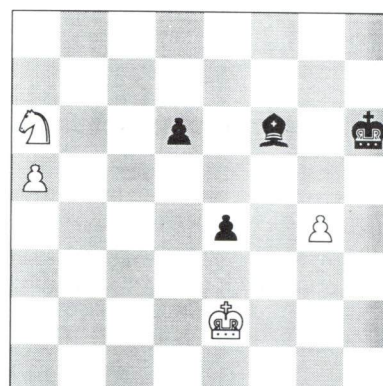


Diagram 2: White to move wins (V. and M. Platov, 1908).
Correction by B. Gosling, 1991.

I began to move the pieces around and then it occurred to me. After 1. g5+ Kxg5 2. Nc5 Black has a strong counterattack with 2. ... Kg4! If White now plays 3. a6 then 3. ... Kf3! wins for Black. The move 3. Ke2 is also no good because Black plays 3. ... Bd4 (Bd8). It is no wonder, therefore, that the computer did not like 1. g5+: the move gives a Pawn away and helps Black in his counterattack. This study was indeed flawed and the computer's dislike very strongly hinted at that fact. However, the study is easily reshaped into validity (see Diagram 2).

Let us place as a correction the black Pawn on e4 and the WK on e2. The black counterattack now does not work. This time the computer came up with the correct solution which was the Platovs' idea of 1. g5+ Kxg5 2. Nc5 Bd4 (Bd8) 3. Ne6+ wins. The Bishop cannot get to an important diagonal to stop the a-Pawn.

[I would like to acknowledge Timothy Whitworth's help in checking the original position of 1908.]

Study 2

The main line of the composers' solution to Diagram 3 is 1. Re1 Ke8 2. a4 Rb2+ 3. Kxf3 Rb3+ 4. Kg2! Rb2+ 5. Kh1 Rb4 6. a5 Rb5 7. a6 Rb6 8. a7 Ra6 9. Rg1! Kxe7 10. Rg8 Rxa7 11. Rg7+ and wins the Rook.

All this is very pretty but it has a fatal flaw. I had a suspicion that something was wrong. Black has an important defensive resource which the composer overlooked. Also the computer playing at 3.5 minutes per move could not find the correct idea. So I left it analysing overnight. (I can understand why Botvinnik wanted to develop a chess-playing computer. He had lost enough sleep analysing those adjourned games in the early hours!)

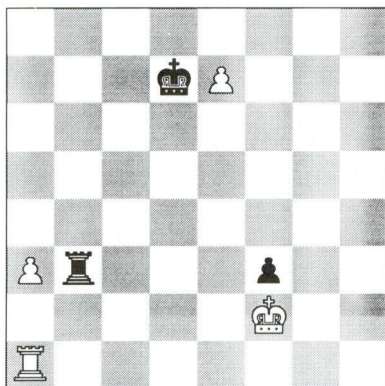


Diagram 3: White to move wins (V. Korolkov, 1948).
No. 515 Livshits/Speelman (1988).

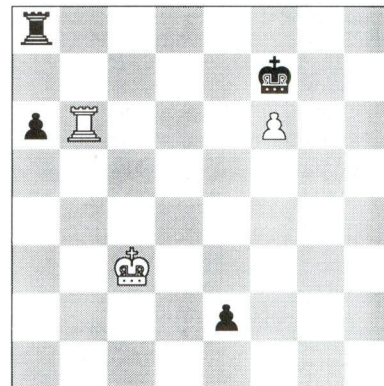


Diagram 4: White to move draws (V. Korolkov, 1948).
Correction by B. Gosling, 1991.

The defensive idea which the computer found, though it took a full night, is to play the BR to the 6th rank where it is able to block the Pawn.

After 1. Re1 Ke8 2. a4 the move 2. ... Rb6! secures the draw. This is one of those rare positions where the R is better positioned in front of the Pawn rather than behind. Both the WP's are weak, the WK too far away to defend them. Black has time to set up a defensive position to secure the draw. 3. Re5 Ra6. The Pawn must not be allowed any further than the fifth rank. Otherwise Black cannot draw. 4. a5 Rf6. White can make no progress in this position. 5. Re4 Ra6 6. Ra4 Kxe7 7. Kxf3. It is a draw. Again, the computer outdid the composer.

Yet again, the study can be corrected, albeit by the artefact of reversing the colours and making White to move and draw (see Diagram 4).

1. Kd2 Re8 2. Ke1 a5 3. Rb3! Re4 (3. ... Kxf6 4. Rf3+ Kg5 5. Ra3 Re5 6. Ra2 Kf4 7. Rxe2 Rd5 8. Rd2=) 4. Ra3 a4 5. Rf3 Re5 6. Ra3 Ra5 7. Kxe2 Kxf6=.

Study 3

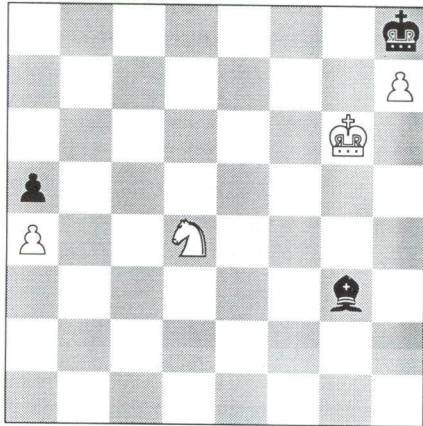


Diagram 5: White to move wins (F. Hey, 1913).
Black to move draws (Averbakh, 1985).
No. 272 Livshits/Speelman (1988).

It is interesting to note that both Fine (1941, pp. 206-207) and Averbakh (1985, pp. 89-90) quote the same position as a draw. Fine gives the name 'O. Hey' and analyses the position with White to move to a draw. Averbakh analyses with Black to move and comes to the same conclusion. Here too, the computer begs to disagree with F. Hey: no win, but a draw...

Study 4

To understand the position of Diagram 6 the computer would have needed to search to a depth of over 16 plies. Failing this it also fails to find the correct winning solution. Even the draw is not easy to find but within the computer's capacity. What it sees is:

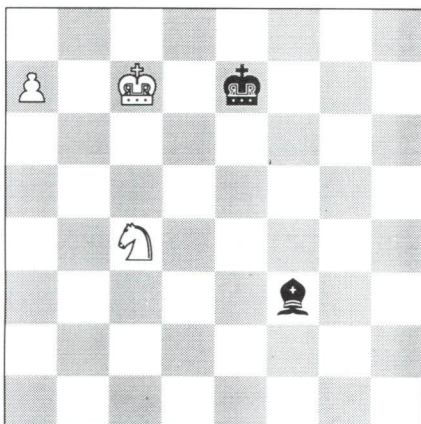


Diagram 6: White to move wins (V. Chekhover, 1950).
No. 283 Livshits/Speelman (1988).

With White to move, Livshits and Speelman give the following solution to Diagram 5: 1. Ne6! Bc7 2. Ng5 wins. I have no way of checking the original but I doubt if this is Hey's solution.

This study is a good example of corresponding squares. In order to mate, the Knight has to get to f7. From e6 the Knight can get to f7 from g5 and d8. So Black has only one move and that is 1. ... Bh4. The corresponding square for e6 is h4. A whole series of corresponding squares can be compiled.

The solution is 1. Ne6 Bh4=. The computer showed that White's threats of mate and attack therefore on the a-Pawn can be met by accurate defence.

1. Kb8? Kd8 2. Nd6 Ba8! 3. Kxa8 Kc7! resulting in a well-known drawing position because the WK is trapped. The winning idea is subtle: obtain the *same(!)* final position but with Black to move.

The win was first shown by Horwitz (1880) in his chess column in *The Chess-Monthly* and later published in Horwitz (1884). It includes a fine knight manoeuvre: 1. Na5 Ba8 2. Kc8! Ke8 3. Nc4 Ke7 4. Kb8 Kd8 5. Nd6 Kd7 6. Nb7 Kc6 7. Kxa8 Kc7 8. Nd6! wins.

Conclusions

The final result from analysing 10 groups of 6 studies was a 66% success rate in solving by computer. On average the computer solved 4 out of the 6 studies for each group. Each group represented a different type of endgame. The playing level chosen gave an average response time of 3.5 minutes per move. Studies solved by overnight analysis are not included in the result. Obviously if these were counted the result would be very much higher, in the order of 70-80%.

This is a brilliant result and indicates that we are only a few years away from a 100% score. Well, what does it mean? It means that most chess-players have the possibility of owning computers which can play the endgame perfectly. These computers will have a grading in excess of 3000 ELO (as judged by their endgame results).

Some of you may ask why do we need such computers? The Study Composers of the past got by without such machines. Look at Troitzky (1934), when he worked out the theory of that very difficult ending KNNKP, he did so without benefit of a computer. Troitzky may be considered a very special case, since his mental ability and his patience seem inhuman to most of us (Dekker *et al.*, 1987; Herschberg *et al.*, 1990).

I think that players interested in the endgame will welcome such a machine. Very few of us can afford the luxury of spending more than a few evenings a week on chess. Such machines will enable us to cover more theory and allow us to be assured that our compositions are technically perfect when they are. The composer will be free to concentrate on the other facets of his art. Composing will become more accessible to players who otherwise would be put off by the sheer volume of theory they need to know. Often awards are made to studies which are later found to be technically flawed. This need no longer happen. Hard-pressed judges and adjudicators should embrace them wholeheartedly. This does not detract from the judging process. The technical and artistic ability of the judge still have to be second to none.

Chess computers have to be used wisely. Using them indiscriminately soon degenerates into using them trivially, say as a school boy whose math depends on the mechanics of his calculator. As a West-of-England Regional Coach I have become convinced of the important role of chess computers in teaching endgame theory. One way to impart such knowledge without tears is the analysis of studies. Since they are available now the challenge for all of us is to live creatively with them and enlist their help in the further enrichment of the Art of Chess.

Acknowledgement

I would like to acknowledge Terry Knights's help and advice, and in supplying the computer. Moreover, Mr. Chr. M. Bijl, librarian of the Bibliotheca Van der Linden-Niemeijeriana in the Royal Dutch Library, is thanked for his supplying of all relevant references.

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ON ASYMMETRIES IN CHESS PROGRAMS

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1. INTRODUCTION

Asymmetry in chess programs may arise by several reasons, not excluding combinations of them. The four singled out below certainly are not exhaustive.

(a) The evaluation function is asymmetric.

One simple example would be a program which stresses the evaluation of irregularities in its own pawn structure with greater emphasis than those of its opponent. Another example would be rewarding the centralization of one's own men differently from that of the opponent's.

(b) The search tree is chosen asymmetrically.

In the state of the art, no distinguished program performs a purely fixed depth search: quiescence searches and some types of selective deepening are always involved. Asymmetry arises, for instance, when a very cautious program searches more deeply in all those parts of the tree where the opponent may choose attacking moves.

(c) The opening book has an asymmetric structure.

This asymmetry may be found in almost all chess programs. Typically, large parts of the book consist of passive lines played only when forced by the opponent. Thus, more opponent's moves are recorded than the few available to one's own side.

(d) The contempt factor renders a program asymmetric.

The setting of this factor, also called "drawing factor", leads to asymmetric decisions: a draw by repetition of moves may be preferred to a slight advantage or, conversely, a slightly inferior position is preferred to a draw. When minimaxing in the search tree the opponent is automatically credited with the negative of one's own contempt factor.

The problem posed here is to determine whether a given program, the source code of which is inaccessible to the experimenter, is asymmetric [say in the (a), (b) or (d) sense], and if so, to what extent?

A natural possibility is to make use of the principal variations displayed by most programs. The following experiment is an obvious suggestion.

In any given chess position one makes the program perform a search of depth $n+1$ (plus selective extensions) and records the first two plies a, b of the resulting principal variation. Then one executes move a and subsequently makes the program perform a search of depth n (plus selective extensions), resulting in some move c . Only if the program is completely symmetric and deterministic, one will always observe $b = c$. Over an experiment encompassing many positions, the relative frequency of $b \neq c$ can serve as a measure of the program's asymmetry.

An actual experiment with two commercial chess computers is described in the next section.

2. EXPERIMENTAL

The experiment was complicated by one of the two programs being unable to accept the setting of n . As an approximation, I have adopted a constant time of 30 seconds per move for depth $n+1$ and of 6 seconds for depth n . The factor 5 ($= 30/6$) should typically allow the machines to search one ply deeper (Frey and Atkin, 1978).

I let each machine play 4 games against itself with a thinking time of 30 seconds per move. These games started at the end of a one-move opening line (1. b4 f5; 1. g4 c5; 1. Na3 c5; 1. e4 Na6) and were broken off when the outcome was obvious or when move 40 was reached. (In several endgames the time factor for searching one more ply clearly was less than 5.)

During the 30-second searches I recorded from the display the preliminary move proposals after 6 seconds. After the 30 seconds the machine was stopped and the first and second ply of the principal variation computed were noted.

Hence, for every position in these games three move proposals were available:

- x : the second ply of the principal variation of the preceding move;
- y : the move proposal after 6 seconds;
- z : the move proposal after 30 seconds.

For answering the question as stated one would only have to determine the relative frequency of $x \neq y$. But comparing x, y with z also has its interest, for which see Section 3.

Altogether there are five (in)equalities possible

- $x = y = z$: All three proposals coincide.
- $(x = y) \neq z$: x and y coincide, z is different.
- $(x = z) \neq y$: x and z coincide, y is different.
- $x \neq (y = z)$: y and z coincide, x is different.
- $x \neq y \neq z$: All three proposals are distinct.

Clearly, the last three occurrences summed count all cases with $x \neq y$.

The table below shows the statistics of the experiment.

Machine and Programmer	Total number of positions	$x=y=z$	$(x=y)\neq z$	$(x=z)\neq y$	$x\neq(y=z)$	$x\neq y\neq z$
1. Mephisto Lyon 68030 R. Lang	307	153	27	18	74	35
2. MM 4 E. Schröder	293	190	41	36	16	10

Table: The statistics of the experiment.

For Mephisto Lyon, $x \neq y$ occurred in some 41 percent, for MM 4 in only 21 percent. So Mephisto Lyon seems to be more asymmetric than MM 4. This certainly does not contradict what is thought generally, namely that Richard Lang's programs are strikingly asymmetric.

