

Thorpe, 704 Beat Blackjack

By Jeff Levinger '63

Edward O. Thorpe, an instructor in MIT's Mathematics Department, has recently published preliminary results of a study on "A Favorable Strategy for Blackjack." Intrigued by the possible applications of probability and game theory to the standard gambling games, Thorpe has visited every major casino and numerous minor establishments in Nevada, over 80 in all. Those of lesser significance, or ones he has been unable to reach, have been researched with the aid of questionnaires. His extensive study of variations in rules and betting procedures in professional gambling haunts lends his added air of authority to his report, impressive on its own merits. Analysis of present variations shows a corresponding change in expectation of, at most, .005 from the theoretical figures.

Complex Model with Computer

Thorpe refers to an earlier study of blackjack which considered the game from the standpoint of independent trials, i.e., the player does not keep track of cards already used. Simplifying assumptions were necessary to keep the computations within the bounds of a desk calculator.

With the advantage of a high speed computer, it was possible to dispense with many of these approximations. The former value of player expectation (winnings) was — .62%, least unfavorable among current gambling games. The new result is — .21% for a one player game. In addition, the computer allowed consideration of unused sets of arbitrary composition of cards, thus making possible calculations on the basis of seen cards. The consequent dependent trial viewpoint "makes the determination of a winning strategy possible."

Strategy and Subsets

Certain subsets were investigated using the computer as to changes in expectation. When all cards of a given value are gone, expectation of the player can be radically altered. One pleasantly unexpected result was the information that when all the fives are gone, expectation rises to an extremely favorable 3.29%. The three pairs on either side of five (4-6, 3-7, 2-8) show relatively symmetric decrease in expectation, though all are favorable. Thus a player using this information would bet minimal amounts until, paying attention only to the chosen subsets, the expectation became strongly favorable. He then would wager the allowable maximum, with strong likelihood of success. The larger the ratio of allowable maximum-to-minimum bet, the closer the results will fit the theoretical projection. Though relatively infrequent, these subsets do provide winning strategies.

A strategy based on the proportion of tens remaining provides definite though small player advantage nearly half the time. Programming the computer to simulate actual blackjack play would enable more comprehensive strategies, applicable to the greater number of situations, to be evolved and investigated. Offers of assistance from experienced programmers would be welcome.

Profit-Piercing Probabilities

Widespread publicity followed the publication of the report, though blackjack-veteran reporters remain rather skeptical, even scornful. Offers of money and requests for the system have flooded Thorpe's mail. Offers of free room and board have come from Las Vegas casinos, where professionals are eager for anyone with the \$3200 that the system suggests offers \$10 hourly profit. With proper assurances, Instructor Thorpe may take a trip, and make a test which could force alteration of the time-honored rules of blackjack with modern mathematics.

UAP Candidates Uncommitted

Elections Scheduled for March 14

Elections for Undergraduate Association President and Class Officers for next year will be held on Tuesday, March 14. Besides the officers of the classes of '62, '63 and '64, the permanent officers for the class of '61 and the members of the Senior Executive Committee will be elected.

Those interested in running for either UAP or class officers must file their petitions with the Institute Committee by Friday, March 3. The forms for the petitions and detailed information may be obtained in the Litchfield Lounge of Walker Memorial.

Area Coaches Pick Tech Star to All-New England Team

Dave Koch, high scoring center of Tech's much-improved basketball squad, has been named to the All-New England first team by a vote of the coaches of the Greater Boston area.

The 6'4" junior from Wichita, Kansas, is currently the leading scorer in the Boston collegiate circuit with an average of 24 points per game and is among the top thirty scorers in the nation. Coach John Barry had been named coach of the week by the same group earlier in the season.



Dave Koch

As yet, no one has definitely announced his candidacy, but *The Tech* expects to receive statements from prospective candidates by next week. Among those names now being mentioned in student government circles as likely to run are: Frank Osha of Burton House; Juri Toomri of East Campus; Robert Huff, East Campus; Mike Jablow, Pi Lambda Phi; Ed Linde, Sigma Alpha Mu; and Joe Vittek, Sigma Phi Epsilon.

After electioneering starts, candidates will visit the various dormitories on campus to explain their stand on election issues. Elections will take place in the lobbies of Buildings 10 and 2.

Elections for Freshman Section Leaders will be held next week during the second or third meetings of the 21.02 classes. Posters will be up announcing these elections which will be run by a member of the Student