Having found a well-performing asymmetric program, as we have, the next question is which is the better on the average: is it true that $y > x$, i.e., the move proposal after 6 seconds is better than the second ply of the principal variation of the preceding move (at depth $n+1$). It is intuitive to expect the depth- n proposals to be better, i.e., $y > x$.

However, the experiment about to be described below may question the intuition. Mephisto Lyon 68030 was allowed to play 20 games against itself. For the one side the machine always performed a search of depth 4. For the other side the second ply of the principal variation of the opponent's preceding move was played. (Doing this with a symmetric and deterministic program would simply result in a perfect match between depths 4 and 3, i.e., $x = y$ always.) Contrary to expectation ($y > x$) the side with depth 4 was the winner by 14.0 : 6.0 (+12, = 4, -4). The difference, while large, is not overwhelming. For comparison we quote Condon and Thompson (1983), who let Belle play itself at different search depths. Writing P_n for the version with search depth n the results were

$P_5 : P_4$	15.0 : 5.0
$P_6 : P_5$	16.5 : 3.5
$P_7 : P_6$	16.0 : 4.0
$P_8 : P_7$	15.0 : 5.0
$P_9 : P_8$	14.5 : 5.5

In all cases the advantage of P_{n+1} over P_n was more pronounced than in my experiment.

The control experiment "depth 4 vs. depth 3" was not performed since it would have been unduly laborious with a single machine.

3. THINKING ON THE OPPONENT'S TIME

Many chess programs use the opponent's thinking time by expecting the opponent to play the second ply of the principal variation of their own last move and preparing an answer to this move.

This way of anticipating the opponent's move may well be sub-optimal, as may be read off from the Mephisto Lyon data in the table above. Frequencies of $x = z$ are 56 percent, whereas $y = z$ has coincidence of 74 percent. (For the MM 4 these fractions are 77 and 70 percent, respectively.) Hence, if an asymmetric chess program must play against a (very) similarly structured opponent, it may be better to anticipate the opponent's answering moves by a new shallow search instead of mechanically using the second move of the opponent's principal variation.

This is hinted at, too, by a separate minor experiment when Mephisto Lyon was pitted against itself at one minute per move. Here, too, 5-second searches still had a clear predictive advantage over second plies of the previous principal variations.

In general and not necessarily only for asymmetric programs, I think that currently thinking on one's opponent time is far from being done optimally.

4. THE FUTURE

Below, we supply some promising areas of future work in the context of asymmetries in game-playing programs.

- (a) It would be a valid object of research to determine the degrees of asymmetry for any chess program, commercial or otherwise.
- (b) Given the asymmetry of the evaluation function $v()$, the most disconcerting fact is that, in principle, $v(w)$ and $-v(b)$ are unequal (w for White, b for Black). They may be equalized by introducing $v'()$, most simply as symmetric averages by

$$v'(w) = 0.5 \times [v(w) - v(b)]$$

$$v'(b) = 0.5 \times [v(b) - v(w)].$$

This obviously restores $v'(w) = -v'(b)$.

More generally, one may define a real-valued parameter λ as follows.

$$v'(\lambda, w) = \lambda \times v(w) - (1-\lambda) \times v(b)$$

$$v'(\lambda, b) = \lambda \times v(b) - (1-\lambda) \times v(w).$$

For $0.0 \leq \lambda \leq 1.0$ this is a weighted averaging process, the particular value of $\lambda = 0.5$ giving the symmetric average. After this introduction, one may define a most fascinating optimization problem:

Given an asymmetric evaluation function it is required to determine the value of λ_{opt} that is the weighting which optimizes moves by either side.

- (c) Beyond the scope of this note, there is a problem to account for the fact that asymmetric programs are successful in what is obviously a symmetric game such as chess. Even more remotely beyond the scope of this note, there is the idea of transferring asymmetries in chess to other games now played by computers. It is not unreasonable to hope that some of those transfers may lead into new insights into computer chess.

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NEWS, INFORMATION, TOURNAMENTS AND REPORTS

A DATABASE AS A SECOND

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ABSTRACT

Chess endgame databases have provided computer-chess researchers with perfect knowledge of many endgames. Grandmaster play, however, has been largely unaffected by their existence. In the 1992 Linares tournament, Timman and Speelman adjourned a position which could lead to the KBBKN endgame. With the aid of publications on computer analysis of this endgame, Timman successfully prepared for the human-to-human confrontation and defeated Speelman. This contribution describes the background of the KBBKN endgame, the sequence of events which led to Timman's victory, and presents analyses of the grandmasters' performance.

1. BACKGROUND

More than a century ago, Kling and Horwitz (1851) published the first thorough study of the KBBKN endgame. Their analysis showed that in the position of Diagram 1, Black can hold out indefinitely against White's attacks. They concluded that King and two Bishops cannot win if the weaker side can obtain the position of Diagram 1. The essential feature of this position is the King and the Knight's making up a fortress near a corner of the board, it being crucial that the Knight is on b7; this essence is maintained upon reflection in one or both of the board's medial lines. Kling and Horwitz (1851) asserted that Diagram 1 and its reflections provided an exception, and that, Black failing to achieve Diagram 1, White was bound to win. Their false claim would stand unchallenged for 130 years to come.

In tournament practice the endgame, though rare, has occurred several times. In the match Tal'-Botvinnik (Moscow, 1961), Tal' achieved an adjourned game with two Bishops against a Knight (see Diagram 2). However, his opponent's King and Knight were not in a position to build the fortress with due speed and hence Botvinnik lost in accordance with the accepted wisdom of the times (Van den Herik, 1984).

A further serious and prolonged attempt to win with the two Bishops was made by IGM D. Bronstein playing IM J. Pinter in Budapest, in 1978 (Roycroft, 1988b). In spite of his efforts, Bronstein had to accept a draw declared after 50 moves of fruitless attempts. His opponent seemed to be well aware of the Kling-Horwitz position and reached it three times during his defence, at different corners of the board. Thus, the over-a-century-old analysis had withstood the attacks of a strong IGM.

In 1983 Ken Thompson (Thompson and Roycroft, 1983; Thompson, 1986) created an endgame database for the KBBKN endgame. Contrary to what the chess world was led to believe after Kling and Horwitz, Thompson showed that Black is not ultimately safe even in the Kling-Horwitz position. Rather, he found that the win was always for White with a few degenerate exceptions in which White speedily loses the use of a Bishop.

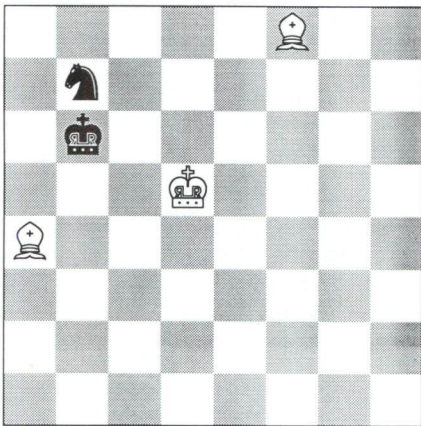


Diagram 1: The Kling-Horwitz position.

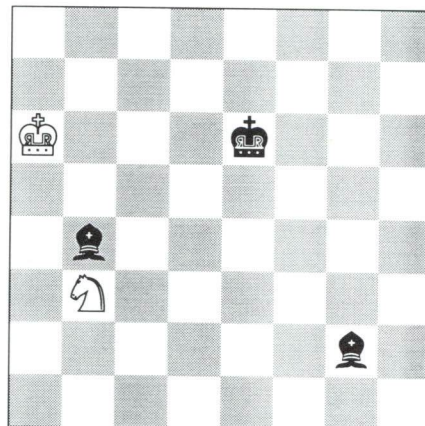


Diagram 2: Botvinnik-Tal', Moscow 1961.

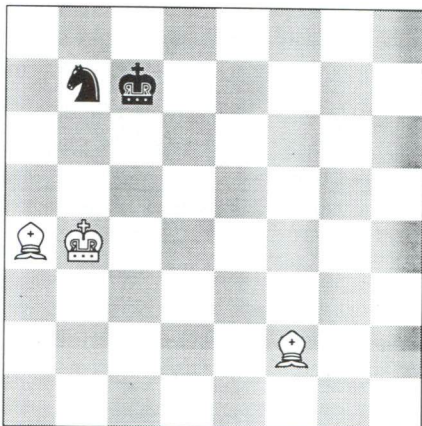


Diagram 3: BTM loses in 39 moves.

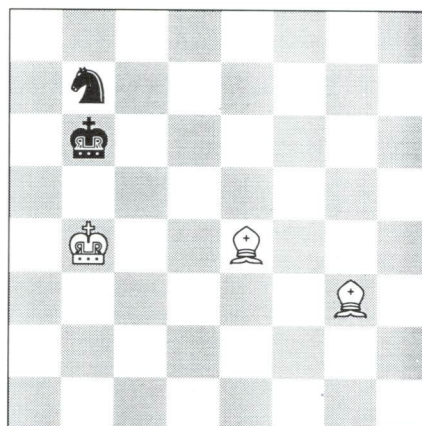


Diagram 4: BTM loses in 38 moves.

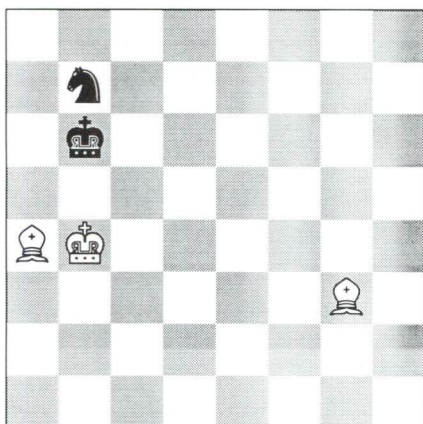


Diagram 5: BTM loses in 38 moves.

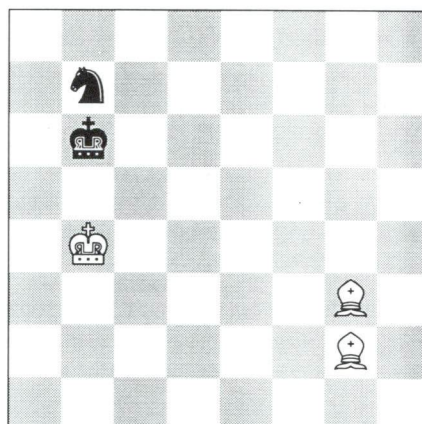


Diagram 6: BTM loses in 40 moves.

Evenso, it is a far cry from a computer enumeration of millions of positions to a coherent scheme for the Bishops to cooperate so as to defeat the lone Knight. Timman, aware of Thompson's database result, was one victim of the difference between knowing *the* result and knowing *how* to achieve it. The incident occurred during Timman's analysis of Popovich's game against Korchnoi in Sarajevo, 1984. The result of the game would have been crucial to Timman's own chances for the tournament's victory (Van der Wiel, 1984, p. 19). Timman was cognisant of Popovich's won position, but found himself unable to translate a proved win into a

winning line of play. The game ended in a draw, ultimately to Timman's disadvantage (Van den Herik, 1986).

John Roycroft, the chess-endgame specialist set out to master the patterns thought to be underlying the KBBKN database. The results of his efforts were published in Thompson and Roycroft (1983), Roycroft (1986a, 1986b, 1986c, 1988a, 1988b) and Michie and Bratko (1987a, 1987b). Briefly, he distinguished five phases in the process which would ultimately lead to mate or loss of the Knight. In the first phase, White seeks to lift any immobilization Black may have imposed on any of his pieces. In the second phase, Black retreats to the Kling-Horwitz position, in any of its reflected equivalents. The third phase consists of White manoeuvring the men into any of the BTM compulsory exits of the Kling-Horwitz position; the four known exits are shown in Diagrams 3, 4, 5 and 6. Phase four, the most difficult stage according to Roycroft (1988b), is "complex, fluid, lengthy and difficult". Black searches freedom, or a chance to reestablish the Kling-Horwitz configuration. White seeks to limit Black's freedom and ultimately is bound to push the black King to the edge of the board, near the corner, still accompanied by the Knight. In the fifth phase, the Knight has the options of leaving the King or staying in close proximity; the Knight is bound to be lost whatever the option exercised.

Thus matters stood early in 1992: games hinging on KBBKN had been played twice when aware of a faulty 1851 Kling-Horwitz analysis and analysed once in full awareness of Belle's correct and completely diverging results, though to little avail.

Against this background, the history of KBBKN was to have a chapter added to it on March 8-9, 1992. IGM Jan Timman played White against IGM Jonathan Speelman in round 10 of the Linares tournament. The game was adjourned in the position of Diagram 7. Clearly, Timman was able quickly to eliminate the two black Pawns against his last Pawn. Thus, from the adjourned position, the KBBKN endgame was to decide the game.

The sequence of events after the game was adjourned is described in Section 2. In Section 3, a computer-aided analysis is given of the second session of the game on March 9. In Section 4, the performance of the players is assessed, both from a computer standpoint, and the point of view of human players. Conclusions are mentioned in Section 5. A maximin variation of the first KBBKN position in the game is given in the Appendix.

2. THE SEQUENCE OF EVENTS

On the evening of March 8, Jan Timman was confronted by the position of Diagram 7, resulting from the moves listed below.

White: J.H. Timman

Black: J. Speelman

Linares, round 10.

1. d4 Nf6 2. c4 e6 3. Nf3 d5 4. Nc3 Nbd7 5. cxd5 exd5 6. Bf4 c6 7. Qc2 Be7 8. h3 O-O 9. e3 Ne4 10. Bd3 f5 11. O-O Bf6 12. b4 a6 13. Na4 Re8 14. Rab1 Nf8 15. Rfc1 g5 16. Bh2 Ng6 17. Nc5 h5 18. Nd2 g4 19. Nf1 Bh4 20. hxg4 hxg4 21. Nxe4 fxe4 22. Be2 Rf8 23. Ng3 Bd7 24. a4 Qg5 25. b5 axb5 26. axb5 Rxf2 27. Kxf2 Rf8+ 28. Ke1 Qxe3 29. Rb3 Qf2+ 30. Kd1 Qxd4+ 31. Qd2 Qxd2+ 32. Kxd2 Bg5+ 33. Kd1 Bxc1 34. bxc6 Bxc6 35. Kxc1 Rf2 36. Bf1 Nf4 37. Bg1 Ra2 38. Kb1 Ra8 39. Nf5 Rf8 40. Nh6+ Kg7 41. Bc5 Rd8 42. Nxc4 d4 43. Bb6 Rd7 44. g3 Ne6 45. Kc1 d3 46. Be3 Nd4 47. Rb2 Nf5 48. Bf4 Rd5 49. Kd2 Ra5 50. Ne3 Nd4 51. Bg2 Kf6 52. Nc4 Rc5 53. Nd6 Nb3+ 54. Ke3 Rc2 55. Nxe4+ Bxe4 56. Kxe4 Nc5+ 57. Kd5 Rxb2 58. Be5+ Kg5 59. Bxb2 Kg4 60. Bf1 b6 adjourned

It is clear that the adjourned position will convert quickly into the KBBKN endgame, in which Black can reach the Kling-Horwitz position in the g2 region. Recalling his experience with the unsuccessful analysis of Popovich's game, Timman decided to get in touch with Jaap van den Herik. He asked Van den Herik if he could send him as much material on the endgame as he had. Timman's hope was that the omniscience of the computer databases might teach him how to play the endgame well enough to defeat Speelman.

Van den Herik thus telefaxed over 40 pages of publications to Timman, such as Thompson and Roycroft (1983), Van den Herik and Herschberg (1987), Roycroft (1984, 1986a, 1986b, 1986c, 1988a) and Michie and Bratko (1987a). From then, it was up to the grandmaster to interpret the raw material (maximin position, optimal lines of play) and the conclusions by John Roycroft.

He held that he was now much more knowledgeable about this endgame than on the day before. As against this he also experienced some pressure on his now *having* to win, being instructed by the computer as he was. In the opponent's camp, IGM Nigel Short expressed himself trustful of Speelman's defensive capabilities,

predicting that Timman would not be able to exploit the 75 moves allotted to him to achieve a win. (We note that KBBKN is one of the endgames listed in article 10.9 of the FIDE rules, to which a 75-move rule instead of the normal 50-move rule applies.) IGM Nigel Short was most definitely off the mark: after 6 moves capturing the Pawns, only 25 moves sufficed to see Speelman resign.

Of course, this is not tantamount to proving that Timman had mastered the endgame, but it may be adduced as evidence that he had understood it rather better than had his opponent. After his win, Timman stated (quite fairly in our view) that he would not claim an ability to win the endgame against a computer program providing optimal counterplay. Such an opponent, he stated, would at least force him into a longer game, possibly even exceeding the 75-moves limit.

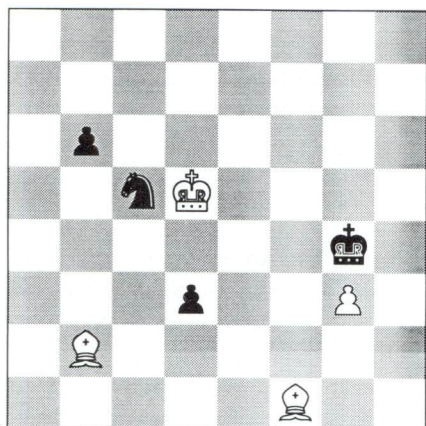


Diagram 7: The adjourned position.

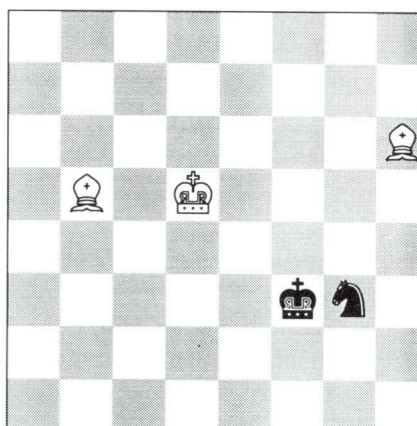


Diagram 8: Timman-Speelman after 66. Bxb5.

3. THOMPSON ANALYSIS

As stated before, the game resumed from the position of Diagram 7 led to Diagram 8 by the moves **61. Be5 Kf3 62. Bf4 d2 63. Bxd2 Ne4 64. Bh6 Nxg3 65. Bd3 b5 66. Bxb5** ending in a pure KBBKN endgame susceptible to analysis by the CD-ROM containing amongst others, that endgame's database as created by Thompson (1991).

For definiteness, we recall the five-fold graduation of White's aims as stated by Roycroft (1988b):

1. White lifts any constraints which may be imposed on him by Black; this may take up to 12 moves.
2. Black retreats, seeking refuge in one of the Kling-Horwitz positions; this phase may take up to approximately 8 moves.
3. White sets up one of the exits from the Kling-Horwitz position; Black is then forced out into the open; typically this phase lasts for 6 or 7 moves.
4. Black moves in an effort to gain full freedom of movement, to which he comes close were it not for White restraining him; White can and does prevent Black from achieving another Kling-Horwitz position; this may take some 23 moves.
5. The Knight is lost, regardless of whether it stays close to the King, or runs off. A dozen or so moves are required for a capture.

In the position of Diagram 8, neither of White's Bishops is under any constraint, nor can Black be prevented from reaching the Kling-Horwitz position in the g2 region. Therefore, White may skip phase 1 and can start with phase 2. Consultation of the database showed that this position can be won in 48 moves.

In the analysis of the following subsections we have included the distance to conversion or mate (DTC) in parentheses. The distance is defined as the number of white moves still to be made. Thus, an optimal white move will decrease the distance by 1. Suboptimal moves will not decrease or even increase the DTC. Optimal Black moves keep the DTC unchanged, while suboptimal moves decrease the distance.

All optimal moves are listed in square brackets, whether they are at variance with the text move or are merely equi-optimal with the text move, then necessarily among the optimal ones.

3.1. Phase 2: reaching a Kling-Horwitz position

In this phase, Black retreats gradually to a Kling-Horwitz position. Since the position can be achieved in all four quadrants, Black can make counterplay more difficult for his opponent by keeping his pieces centered as long as possible. White's errors, if any, may then be reacted to by a switch to another quadrant, lengthening the game.

66. ... Nf5! (48) [Nf5]

The best move. The Knight had to make at least three moves to reach g2. If Black would have made any other move, White can prevent his reaching g2. For instance, 66. ... Nh5 67. Ke5 impeding 67. ... Nf4. As a consequence, all other moves would have shortened the DTC by at least 23.

67. Bf8 (51) [Bg5 Bd2]

The Bishop should have stayed in control of the f4 square to prevent Black from setting up a *pseudo-fortress* with 67. ... Kf4 (see Diagram 9). Roycroft (1988b) defines a pseudo-fortress as a position with "summed distances" of 3 or 4 to two distinct Kling-Horwitz positions. The summed distance is the number of moves to be made with both the Knight and King to reach a Kling-Horwitz position. In Diagram 9, the distance to both the g2 and g7 Kling-Horwitz positions is just 3, explaining the long DTC of 51.

67. ... Ne3+ (47) [Kf4]

Apparently Speelman is not familiar with the pseudo-fortress concept. Since he does know the Kling-Horwitz concept, he is eager to play the Knight to g2 as quickly as possible. His play does shorten phase 2, though.

68. Kd4 (47) [Ke5]
68. ... Ng2 (46) [Nf5+]

This concludes phase 2 (see Diagram 10). Even though the black King is not on f2 or g3, it can reach these squares any time desired.

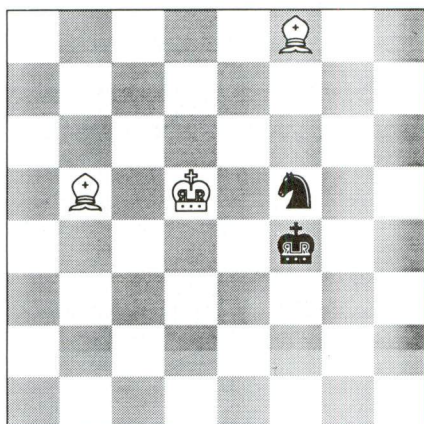


Diagram 9: A pseudo-fortress.

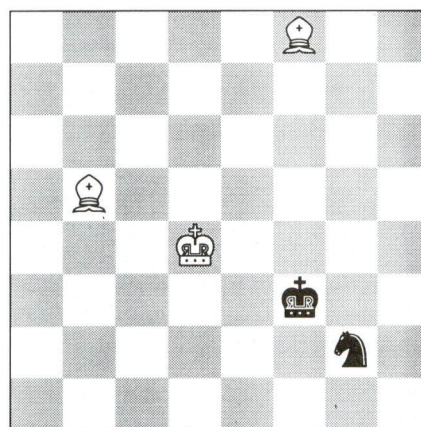


Diagram 10: End of phase 2.

3.2. Phase 3: extraditing Black from the Kling-Horwitz position

The Kling-Horwitz position has long been considered an impregnable fortress. Later, it was found that the fortress could be reduced, but it was then thought that the King driven out could, when thus forced into the open, reestablish the fortress in a symmetrically related position. Due to database research we now know that the fortress may be reduced and that a refuge in a similar fortress is not available. Accordingly, the aim of phase 3

is to expel the King from his fortress through known exits, characterized in advance.

69.	Kd3?	(53)	[Be7 Bd6 Bc5 Bb4 Bc6+]
-----	-------------	------	------------------------

69. Bc6+ is better. Speelman could have taken advantage of Timman's error by playing 69. ... Nf4+. Then White has five options, four of which are essentially different.

- A. 70. Kd2 or 70. Kc3 is followed by 70. ... Ke4 71. Bg7 Kd5 and the black King is centered; effectively White must start phase 2 all over again.
- B. 70. Kc2? Ne6! followed by 71. ... Nc4+ is a draw.
- C. 70. Kd4? Ne6+ is a draw.
- D. 70. Kc4 is White's best option as it prevents the black King from moving to d5. It can be followed by 70. ... Ke4 71. Bg7 Kf5.

However, Speelman seems anxious to stay in the Kling-Horwitz position.

69.	...	Nf4+	(53)	[Nf4+]
70.	Kd2		(56)	[Kc4]
70.	...	Ng2?	(44)	[Ke4]

Much better is 70. ... Ke4 71. Bg7 Kd5 72. Bb2 Kc5 73. Bf1 Ne6 74. Ke3 Kd5 75. Bg2+ Kc4 76. Bf6 Nc5, and Black has reached a pseudo-fortress. Speelman effectively does nothing, while Timman sets up the exit from the Kling-Horwitz position.

71.	Bc6+		(43)	[Bc6+ Be7]
71.	...	Kf2	(43)	[Kf2]
72.	Bd6		(44)	[Be7 Bc5+ Bb7]

This position resembles the fourth exit of the Kling-Horwitz position (see Diagram 6), although it has a somewhat longer DTC.

72.	...	Nh4!	(44)	[Nh4]
-----	-----	-------------	------	-------

The best move. Every other move shortens the distance to conversion or mate by at least 37 moves. In these cases the difficult phase 4 would have been skipped altogether.

73.	Bc5+		(43)	[Bc5+ Kd3]
73.	...	Kg3!	(43)	[Kg3]

73. ... Kf1 is bad in view of a tempo move along the white main diagonal. E.g., 74. Bd5 and now:

- A. 74. ... Ng2? 75. Bc4+ mate.
- B. 74. ... Nf5 75. Be6 Nh4 76. Bh3+ Ng2 77. Kd3 (see Diagram 11) and Black loses his Knight.
- C. 74. ... Ng6 75. Ke3 Ke1 (75. ... Nh4 76. Kf4) 76. Bc4 Nh4 77. Bb4+ Kd1 78. Be2+ Kc2 79. Bd3+ Kb3 80. Bd2 and the white King will capture the Knight in three more moves.
- D. 74. ... Nf3+ 75. Ke3 Ng1 76. Bb4 Nh3 77. Be7 Ng1 78. Bh4 Nh3 79. Kf3 Ng1+ 80. Kg3 Ne2+ 81. Kh2! (see Diagram 12) and Black loses the Knight: 81. ... Nf4 82. Bc4+ Ne2 83. Kh3.

74.	Bb6		(48)	[Kd3]
-----	------------	--	------	-------

Better is 74. Kd3 Ng2 (74. ... Kf4 75. Bd6+ Kg5 [75. ... Kf5 76. Bd7+ and the black King cannot move to e4] 76. Ke4) 75. Bb6.

74.	...	Ng2?	(40)	[Kf4]
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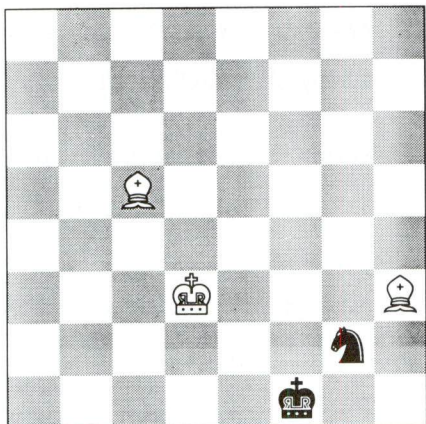


Diagram 11: Black is about to lose his Knight.

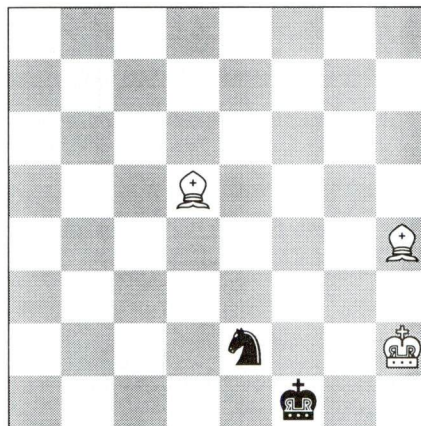


Diagram 12: Black is about to lose his Knight.

74. ... Kf4 is better: 75. Bc7+ Kf5 76. Ke3 Ke6 77. Ke4 Nf5 78. Bd5+ Kf6 79. Bd8+ Kg6 80. Ke5 Ng7 and Black has again reached a Kling-Horwitz position (see Diagram 13).

75.	Bd5	(41)	[Bc7+]
75.	...	(37)	[Nf4]

75. ... Nf4 prevents Ke2 and attacks the white Bishop. Black has nothing to fear from 76. Bc7. After 76. ... Kg4 77. Be4 Ne6 78. Bd6 Kg5 79. Ke3 Kf6 80. Bc2 Ng7 Black seems almost to have reached a Kling-Horwitz position, but the illusion is dispelled in two more plies.

76.	Ke2	(36)	[Ke2]
76.	...	(36)	[Kf4]

Black has been forced out of the Kling-Horwitz position (see Diagram 14), and cannot recuperate to a Kling-Horwitz position henceforth. This achieves the aims of phase three. The most difficult part, however, is still to come.

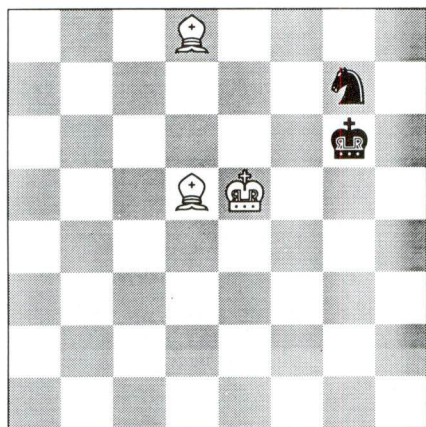


Diagram 13: Black reaches a Kling-Horwitz position.

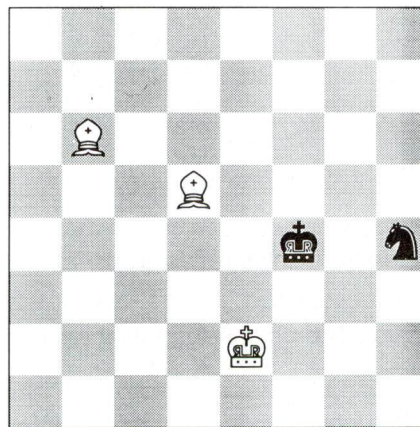


Diagram 14: End of phase 3.

3.3. Phase 4: trapping Black at the edge

In phase four, White must force Black to the edge, without allowing him to reach another Kling-Horwitz position. The notion of progress in this phase is quite difficult to define. Many pitfalls exist where all progress can be immediately lost by one inaccurate move.

77.	Bb3	(35)	[Bb3 Ba2 Bc7+]
-----	-----	------	----------------

77. ... Nf5 (33) [Ng6]

Black has set up a pseudo-fortress. In this case, however, careful white play can prevent Black from reaching the g2 or g7 Kling-Horwitz position. The white King can control g2, while the Bishops prevent the Knight from reaching g7 safely.

78. Bc7+ (32) [Bc7+]

Now Black cannot put the white King off-side by playing 78. ... Ke4 because the Knight is lost after 79. Bc2+.

78. ... Kg5 (31) [Kg4]

79. Be5 (30) [Be5]

An important move. It prevents Black from reaching the Kling-Horwitz position at g7 with 79. ... Ng7.

79. ... Kg4 (30) [Kg4 Ne7]

After 79. ... Kg6 White should play 80. Bc2+ to prevent Ng7.

80.	Bc2	(31)	[Kf2]
80.	... Ng3+	(29)	[Nh4 Ne7]
81.	Kf2	(28)	[Kf2]
81.	... Nf5	(28)	[Nf5]
82.	Bd1+	(27)	[Bd1+]
82.	... Kg5!	(27)	[Kg5]

The best move. After 82. ... Kh4 83. Bf6+ Kh3 84. Bd8 Ng3 85. Kf3 Black's position is cramped.

83.	Kf3	(26)	[Kf3]
83.	... Nh4+	(25)	[Ne7]
84.	Ke4	(24)	[Ke4]
84.	... Nf5	(24)	[Nf5]
85.	Ba4	(26)	[Bc2]

85. Bc2 is slightly better. It prevents 85. ... Kg6 by 86. Kf4.

85. ... Ne7 (22) [Kg6]

85. ... Kg6 is better: 86. Be8+ Kg5 87. Bd7 Ne7 88. Be6 Ng6 89. Bc3.

86.	Bd7	(25)	[Bc3]
86.	... Ng8	(25)	[Ng8]

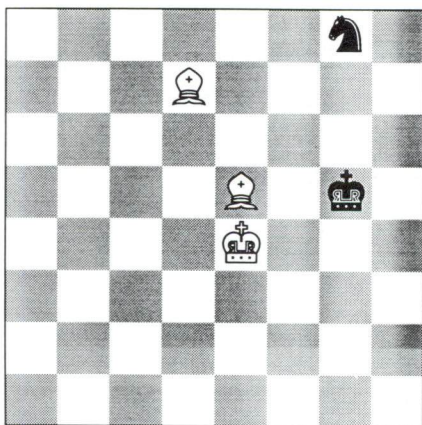


Diagram 15: Timman-Speelman after 86. ... Ng8.

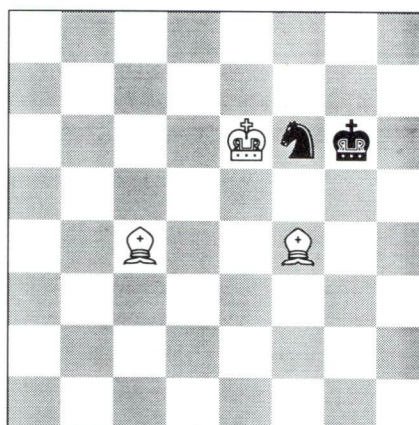


Diagram 16: Speelman resigns.

...	Kg7	(11)	[Ng8]
Bh5		(12)	[Bd3]

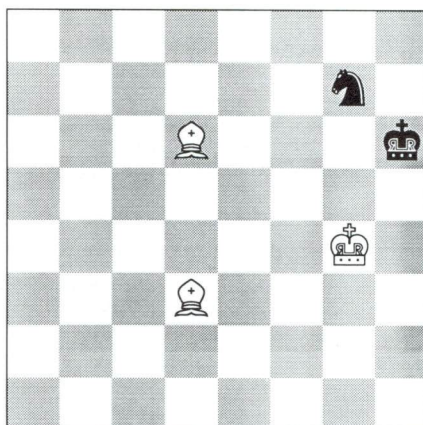


Diagram 17: Black is about to lose his Knight.

Better is 94. Bd3 Ng8 95. Bc3+ Kf8 96. Bg6 Nh6 97. Bh5 Ng8 98. Bd4 Nh6 99. Kf6 Ng8+ 100. Kg6 Ne7+ 101. Kh7 Nf5 102. Bc5+ Ne7 103. Kh6!.

94.	...	Ng8	(12)	[Ng8]
95.	Be3		(11)	[Be3 Bc3+]
95.	...	Nh6	(8)	[Nf6 Kh7]

Better is 95. ... Nf6 96. Be2 Ng8 97. Bd3 Nh6 98. Bd4+ Kf8 99. Bg6 Ng8 100. Bh5 Nh6 and the position after 98. ... Nh6 in the variation of 94. Bd3 above is reached.

96.	Bd4+		(7)	[Bd4+]
96.	...	Kh7	(7)	[Kh7]
97.	Be2?		(13)	[Kf6]

Much better is 97. Kf6 reaching the position after 100. Kf6 as in the maximin variation at the end of this section.

97.	...	Kg8?	(6)	[Kg6]
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Much better is 97. ...Kg6 98. Bf6 Ng8 99. Bd3+ Kh6 100. Bh4 Kg7 101. Bf2 Nh6 102. Bd4+ and the position after 98. Bd4+ in the variation after 95. ... Nf6 is reached.

98.	Kf6		(5)	[Kf6]
98.	...	Kh7	(5)	[Kh7 Kf8]
99.	Bd3+		(4)	[Bd3+]
99.	...	Kg8	(4)	[Kg8]
100.	Kg6		(3)	[Kg6]
100.	...	Ng4	(3)	[Ng4]
101.	Bg7		(2)	[Bg7 Be2 Bf5]
101.	...	Ne3	(2)	[Ne3]
102.	Be4		(1)	[Be4]

Black is mated on the next move.

The optimal defence for Black takes slightly longer than in the previous analysis. A maximin variation from the position of Diagram 16 is given below.

91. ... Ng4 92. Be2 (Bd2 Bb5 Bd5) Nh6 93. Bd2 (Bc1 Be3 Bd1 Bf3) Ng8 94. Be3 (Bb5) Nh6 95. Bb5 Ng8 (Ng4 Kg7) 96. Bd4 Nh6 (Kh5 Kg5) 97. Be8+ Kh7 98. Bh5 Ng8 99. Kf7 Nh6+ 100. Kf6 Ng8+ 101. Kg5 Ne7

102. Bf3 Kg8 103. Kf6 Nc8 104. Bc5 Kh7 (Kh8) 105. Bb7 (Bg4) Na7 (Nb6 Nd6 Ne7 Kh8 Kh6 Kg8) 106. Bxa7.

4. TIMMAN's AND SPEELMAN's PERFORMANCE ASSESSED

Let us first consider some statistics. The KBBKN endgame lasted 25 moves. Both grandmasters played several suboptimal moves. If they are classified as errors, the error rate is: Timman 10, Speelman 11. However, this is a crude assessment indeed. Let us analyse more closely then, say by the plans Roycroft recognized.

In phases two and three, moves 66 to 76, Timman made 7 suboptimal moves. Two of these, 69 and 74, would have meant major setbacks against a perfect adversary. Being a human adversary, Speelman responded once by a suboptimal countermove so that after the move incriminated the DTC decreased nevertheless. The Grandmasters' play may be loosely paraphrased as we grant that Timman deviated from optimality, but we know that Speelman also deviated, even more tellingly in return. The relatively large number of Timman's suboptimal moves in the first two phases seems to indicate that Speelman had the edge in that part of the game.

Turning to the fourth and most difficult phase, comprising fifteen moves, Timman played suboptimally (i.e., delaying the end) on three occasions, whereas Speelman hastened the end on six occasions.

Summarizing, one can fairly conclude that both players had concentrated on parts of the required strategy. Timman, for his part, had concentrated on building up the pressure to force Speelman out of the Kling-Horwitz position. In spite of three minor slips, the pressure was increased to the point of forcing Black into a breakdown. Speelman concentrated on achieving the Kling-Horwitz position. When he had found that a Kling-Horwitz position was not reachable, he abandoned his resistance.

By hindsight, it is doubtful whether Speelman and Timman met in a common challenge. Speelman was not a true competitor where Timman was weakest. Instead of resisting moves to confine him to the Kling-Horwitz position, he submitted to being confined. In some ways, the match was not therefore a challenge between equals and the question thus remains open whether Timman could have won the game against a perfectly playing omniscient program.

5. CONCLUSIONS

A few tentative conclusions are proffered.

- An endgame database, the results of which have been analysed by Roycroft, has enabled Timman to prepare a KBBKN endgame and to win it against Speelman.
- The conclusion must be qualified by finding that
 - in phases two and three Speelman offered little resistance, while
 - Timman's play in the fourth, most difficult and decisive phase was nearly perfect, this in spite of 40 percent of Timman's moves being suboptimal.
- In at least the present instance and, we expect, in many more instances to come, a grandmaster can fully rely on a second as knowledgeable as a database program when made fit for human consumption by a human expert.

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APPENDIX

A maximin variation (from Diagram 8):

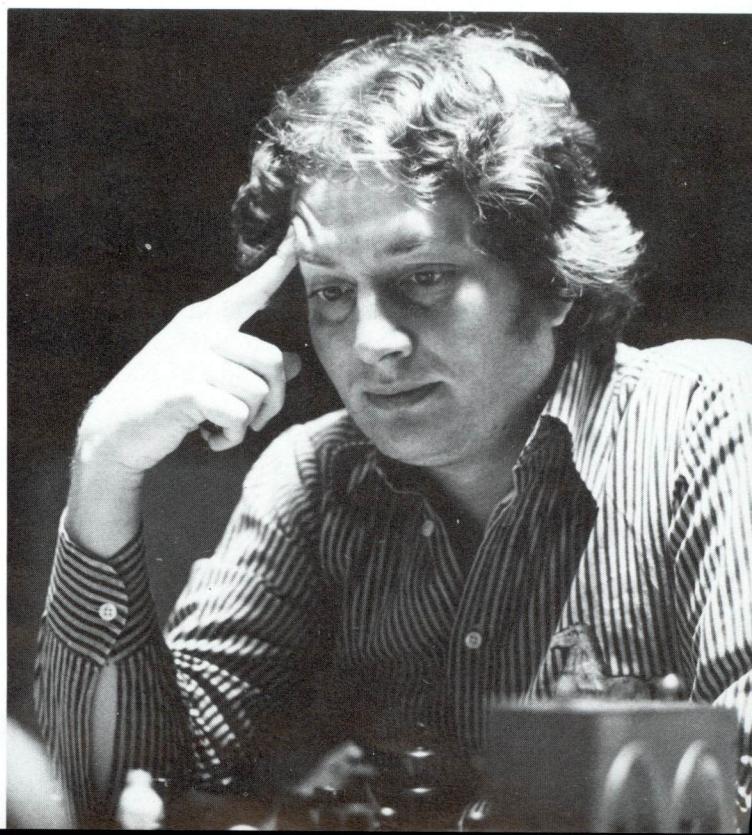
66. ... Nf5 67. Bg5 (Bd2) Ne3+ 68. Kd4 (Ke5) Ng2 69. Bc6+ (Ba4 Bc4 Bf6 Be7 Bd8) Kg4 (Kf2) 70. Bd8 (Bf6 Be7) Kg3 71. Bc7+ (Bb6 Ba5 Be7 Bf6 Bd5 Be4 Ke4 Kd3) Kf2 72. Kc3 (Bb6) Ne1 (Nh4) 73. Bb6+ Kg3 74. Kd2 Ng2 75. Bc7+ Kf2 76. Bd5 Nh4 77. Bb6+ Kg3 78. Ke2 Kf4 79. Bb3 (Bc7+ Ba2) Ng6 80. Bc7+ Kf5 81. Bc2+ Kf6 82. Bd8+ Kf7 83. Ke3 Ne7 84. Bb3+ Ke8 85. Bc7 Kd7 86. Bf4 Kc6 87. Kd4 Kd7 88. Bh2 (Bd1) Nf5+ 89. Ke5 Nd6 90. Bg3 Kc6 91. Bd5+ Kd7 92. Bf3 Nb5 93. Bf2 (Bf4 Bh4 Be1) Nc3 94. Be3 Nb5 95. Bh5 Nc7 96. Bd1 Na6 (Na8) 97. Ba4+ Kc7 98. Be8 Nb8 (Nb4) 99. Kd5 Nd7 100. Bf4+ Kd8 101. Bg6 Ke7 102. Bg5+ Kf8 103. Bf5 Ke8 104. Bg4 Nf8 105. Bh5+ Kd7 106. Bd2 Kc7 107. Ba5+ Kd7 108. Ke5 Nh7 (Kc8) 109. Bd2 Nf8 (Kd8) 110. Bb4 (Kf6) Nh7 111. Kf5 Kc6 112. Kg6 (Bg6 Be2) Kb5 113. Be7 Kc6 (Ng5 Nf6 Nf8+ Ka6 Ka4 Kc4 Kb6 Ka5) 114. Kxh7

Note that the position after 78. ... Kf4 actually occurred in the Timman-Speelman game, viz. after 76. ... Kf4.

GRANDMASTER JAN TIMMAN PUSHING HIS BRAINS.

A two Bishops' win made him second in Linares (1992).

Photo by courtesy of KRO broadcasting corporation.



BEFORE DATABASES

David Levy (DL)

Harry Nefkens (HN)

London, UK

Rotterdam, The Netherlands

1. TOURNAMENT PLAY (David Levy)

One of the most enjoyable tournaments of my chess-playing career was my first appearance in the Capablanca Memorial in Cuba, played in the resort of Cienfuegos in 1972. In an early round, I faced the Hungarian Grandmaster Levante Lengyel who kindly blundered a Pawn against me, allowing me to adjourn the game in a very promising-looking position. I analysed the adjourned position for many hours. It was quite clear that the game would soon come down to Queen and Knight versus Queen, but I could not find a forced win. The other Grandmasters in the tournament were eager to help me in order to reduce the chances of one of their Grandmaster colleagues, and hence enhance their own prospects of a high place. Donner, Platonov and Lein all tried to find a win in the KQNKQ ending but without success.

When the game resumed we duly reached KQNKQ, but soon Lengyel made a move which I had considered, during the adjournment analysis, to be non-optimal. Sure enough I managed to win the game.

But all this was long before Ken Thompson *et al.*, so I am now submitting this endgame to the scrutiny of the Thompson (1991) database so that we can find out whether the ICCA President-to-be (DL) and his Grandmaster opponent played as well as the database.

The game

For interested readers, we provide the first 66 moves of the game resulting in the position of Diagram 1.

Lengyel - Levy NiCKey HD 1.4

Cienfuegos, 1972

1.Nf3 f5 2.d4 e6 3.g3 Nf6 4.Bg2 Be7 5.O-O O-O 6.c4 d6 7.Nc3 a5 8.b3 Ne4 9.Bb2 Bf6 10.Qc2 Nc3 11.Bc3 Nc6 12.e4 fe4 13.Qe4 Qe8 14.Rae1 Qh5 15.Re3 Bd7 16.a3 Rae8 17.Qd3 b6 18.Rfe1 Ne7 19.h4 Nf5 20.Re4 Qg6 21.Rf4 Nh4 22.Qg6 Ng6 23.Rfe4 Re7 24.Bh3 Rfe8 25.Nh2 h5 26.f4 h4 27.Ng4 hg3 28.Nf6+ gf6 29.f5 ef5 30.Re7 Re7 31.Re7 Ne7 32.Kg2 Kf7 33.Kg3 f4+ 34.Kh2 Bh3 35.Kh3 f5 36.Kh4 Kg6 37.d5 c6 38.dc6 Nc6 39.Bd2 Nd4 40.Bf4 Nb3. Adjourned. 41.Bd6 Nd2 42.c5 Ne4 43.Bc7 bc5 44.Ba5 c4 45.Bb6 c3 46.Be3 Nd2 47.a4 Nb3 48.Bf4 Kf6 49.Kh5 Na5 50.Bc7 Nc4 51.Bf4 Na5 52.Bc7 Nc4 53.Bf4 c2 54.Kh4 Ne5 55.Bc1 Nc4 56.Bf4 Ne5 57.Bc1 Nd3 58.Ba3 Ke5 59.a5 Nc5 60.Kg3 Ke4 61.Bc1 Kd4 62.Kf4 Nd3+ 63.Kf5 Nc1 64.a6 Nd3 65.a7 c1Q 66.a8Q

The endgame

Diagram 1 contains the position in which the KQNKQ endgame starts. We first give the continuation as played in the game: 66. ... Qf4+ 67.Ke6 Qh6+ 68.Kd7 Qg7+ 69.Kc8 Qf8+ 70.Kb7 Nc5+ 71.Ka7 Qe7+ 72.Kb6 Nd7+ 73.Kc7 Ne5+ 74.Kb8 Qd8+ 75.Kb7 Qd7+ 76.Kb6 Nc4+ 77.Ka6 Qd6+ 78.Kb7 Qd7+ 79.Kb8 Qd8+ 80.Kb7 Nd6+ 81.Ka7 Qa5+ 82.Kb8 Qb6+ 0-1

For comment, I must needs switch to my co-author, HN.

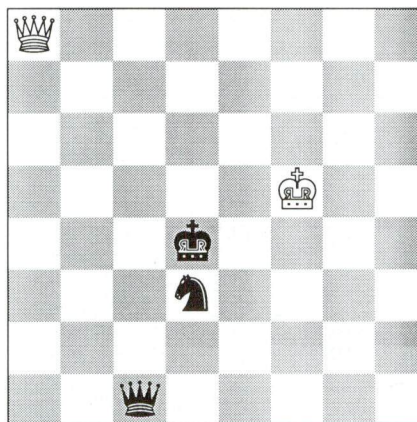


Diagram 1: Position after 66. a8Q.

2. ANNOTATIONS (Harry Nefkens)

It is only due to having Ken Thompson's (1991) CD-ROM available that I am able to comment upon the KQNKQ endgame sequence by DL as actually played.

Informed Comment

The simplest form of my comment is that starting from the position of Diagram 1, both contestants were far from optimality. As a reference, we pick up the position as continued from 66. a8Q. The omniscient database states that the position is won for Black with 14 moves to conversion. Our annotations take the form of stating the move played (the + for check being understood), followed by the distance to conversion in parentheses where applicable. This distance is computed as referred to what emerges after the move actually played.

When the comment in parentheses states 'draws!', it indicates that Black, the designated winner has allowed to degenerate his prospects of the theoretical value of the game to a mere draw. Move(s) after the semicolon in parentheses is/are optimal moves when the text move is not, and equi-optimal moves when the text move is optimal but one among several. As a rough indication of adhering to optimality the reader may be guided by a monotonous decrease (be it White's or Black's) of the number of moves to conversion: whenever this decreases by more than unity, the weaker side has given away moves; whenever this increases by whatever amount the stronger side is similarly at fault. The moves in square brackets are not played in the game.

66. ... Qf4 (13) 67. Ke6 (12) Qh6?? (draws!; Nc5) 68. Kd7?? (8; Ke7) Qg7?? (draws!; Nc5) 69. Kc8?? (5; Ke6) Qf8? (11; Qg8) 70. Kb7 (10) Nc5 (10) 71. Ka7 (9) Qe7? (16; Qf7) 72. Kb6 (15) Nd7 (15) 73. Kc7? (13; Kb7) Ne5 (13) 74. Kb8 (12) Qd8? (13; Qe8) 75. Kb7 (12) Qd7 (12) 76. Kb6? (8; Ka6) Nc4 (8) 77. Ka6 (7) Qd6 (7) 78. Kb7 (6) Qd7? (8; Qb4, Qb6) 79. Kb8? (4; Ka6) Qd8 (4) 80. Kb7 (3) Nd6 (3) 81. Ka7 (2) Qa5 (2) 82. Kb8 (1) Qb6 (1) [83. Qb7 (0) Qxb7 (0)]

With the database in hand, we may state that, of the 17 black and 16 white moves played, only 11 were optimal by both players. More specifically, it has been shown that Black (DL) blunderingly had relinquished its assumed win twice on moves 67 and 68. Black was saved by White's abandoning his potential draw by a compensating blunder, immediately restoring the winning potential to Black.

A truly optimal line

Acting on the information from the database, one can present an optimal, shorter line for Black to win, equi-optimal moves being within parentheses. 66. ... Qf4+ 67. Ke6 Nc5+ 68. Ke7 Qh4+ 69. Kf7 Qh7+ 70. Kf6 Ne4+ 71. Ke6 Qg6+ 72. Ke7 Qf6+ 73. Kd7 Qf7+ 74. Kc8 Qg8+ 75. Kb7 Nc5+ 76. Ka7 Qa2+ 77. Kb8 Qh2+ 78. Ka7(c8) Qc7+ 79. Qb7 Qxb7 mate.

Encyclopaedia of Chess Endings' Reporting

It is a rough indication of the near-impossibility of unconsisted human analysis, that this Lengyel-Levy endgame was published in the *Encyclopaedia of Chess Endings* (Matanović, 1989) with appropriate comment on the theoretical value of the position, but with four non-optimal moves. Below we give the *Encyclopaedia's* main variation.

66. ... Qf4 67. Ke6 Nc5! 68. Ke7 Qh4! 69. Kf7 Qh7 70. Kf6 Ne4 71. Ke6 Qg6 72. Kd7 Qf7 73. Kc8 Nd6 74. Kb8 Qe8 75. Ka7 Nb5 76. Kb7 Qe4 77. Kb8 Qe5 78. Kb7 Qd5 79. Kb8 Qd8 80. Kb7 Nd6 81. Ka7 Qa5 82. Kb8 Qb6

According to the database, only four moves out of the 33 decisions turned out to be non-optimal moves. These were

72. Kd7? (optimal is 72. Ke7; from a win-in-8 to a win-in-7)

73. ... Nd6? (optimal is 73. ... Qg8+; from a win-in-6 to a win-in-8)

76. ... Qe4? (optimal is 76. ... Qe7+; from a win-in-5 to a win-in-7)

78. ... Qd5? (optimal is 78. ... Qe7+; from a win-in-5 to a win-in-6).

A personal view

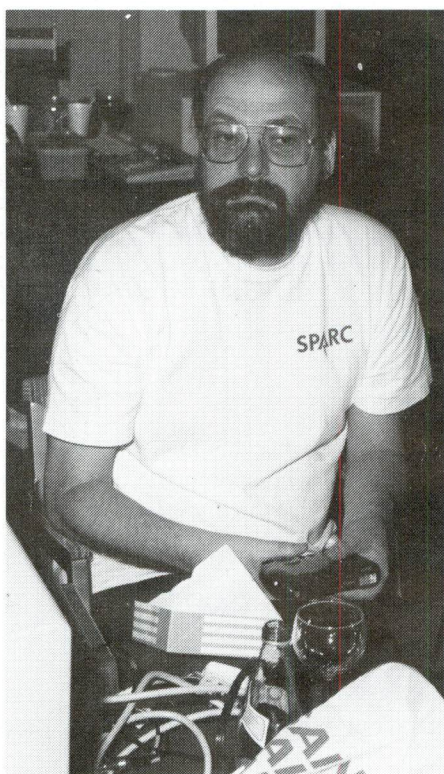
Injecting a personal note, I feel that both players performed poorly. I can substantiate this by having proved their blundering twice each. In mitigation, it may be stated that the *Encyclopaedia*, which could comment *a tête reposée*, deviated as often from optimality as the contestants blundered in the heat of the game.

3. REFERENCES

Nefkens, H.J.J. (1991). How to Win with a Knight Ahead. *ICCA Journal*, Vol. 4, No. 4, pp. 201-203.

Thompson, K. (1991). Chess Endgames Vol. 1. *ICCA Journal*, Vol. 14, No. 1, p. 22.

Matanović, A. (1989). *Enciklopedija Šahovskih završnica (Encyclopaedia of Chess Endings)*, Study 1403. Šahovski Informator, Beograd.



KEN THOMPSON,
the Bell Captain of the
CD-ROM endgame databases.



DAVID LEVY
corrected by Thompson's
omniscient CD-ROM.

Photos by Jos Uiterwijk.

THE SWEDISH RATING LIST

ICCA Communication

T. Karlsson and G. Grotting

Continuing our policy, this issue contains the latest version of the Swedish Rating List. All games were played at 40 moves in two hours by members of the Swedish Chess Computer Association (SSDF). As usual, '+ -' denotes the half-width of a 95% confidence interval on the rating, 'games' stands for the number of games on which the rating is based and 'against' stands for the average rating of opponents. By elementary methods wider (> 95%) or narrower (< 95%) confidence intervals may be derived by referring to Gaussian statistics.

#	Name	rating	+ -	games	win %	against
1.	Mephisto Lyon 68030 36 MHz	2259	59	250	84	1976
2.	Mephisto Portorose 68030 36 MHz	2245	47	342	82	1984
3.	Chess Machine Schröder 512K ARM2 16 MHz	2237	45	316	75	2045
3.	Mephisto Vancouver 68030 36 MHz	2237	75	107	68	2103
5.	Chess Machine The King 512K ARM2 16 MHz	2207	58	187	73	2034
6.	M. Chess 1.1-1.66 80486 33 MHz	2188	52	230	74	2006
7.	Mephisto Lyon 68020 12 MHz	2160	29	707	75	1973
7.	Mephisto Vancouver 68020 12 MHz	2160	51	288	81	1914
9.	M. Chess 1.1-1.66 80386 25-33 MHz	2136	38	373	67	2014
10.	Mephisto Portorose 68020 12 MHz	2128	28	724	74	1946
11.	Fidelity Elite 68030 32 MHz (vers. 9)	2127	44	324	75	1935
12.	Mephisto Vancouver 68000 12 MHz	2123	48	309	79	1898
13.	Mephisto Lyon 68000 12 MHz	2113	28	694	69	1977
14.	Mephisto Almeria 68020 12 MHz	2089	47	259	70	1940
15.	Fidelity Mach IV 68020 20 MHz	2086	31	554	65	1973
16.	Mephisto Portorose 68000 12 MHz	2049	28	662	67	1927
17.	Mephisto Polgar 6502 10 MHz	2042	42	283	59	1979
18.	Fidelity Elite 68000 x 2 (vers. 5)	2036	49	209	57	1986
19.	Mephisto Roma 68020 14 MHz	2033	28	677	68	1900
19.	Fritz 80386 25-33 MHz	2033	75	89	51	2025
21.	Rex Chess 2.3 80386 25-33 MHz	2029	68	114	60	1957
22.	Mephisto Almeria 68000 12 MHz	2019	32	534	67	1896
23.	Fidelity Mach III 68000 16 MHz	1999	16	1866	59	1937
24.	Zarkov 2.5 80386 25-33 MHz	1996	69	103	51	1986
25.	Mephisto MM 5 6502 5 MHz	1986	25	758	60	1915
26.	Novag Diablo 68000 16 MHz	1983	39	335	60	1915
27.	Mephisto Polgar 6502 5 MHz	1970	21	1100	52	1958
28.	Mephisto Roma 68000 12 MHz	1966	18	1399	57	1917
29.	Novag Super Expert C 6502 6 MHz Sel 5	1952	21	1064	51	1944
30.	Mephisto Academy 6502 5 MHz	1940	21	1091	50	1943
31.	Rex Chess 2.3 80386 16-20 MHz	1929	53	174	49	1935
32.	Mephisto Amsterdam 68000 12 MHz	1923	22	1020	58	1869
33.	Fidelity Excel Mach IIc 68000 12 MHz	1916	23	884	52	1902
34.	Mephisto Mega IV 6502 4.9 MHz	1914	20	1161	50	1913
34.	Saitek Maestro D 6502 10 MHz	1914	25	730	51	1904
36.	Mephisto MM 4 6502 5 MHz	1902	20	1165	53	1881
37.	Novag Super Expert B 6502 6 MHz sel 4	1900	35	394	56	1855
38.	Psion Atari 68000 8 MHz	1880	19	1338	46	1905
39.	CXG Sphinx Galaxy 6502 4 MHz	1878	21	1105	45	1915
40.	Saitek Turboking II 6502 5 MHz	1867	27	642	45	1899
41.	Conchess Plymate Victoria 6502 5.5 MHz	1861	28	600	42	1920
42.	Fidelity Par Excellence 6502 5 MHz	1825	23	871	51	1817
43.	Novag Forte B 6502 5 MHz	1812	24	837	44	1856
44.	Mephisto Super Mondial 6502 4 MHz	1810	21	1112	40	1882
45.	Conchess Plymate 6502 5.5 MHz	1806	16	1791	43	1859
46.	Saitek Simultano/Corona C 6502 5 MHz	1802	25	838	34	1920
47.	Saitek Turbostar 432 6502 4 MHz	1759	22	1005	45	1797
48.	Saitek Kasparov Blitz	1733	50	202	41	1795
49.	Novag Super Nova	1730	38	350	40	1798
50.	Novag Super Constellation 6502 4 MHz	1726	18	1558	36	1830
51.	Chessplayer 2150 Atari/Amiga	1711	78	93	36	1812
52.	Novag Super VIP	1682	58	174	32	1811
52.	The Final Chesscard 6502 5 MHz	1682	73	119	29	1835
54.	Mephisto Europa	1678	58	143	49	1683
55.	Chessmaster 2100 Amiga 68000	1675	85	100	25	1870
56.	Chess Champion 2175 Atari/Amiga	1669	62	157	30	1818
57.	Chessmaster 2000 Atari 68000 8 MHz	1651	45	312	25	1837
58.	Novag Constellation Primo	1632	58	149	44	1678
59.	CXG Super Enterprise	1557	39	386	28	1721
60.	Saitek Turbo S 24K	1468	108	75	21	1693

We repeat the announcement by Mr. Göran Grotting of his up-to-date service, offering Swedish Rating Lists (8 per year) for 120 SEK or alternate issues for 60 SEK. The equivalent in bank notes is also acceptable. If you go through Bank or Giro, please add 40 SEK to the amount stated, this being the equivalent of banking fees, so effectively rendering the payment net to the recipient. The lists will include all results and now cover 6 pages per issue. Dues are payable to SSDF, Swedish postal giro no 41 87 72 - 0, accessible through any bank. The information is based on about 300 tournament games each month. All other information may be obtained by writing to Göran Grotting, Diabasvägen 3, S 437 00 Lindome / Sweden.

CALENDAR OF COMPUTER-CHESS EVENTS

For the benefit of our readers who may wish to enter programs in future computer-chess competitions or to attend as spectators, we shall publish regularly a list of future events. Anyone who is planning to organize an event which should be listed in this calendar is invited to send full details to the Editor.

1992

May 20-27

The 1992 AEGON Man-Computer Tournament, to be held in The Hague, The Netherlands.
Details: Cock de Gorter, Valkenboskade 607, 2563 JE The Hague, The Netherlands.
[See also page 47 of this issue.]

August 5-11

The 4th Computer Olympiad and the 4th Conference on Computer Games, to be held in London, UK.
Details: David Levy, 44, Aylestone Avenue, London NW6 7AA, UK.
[See also pages 45-46 of this issue.]

November 23-27

The 7th World Computer Chess Championship, to be held in Madrid, Spain.
Details: David Levy, 44, Aylestone Avenue, London NW6 7AA, UK.
[See also below on this page.]

1992/1993

The 12th World Microcomputer Chess Championship.
Dates and venue to be announced.
[See also below on this page.]

The 1st Mind Sports Olympiad. To be held in the UK.

Details: Raymond Keene OBE, 15e, Queens Gate Place, London SW7 5NX, England or David Levy, 44, Aylestone Avenue, London NW6 7AA, UK.

THE 7th WORLD COMPUTER CHESS CHAMPIONSHIP

Madrid, Spain
November 23-27, 1992

The forthcoming 7th World Computer Chess Championship will take place from Monday, November 23, 1992 to Friday, November 27, 1992 (both inclusive). The sponsor of the event, DOXA s.a., is currently trying to organize a challenge match between the winning machine and a top-level human player (probably Karpov). Such a game, if agreed on, will be played on Saturday, November 28.

Additional information on this event and on the accompanying computer-chess workshop can be found in the previous issue of this Journal (Vol. 14, No. 4, pp. 236-237). Moreover, the June 1992 issue of the *ICCA Journal* will contain detailed information and an entry form. All inquiries should be addressed to David Levy, 44, Aylestone Avenue, London NW6 7AA / UK; Fax +44 81 4596422.

THE 12th WORLD MICROCOMPUTER CHESS CHAMPIONSHIP

There is not yet a definite offer to hold the 1992 World Microcomputer Chess Championship. There are currently three groups interested in organizing this event, one in Germany, one in Austria and one in Spain. As soon as definite information becomes available it will be circulated to last year's contestants and any others who we know will be interested. An announcement and entry form should appear in the June issue of this Journal.

THE AST COMPUTER OLYMPIAD and THE AST CONFERENCE ON COMPUTER GAMES

A Call for Papers and Computer Entries

London, August 5-11, 1992

The 4th Computer Olympiad will take place at the Park Lane Hotel, London, from August 5-11, 1992. The sponsor will be the computer manufacturer AST, who will also provide MSDOS computers for the use of a number of the contestants.

OLYMPIAD

The Computer Olympiad is a kind of Olympic Games for computers and computer programs. The programs will be playing against each other at a variety of well-known strategy games:

Awari	Cribbage	Go (9x9)	Renju
Backgammon	Dominoes	Go (19x19)	Reversi/Othello (r)
Bridge	8 x 8 Draughts	Go-Moku	Scrabble (r)
Chess	10 x 10 Draughts	Nine Men's Morris	
Chinese Chess	Gin Rummy		

Suggestions on games not listed above are willingly considered for inclusion. Competition is open to programs, both commercial and non-commercial, which run on computers at the tournament site.

CONFERENCE

The 4th Conference on Computer Games will take place alongside the Olympiad. Papers are invited on any aspect of programming "intelligent" games. Papers should ideally be 3,000 to 4,000 words in length, though papers of any length will be considered.

HOW TO ENTER

To enter a program in the Olympiad, send the registration form by mail or fax to David Levy at the address listed below.

For each non-commercial program an entrance fee of £ 60.- applies, while for commercial entries the entrance fee is £ 300.-, to be paid in full at the beginning of the Olympiad. Authors of programs can take part in the Conference without extra charge. Authors are encouraged to enter their programs as soon as possible, but not later than July 5, 1992. After that date an additional charge of 25% of the entrance fee will be applied.

To submit a paper for the Conference, contact David Levy at the address listed below. Contributors have free entrance to the Conference.

To register for the Conference send mail or fax to David Levy at the address listed below, containing your name and address. For the Conference an entrance fee of £ 60.- applies except where noted above.

ACCOMMODATION

The organization can arrange inexpensive accommodation for participants provided they let us know as soon as possible.

INFORMATION

Any additional information on the Olympiad and Conference can be obtained from:

David Levy
44, Aylestone Avenue
London NW 6 7AA
England
telephone: +44 81 459 2388
fax: +44 81 459 6422

Othello (r) is a registered trademark of the Anjar Company Inc. Scrabble (r) is a registered trademark owned in the United States of America by Selchow & Righter Company, New York, in Australia by Scrabble Australia Pty Ltds., and in most other countries by J.W. Spear & Sons PLC, Enfield, Middlesex, England.

THE 1992 AEGON MAN-COMPUTER TOURNAMENT

Cock de Gorter

The Hague, The Netherlands

The 1992 AEGON man-computer tournament will be held on May 20, 21, 22, 25, 26 and 27, 1992. On all competition days playing times will be from 7.30 to 11.30 p.m. local time. The location of the tournament will be the main office of AEGON, Mariahoeveplein 50, The Hague, The Netherlands.

This tournament is the 7th annual venture in its series. It is sponsored by the AEGON insurance company, and is now the 9th tournament, organized by Cock de Gorter in which man and computer meet on equal basis. Both the human and computer participants become stronger every year. The number of (human) grandmasters grew from one in 1989 (Ree), two in 1990 (Piket and Bronstein) and even six last year (Van der Wiel, Piket, Christiansen, Sosonko, Bronstein and Cifuentes). At the computer side, most notable competitors last year were Hitech and Microcomputer Chess Champion Chessmachine WK.

The provisional list of participants include:

Humans

IGM Bronstein, IGM Piket, IGM Vaganian, IGM Cifuentes and former draughts World Champion Jannes van der Wal.

Computers

Mephisto (WK), Mephisto Risc, Mephisto 68030, Fidelity 68040, Fidelity 68030, Chessmachine (WK), Chessmachine The King, Hitech, Novag Diablo, Novag Scorpio, Zarkov, Socrates, Heuristic Alpha, M_Chess, Nimzo, Quest, LChess, Kallisto, Dappet.

For more information, please contact

Cock de Gorter
Valkenboskade 607
2563 JE The Hague, The Netherlands

A TOUGH FIGHT IN THE AEGON TOURNAMENT 1991.

Tournament organizer Cock de Gorter (r) with Wil Sparreboom (The Chessmachine) watching the game M_Chess against IGM Larry Christiansen (USA).



Photo by courtesy of the AEGON insurance company.

ICCA CONSTITUTION AND BY-LAWS

The Board of ICCA

As stated three years ago, the ICCA will publish the Constitution and the By-Laws every three years in order to inform the ICCA members of the formal status of the Association.

The Constitution and By-Laws were first published in the *ICCA Newsletter*, Vol. 2, No. 2, pp. 18-19 as a proposal. They were approved at the first ICCA Triennial Meeting in Linz, Austria on Sunday, September 28, 1980, during the 3rd World Computer Chess Championship. The last published version appeared in the *ICCA Journal*, Vol. 12, No. 1, pp. 44-46. Accepted amendments since the first publication are noted below and documented in footnotes as necessary. As published here, the Constitution and By-Laws constitute a draft, to be ratified formally at the 1992 Triennial Meeting in Madrid, Spain. Proposed changes from the previously valid versions have been noted by angle brackets followed by the original text in parentheses. Additions to the valid version have been noted by a doubled pair of angle brackets.

CONSTITUTION

Article I: Name

The name of this organization shall be the International Computer Chess Association.

Article II: Object

The organization is a non-profit group devoted to providing an international framework for activities in computer chess and encouraging advances in this field.

Article III: Qualification of Members

Members in the ICCA are individuals<<, honorary members and institutional members>>.¹ <Individual membership> (Membership) is open to anyone interested in pursuing the objectives of the organization as stated in Article II, who makes application and pays current dues. <<Honorary and Institutional Membership shall be as set forth in the By-Laws.>>

Article IV: Officers and their Election

The elective officers, their terms <<of office>>, and their duties shall be as set forth in the By-Laws.

BY-LAWS

Article I: Membership

Section 1. General Membership. General Membership shall be as set forth in the Constitution.

Section 2. Honorary Membership. Honorary Membership may be awarded by vote at general meetings to any person who has especially aided the organization.

¹ By decision of the 1986 Triennial Meeting in Cologne, West Germany, Institutional Membership has been created next to individual membership (see *ICCA Journal*, Vol. 8, No. 4, pp. 207-208).

- <<Section 3. **Institutional Membership.** Institutional Membership can be granted following the request of an organization by the ICCA officers. In particular, chess organizations and computer organizations are eligible.>>

Article II: Meetings

- Section 1. **The World Championship and the Triennial Meeting.** The ICCA will hold a World Computer Chess Championship every three (3) years<, starting 1980>. (The first championship to be held under ICCA auspices will be in 1980.) The Triennial Meeting will take place during and at the site of the World Championship.
- Section 2. **Other Meetings.** Other meetings of the ICCA may be called from time to time to be held <concurrently> (concurrent) with and at the site of major international computer chess tournaments.
- Section 3. **Quorum.** A quorum at the Triennial Meeting will consist of at least twenty (20) members.

Article III: Officers

- Section 1. **Elective Officers.** The elective officers of the organization shall consist of a President, Vice-President and Secretary-Treasurer. They shall constitute the Executive Committee of the organization and shall be charged with the administrative affairs of the ICCA.
- Section 2. **Elections.** Elections for the members of the Executive Committee will be held at each Triennial Meeting, with elected officers taking on their duties at the end of that meeting. Nominations are to be made by petition no later than three (3) months before the elections. The *ICCA Journal*² will announce the candidates at least two (2) months before the election. At least five (5) <members'> (member) signatures are required on each nominating petition. All candidates for election must have been members of the ICCA for no less than two (2) years. Officers are elected by a majority of those present and voting <by> (, via) secret, written ballot. Runoffs will be held if no candidate receives a simple majority. The candidate with the least votes will be eliminated from the ballot for each runoff, until one candidate receives the simple majority.
- Section 3. **Terms of Office.** All members of the Executive Committee serve for a three-year term.
- Section 4. **Executive Committee.** The Executive Committee shall be presided over by the President.

Article IV: Standing Committees

- Section 1. **Chairmen.** Committee Chairmen are appointed for a three-year term by the Executive Committee.
- Section 2. **Standing Committees.** Standing Committees shall be the Publications Board, the Ranking Committee, the Tournament Organizing Committee, the Sanctioning Committee, the Program Rights Committee, the Standards Committee, and the Liaison Committee. <<These committees shall be convened by Council at its discretion as and when required.>>
- Section 3. **Publications Board.** The Publications Board will encourage the publication of technical and non-technical works on the subject of computer chess. The official publication of the ICCA shall be the *ICCA Journal*. <<The Triennial Meeting will appoint an Editor-in-Chief of the *ICCA Journal* to act simultaneously as the committee's chairman of the Publications Board.

2 The original text read "ICCA Newsletter", which has since changed its name. This substitution has been carried out consistently throughout the By-Laws.

The Editor-in-Chief shall be empowered to nominate Editors and editorial staff as he sees fit, subject only to the provision that Editors must be ICCA members. The Journal may accept acknowledged sponsoring. The Editorial Board is charged with ensuring that the *ICCA Journal* holds an acknowledged position in the roster of scientific publications. The Advances in Computer Chess Conferences are official ICCA events. The Publications Board is responsible for helping to arrange the publication of the Proceedings of the Advances in Computer Chess Conferences.>>

- Section 4. Ranking Committee.** The Ranking Committee will establish a rating or ranking system for programs and will rank and rate active programs.
- Section 5. Tournament Organizing Committee.** The Tournament Organizing Committee will assist local organizers to the degree necessary with ICCA-sanctioned events. This committee will organize the World Championship (see Article II, Section 1 of the By-Laws).
- Section 6. Sanctioning Committee.** The Sanctioning Committee will give formal ICCA recognition to appropriate events. It will also decide on the time and place of the World Championship subject to Article II, Section 1 of the By-Laws.
- Section 7. Program Rights Committee.** The Program Rights Committee will decide on matters related to the rights of an individual to use a given program in ICCA-sanctioned events.
- Section 8. Standards Committee.** The Standards Committee will look into the problem of developing program input/output to facilitate the automation of computer-chess match play.
- Section 9. Liaison Committee.** The Liaison Committee will seek to establish appropriate ties with other organizations. Any formal ties must be voted upon at the Triennial Meeting (see Article II, Section 1 of the By-Laws).
- <<Section 10. Rules Committee.** The Rules Committee will be responsible for updating existing rules of play at computer-chess events and for introducing new rules in accordance with experience gained from previous events.>>

Article V: Council

- Section 1. Council Membership.** The governing body of the ICCA shall be the Council. The Council shall consist of the President, Vice-President, Secretary-Treasurer and the Chairmen of the Standing Committees.
- Section 2. Council Organization.** The Council shall be presided over by the President.

Article VI: Dues and Finances

- Section 1. Annual Dues.** Dues will be fifty Dutch florins (Hfl. 50.-) or thirty US dollars (\$30.-) per year payable in advance. Dues are collected during the month of January.³
- Section 2. Disposition of Funds.** No part of the net earnings of the ICCA shall ever <accrue> (inure) to or for the benefit of or be distributed to its members, officers or private persons, except that the ICCA shall be empowered to pay reasonable compensation for services rendered, and to make payments and distributions in furtherance of the <express> (exempt) purposes for which it was founded.

3 The 1980 text here read "\$10.00" and "July". The latest amendment was approved in the 1989 Triennial Meeting in Edmonton, Canada.

Article VII: Amendment of the By-Laws

- Section 1. Presentation.** A request for changes to the By-Laws must be made by written petition of at least five (5) members. Petitions must be made no later than three (3) months before the elections. The *ICCA Journal* will announce the proposed amendments at least two (2) months before the elections.
- Section 2. Voting on Proposed Amendments.** Proposed amendments to the By-Laws will become a part of the ballot which includes those running for elected offices. All procedures for voting such a change are the same as for electing officers, except that two-thirds of the members voting and present must support the change.

Article VIII: Dissolution

- Section 1. Dissolution of the ICCA.** Upon winding up and dissolution of the ICCA, after paying or adequately providing for the debts and obligations of this organization, the remaining assets shall be distributed to a non-profit fund, foundation, or corporation whose purposes are consistent with the Object of this organization.

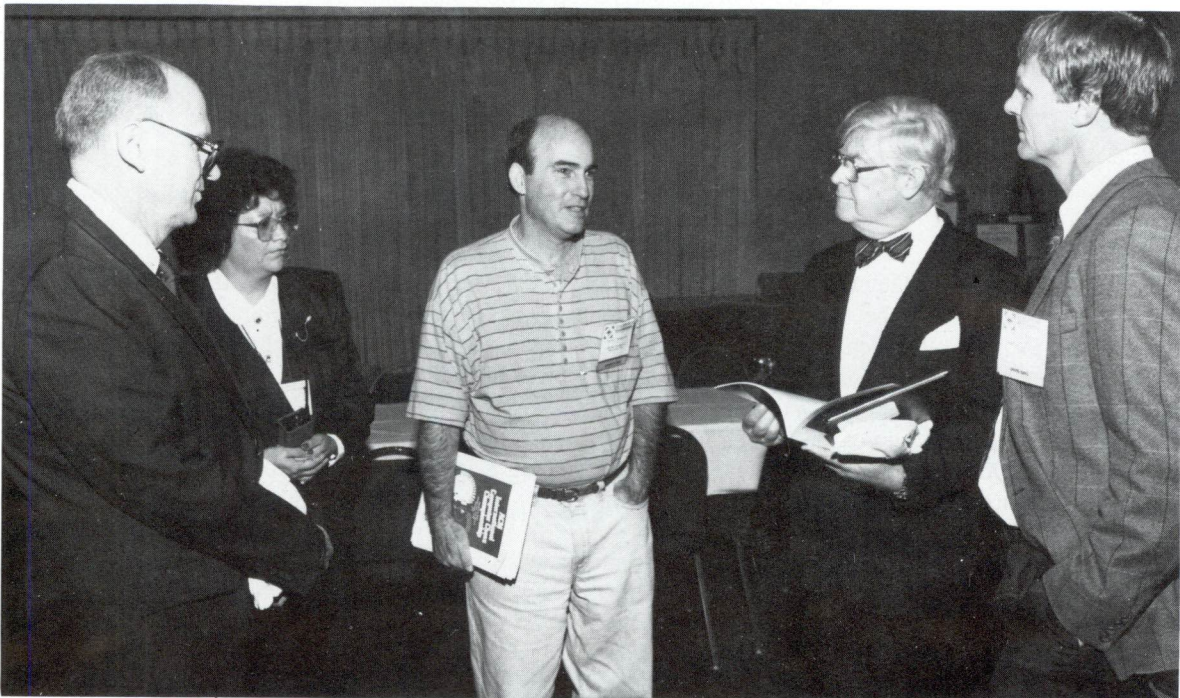
ICCA BOARD ELECTIONS

According to Article III, Section 2 of the ICCA By-Laws (see page 49 of this issue), elections for the members of the Executive Committee of the ICCA (i.e., for its President, Vice-President and Secretary-Treasurer) will be held at the Triennial Meeting during the 7th World Computer Chess Championship in Madrid (November 1992).

Nominations (each requiring at least the signatures of five ICCA members) are to be made by petition no later than three months before the elections. Please send nominations to the ICCA's present President or Vice-President (see inside front cover for addresses). The June issue of this Journal will contain a provisional slate of candidates.

A POTENTIAL ICCA BOARD ADVISOR?

D. Allan Bromley, the US Presidential Science Advisor, is introduced in the world of computer chess by our former President Monroe Newborn (Albuquerque, NM, November 1991).



* Terry D. Moore (9901 Blanda N.W., Albuquerque, NM 87114, USA, 505-898-8232) was ACM's photographer during the 22nd ACM tournament, November 1991.

Photo by Terry D. Moore.

HOW THE JOURNAL REACHES YOU

The ICCA Journal appears four times a year. In order to receive the 1992 Journals, you should subscribe as an ICCA member. The (renewal) fee is now Dutch florins (Hfl.) 50.--, or US \$ 30.-- for those residing in North America. This annual fee is valid for the year 1992 and has been confirmed for the period 1990-1992 at the Triennial Meeting in Edmonton, Alberta in June 1989. Below we discuss the *European* money-transfer possibilities.

We stress that the fee ought to be *net* to ICCA, that is, our credit booking, free of all banking charges. However well intentioned they may be, we often receive checks to the amount of Hfl. 50.-- (or equivalent) on which *we* are charged for banking fees (transfer commission or execution commission). Since these currently amount to a third of the subscription rate, they are unacceptable. Hence we stress that when remitting, you state the amount to be paid in Dutch guilders *net*. This can be effectuated most easily by sending us a Eurocheque or Postal Order (with charges to you). In any case, state the amount in Dutch guilders please.

Although there is a minor risk, we also accept banknotes forwarded to us by post delivery. It is a primitive but effective way of paying your dues and a perfect way of transferring your dues *net* and *free of all charges* to what is after all your own ICCA.

To sum up, the possibilities of paying the renewal fee are

(1) cash Hfl. 50.-- (2) Eurocheque Hfl. 50.-- (3) Direct Bank transfer Hfl. 65.-- (4) all other cheques Hfl. 70.-- all cheques to be made payable to Dr. J. Schaeffer or Dr. H.J. van den Herik **by name**.

For renewals or new subscriptions, US and Canadian readers are invited (for 1992) to remit US \$ 30.-- to:

ICCA
c/o Dr. J. Schaeffer
Dept. of Computing Science
University of Alberta
Edmonton / Alberta T6G 2H1 / Canada

European readers are invited (for 1992) to remit Hfl. 50.-- (or the equivalent) to:

ICCA Europe
c/o Prof. dr. H.J. van den Herik
University of Limburg/Dept. of Computer Science
P.O. Box 616, 6200 MD Maastricht / The Netherlands

ABN/AMRO BANK no. 45 07 90 878
The Postgiro account no. of the ABN/AMRO BANK Maastricht, Helmstraat is:
10 50 085

The address of the ABN/AMRO Bank, Helmstraat is:
P.O. Box 560, 6200 AN Maastricht / The Netherlands

Please include a correct statement of your mailing address. (We keep receiving payments without addresses!) Should your mailing label be erroneous or when changing residence, please return an amended label to Dr. Schaeffer or Prof. dr. Van den Herik as the case may require. Those using Eurocheques for their payment should make mention of their Europass number. Otherwise we are unable to cash the cheques.

While stocks last, back issues of the *ICCA Journal* as from Vol. 6, No. 3 (August 1983) up to Vol. 14, No. 4 are still available at US \$ 6.-- each, US \$ 20.-- for any four and US \$ 150.-- for the set up to Vol. 14, No. 4. Please order these as you would order or renew a subscription.

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Short contributions (2000 - 3000 words) are preferred.

Longer papers of striking originality and cogency may be considered, provided the authors consent to publication in instalments.

Please submit contributions and correspondence to:

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Intending contributors from the US or Canada are kindly requested to submit their copy to Professor Marsland.

Deadline for copy for the next issue is May 20, 1992. Please address all material to be reviewed, digested or abstracted, when in English, to Professor Marsland, when in other languages to Dap Hartmann M.Sc.

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TO: DR. D.A. BROMLEY

DATE OF
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SUBJECT: HE IS WRITING TO ASK PERMISSION TO USE DR. BROMLEY'S
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GIVEN AT THEIR FORUM.

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May 12, 1992

Dr. D. Allan Bromley
Assistant to the President for
Science and Technology
360 Old Executive Office Building
17th Street and Pennsylvania Avenue, NW
Washington, DC 20500

Dear Dr. Bromley:

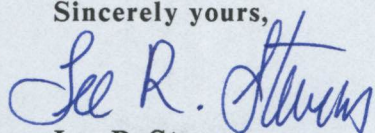
On behalf of all COA members, I would like to express our appreciation for the interesting and thoughtful presentation you gave at our 1992 Congressional Oceans Forum. The response from those who attended was exceptionally positive, and your participation played a significant role in the success of this event.

We have received many requests for transcripts and additional information on the 1992 Congressional Oceans Forum. With your permission, we would like to include your remarks in a printed compilation of all speeches given at the Forum. It is our intention to distribute this document, without charge, throughout the oceanographic community, to Members of Congress, and to others who request it.

Accordingly, I have enclosed a transcript of your remarks for your review and approval. We would like to begin publication of the compilation of remarks in early June, and would appreciate a response at your earliest convenience.

Thank you for your time and consideration.

Sincerely yours,



Lee R. Stevens
Staff Director
Council on Ocean Affairs

Enclosure

cc: Dr. Maynard

DR. D. ALLAN BROMLEY (OSTP)

Ladies and gentlemen, it is a pleasure to be here speaking to the Congressional Oceans Forum. As someone who began as an English major, then as an Electrical Engineer, and finally as a Nuclear Physicist, yet who can't swim, I have high regard for what you do.

It has become completely clear to me over the past few years that the oceans really are becoming vastly more important to this nation, that the awareness of that importance, the awareness of the challenges and opportunities that ocean science presents, are becoming much more widespread and much more appreciated.

One of the most important issues, of course, that I deal with is that of global change and the role of the ocean in global change. But, there are a great many other important questions, ranging from basic understanding of ocean phenomena, to resource management, the restoration of wetlands, coastal pollution, and it is quite clear that there are enough ocean problems out there to keep all of you gainfully employed for the foreseeable future, and in this day and age that is always a great thing to keep in mind.

First, I'd like to begin by emphasizing that the Federal government has been involved in marine and naval research for a very long time. From about 1838 to 1879, the Navy had a remarkable one man Office of Naval Research, a magnificent Swedish chap named John Erickson. He for example, was the first person who put iron armor plating on battleships. As a thirty year veteran of the Yale faculty, I find it somewhat difficult to understand why they called the ship the USS Princeton. Alas, that is the way these things go.

In any event, about 1840, Erickson decided that a self-respecting ship like the USS Princeton needed 12-inch guns, it didn't have any 12-inch guns. So the first recorded example of the Federal government going to the universities for a specific contract item was for this twelve inch gun. Erickson went to seven of the nation's major universities at that time, and to their engineering departments he said, "You design one of these guns. We'll build them made to your specifications, and if yours wins a shootout, then you'll get contracts and many other good things out of it." So, the nation's universities responded quickly, as they so do, and on a bright morning in 1845, the PRINCETON steamed out into Chesapeake Bay, the first gun tested, I believe, was that designed by the Navy itself. That gun exploded, and wiped out the Secretary of the Navy, the Secretary of State, the Governor of Maryland, three Congressmen, several Navy captains, and, as the newspaper reported, that also included "sundry other dignitaries." I think you'll agree that this is the sort of thing that can give technology a bad name.

However, there are a number of reasons for thinking that the ocean sciences are entering a period of increased potential support. Let me start out with the broadest possible of those reasons, and that is the Federal government's overall focus on research and development as an investment in our national future. This is a very important aspect of the Bush Administration's overall budgetary plans, as those of you who look at the most recent budget will recognize this. In the FY 1993 budget that we sent to Congress last week, research and development elements have been singled out for very special emphasis.

- o Basic Research is slated for an 8% increase.
- o Civilian Research and Development is expected to rise by 7%.
- o Basic Research supported within the Defense Department goes up by 3%, and Applied Research by 2%, even though the total Defense budget, as you know, is in the process of undergoing substantial reduction.

The President has proposed a Research and Development budget for the United States in FY 1993 of \$76.6 billion. This marks the fourth year in a row that research and development have received very special attention in the President's budget. If the President's 1993 proposals are enacted by the Congress, the conduct of Civilian Research will have gone up 43% since President Bush took office. Basic Research will have increased in support by 35%, and as result of these changes, our conduct of Civilian Research and Development through support of the Federal government has increased from a little less than .4% of the Gross Domestic Product in 1987, to a little more than .5% today. Now, these numbers may seem small, but \$76.7 billion, as Senator Dirksen pointed out, is real money.

Now, it is very important for me to emphasize that these increases that have been requested for research and development are being made at a time when, not only are we operating under the Omnibus Budget Reconciliation Act, which requires a zero sum game in constant dollars, but this year, as you heard in the President's State of the Union address, we are operating under a budget authority freeze. So, we are playing a zero sum game in total dollars, and that means that for the real increases that are requested for science and technology in the 1993 budget, we necessarily have to find other programs in the domestic discretionary component of the budget that we felt were less important, less pressing, and could therefore be cut back more thoroughly to make room for this increase, and a series of increases in support of research and development. I think that it is important to emphasize this because it is a measure of the importance the President attaches to this investment in our actual future. He is convinced that there is no better

investment in that future than through support of science and technology. So, I am extraordinarily pleased to be able to report this to you, and to be part of the process that has generated this particular budget.

Now, I think that it is important for me to mention one or two highlights. I am delighted to be able to tell you that the National Science Foundation is slated for an 18% increase. That keeps NSF firmly on its doubling trajectory by 1994. Important too, is the fact that we have been particularly conscious of the need to provide support for individual investigators - small groups of individual investigators. I have stated many times in the past that I am convinced, as are many, that they still constitute the heart, backbone, and strength of American science and technology. Each year as we put together a budget, we have to do a careful balancing between supporting our scientists and engineers in doing what they want to do today, as opposed to investing in the programs and facilities that will both define the frontiers of the field five to ten years downstream, and also provide the facilities to take these investigators to those new frontiers.

Over the last few years, there has been a tendency to let the balance drift a little, towards investment in the facilities and therefore, reduce the support of the individual investigator. Last year and this year, we have made a determined effort to redress that balance by requesting and getting last year, a little over 9% increase for the funding of the individual investigators. This year we have again requested just over a 9% increase for that particular purpose. But, I have to say that there is no way that we will ever be able to completely remove the pain that is out there in the scientific and technical community, and a simple demographic fact makes that very clear: 87.5% of all the scientists and engineers that have ever worked in the United States are alive and out there today writing proposals whereas less than 4% of the taxpayers are around to respond to them. This is the kind of fundamental disconnect that inevitably causes us problems. We do the best we can and, I think overall we have done well.

Let me take a particular example of interest to this group. The Ocean Sciences Division at NSF in the budget this year is slated for a 15% increase in funding. This works out to \$206 million, and within that total we have made particular emphasis for the support of individual investigators as part of our attempt to make sure that investigators at the nation's universities and research establishments have the support to enable them to do the primary research that has enabled them to really lead, worldwide, for a very long period.

One of the other important areas of emphasis within NSF, and

a number of agencies, is the coordinated program that we have developed to respond to the need to understand global climate change and global change in general. This is the fourth year in which the Committee on Earth and Environmental Sciences of the Federal Coordinating Council, a body that has the unhappy acronym of FCCSET, has coordinated the activities of, this year, nineteen different Federal Agencies, so that we were able to bring forward through OMB and to the President, one national program that will pertain to applied research rather than nineteen heterogeneous agency programs. I would like to pay tribute here to the remarkable degree of cooperation that has developed in these FCCSET crosscut programs where the agencies have really worked in a remarkably cooperative fashion to integrate and put together one program so that we can now say with confidence to the Congress, and through the Congress to the taxpayer, that we have a program that gets the maximum result for every dollar that the Congress finds it possible to make available for these programs.

In previous years, obviously you have noted that we have devoted substantial attention to programs in ocean sciences. Again this year, ocean science is the number two priority in the entire program. As you know, we have had some exciting results in the past year. For example, the prototype Heard Island experiment was extremely successful. It was the first step in developing a global acoustic network for reliable determination of very small but consistent temperature changes in the ocean. This may well be the way in which we will first be able to pick up an unambiguous signature for global warming.

In 1992, an eight month study on the development, spread, and decline of phytoplankton in the North Atlantic, was conducted as part of the Joint Global Ocean Flux Study, and this was a very important study because it is addressed directly to the base of the food chain. The objective of this study, which is determined on a global scale, records the developments along the different reservoirs in the earth system to determine and project the surface influence. This is a key part of the ongoing program that really has been pioneered here in the United States, to understand global systems interactions between the physical and biological performance of those systems. A change last year was our injection of yet another component into these studies, namely economics. Up until last April, economics had not really been a significant component of any international study of global change. The President's efforts firmly inject economics into this, and I believe without economics research that is pertinent to these problems, it literally is impossible to put together responsible policy options.

Now for the global change program as a whole, this year we propose an increase in funding by 24%. This brings the total up to \$1.37 billion, and this proclaims that we are spending roughly a factor of ten more on understanding global change phenomena

than any other nation.

The National Science Foundation's global change program is up by 50%, in NASA by 18%, and in NOAA by 66%. The influence of this program on the Ocean Sciences, as I think you will agree, is substantial. The Global Oceans Ecosystems program, the World Ocean Circulation Experiment, as well as the Joint Global Ocean Flux Study, are all continuing, are all making excellent progress, and are answering fundamental questions about the role of oceans in the entire geosphere/biosphere complex.

But, we have a number of other activities that go beyond these programs. The Committee on Earth and Environmental Sciences recognizes the importance of activities in our coastal ocean zone. They have just put together a subcommittee on U.S. coastal ocean sciences that will be headed by John Knauss, the director of NOAA, and our goal here is that of obtaining a particular understanding of what goes on in the widely important coastal regions. Coastal environments are some of the most productive ecosystems that we have, composed of coastal wetlands, mangroves, forests, salt marshes, coral reefs, seagrass beds, kelp beds. In the United States, it is worth noting that more than 50% of our entire population lives within fifty miles of the coast. So, there is a very special importance to what is going on in our coastal zone. I hope that our new focus in this area will turn out to be a significant one.

The Global Change Program also contains the Earth Observing System, a large component of Mission to Planet Earth. I must say that, as you noticed yesterday in the new information on the ozone situation, that the first satellite in Mission to Planet Earth, the Upper Atmosphere Research Satellite, launched September 12th of last year, is doing an absolutely phenomenal job, vastly beyond anything we could have anticipated. It has demonstrated in the most telling way, just how powerful observations with our instrumentation from space can be in understanding what happens on the surface of planets.

We have been fortunate too, that the planning for later stages of Mission to Planet Earth, namely the Earth Observing Satellite system, benefitted enormously from a review carried out during this past year by a Committee led by oceanographer Ed Frieman of the Scripps Institution of Oceanography. Ed's study of the EOS program has had a profound impact on that program, and has again demonstrated the importance of having first class, private sector input to the design and planning for major programs that would otherwise have to be crafted here inside the Beltway. It is vastly important that we get the validation and collaboration of scientists from the outside.

It is important to recognize that global change, like oceanography, knows no natural or political bounds. Thomas

Jefferson once said, in a somewhat different context, that the ocean, like the air, is a common birthright of mankind. That indeed remains true of all the places that are treating that birthright with all the care and attention it deserves.

It is also true that you have a field, like some others in science, that requires major and expensive facilities to take you to some of the frontiers in your field. You have been very adept at developing international cooperation to share the cost of some of those facilities, and a number of the other fields in international science have been learning from your experience and will continue to learn from it.

I myself feel that in field after field, we have reached the stage where the day of the "one nation will go it alone" syndrome are over, and the time has come when science must be much more internationalized than is now the case. Specifically, projects like the Superconducting Supercollider in this country, and the large hadron collider in Europe, if they were being started over again, as far as I'm concerned, would be started in entirely different ways. What indeed we should have done was to bring together the leaders in the fields involved, asked them what the real questions were that were most important to the field, what facilities were required to answer those questions, and then we could have decided what we needed to build, where we were going to build it, and how we were going to use it. This would give a much more equitable distribution of the facilities and a much more profound cooperation base than we have at the present time.

Now, I think that it is also true that we probably have to figure out new methods and mechanisms for participating in international science. We have gained a reputation, as many of you know too well, for being "unreliable partners." There are two reasons for that. The first is something intrinsic in the way we do business, and that is we have an annual budget cycle, and so our friends in Europe, Japan, and elsewhere, just simply don't understand what we are up to when each year we take back a program for discussion with the Congress, a program they thought has already been approved and funded a third time around. There is nothing we can do about that except try to educate our friends abroad that this is the way we do things. The second reason however, is that some agencies are remarkably insensitive to the need to borrow or collaborate for information. We intend to make substantial changes in programs that avoid collaboration.

So, in about a month, I am going to participate in the first OECD ministerial to be held since 1987, and I've arranged that the major agenda item at that meeting is going to be this question of international science, large projects in particular. I think that it may well be that we at some point may enter into something more like a treaty obligation, so that we are bound as a nation to participation for the entire cycle of the project

that we join, rather than having to renegotiate and refund on an annual basis.

We have been relatively successful in the past few years in building a base for international science. One of the fundamental differences that has occurred in the last few years is that, whereas in the past our international scientific agreements have almost always been from the top down, in other words, senior governmental officials decided what we were going to cooperate on and how, and how much money, and then it was divided up programmatically. What we've done more recently is to try to develop international science the same way we do our own science, namely from the bottom up, on the basis of proposals from individual scientists, and try to develop scientist to scientist relationships, and institution to institution relationships. One of the bits of evidence that this is actually working is that despite the remarkable political and structural changes that have taken place in the former Soviet Union during this past year, the relationships that were established on this institutional and individual basis have, to a remarkable degree, remained in place and have been given very high priority by the leaders of the Commonwealth of Independent States, who assure us that they are going to provide the funding that was negotiated over the past several years, and that these programs will maintain their momentum as in the past. This includes, of course, the Ocean Drilling activity, where just within the past year we were able to make arrangements to bring the Soviets, or former Soviets, back in as full-fledged partners. This is a challenge to maintain a strong, international scientific program, and it is one that I think we must meet.

It is also, I think, important for us as scientists, or for you as scientists -- I sometimes forget that I am now a bureaucrat rather than a scientist. I keep being reminded of the famous words of one of the giants in my field, Ernest Rutherford, who in one of his more testy moments said, "It is essential for men of science (today he would have said men and women of science) to take an interest in the administration of world affairs or else the professional civil servant will step in and then God help us." Your input into the activities of the Administration, the Federal government, and the Congress, is critical and in particular, your input to the Congress is especially important. I think that everyone in the ocean science community has a special responsibility in helping to emphasize to Congress the importance of responding to the President's requests because, after all, the President requests and proposes; it is the Congress that disposes and appropriates. So, I think that I have, over the past few years, seen a remarkable change in the willingness of one scientific group after another -- the physicists, the chemists, the biologists, the astronomers -- to not take their own case, because that is not productive, but to take their general concern for the health of American science and

American education, to Members of Congress, to their own Representative, to their own Senator, and such communication is enormously important. There is nothing that is more important in terms of ensuring that this country continues to play a leadership role in all fields of science and specifically, in ocean science.

And so, I think that I would have to conclude by saying that the title of this session I noted is, "Scientific Solutions in an Uncertain World." Of the kind of questions that arise to a Presidential level, science very rarely offers a complete solution. Science is a necessary element in the decision making process, but it is not a sufficient one, and it is important for us all to keep that in mind. Scientific input is one element in a complex mix of elements, and all of them are important as the Administration and the Congress make the kind of decisions that determine where we go in science and technology, and the role that science and technology can play to better the quality of life in this country, improving the state of our health, making us more economically independent and maintaining our security.

The work you are doing is enormously important, and as a closing note, I have a particular challenge that I would like to address to oceanographers and ocean scientists. It occurred to me awhile back that, when we decided to claim the 200 mile Exclusive Economic Zone, we claimed a substantially larger area than the Louisiana Purchase, and we had very little knowledge about what we got. It seems to me that is a very major national challenge that only you can answer. What do we have in the EEZ? So, among all of the other fascinating things that I'm sure you are looking at, I hope some of you will keep that in mind, and I look forward to hearing from you when you have an answer. It was a pleasure being here to talk to you. Thank you.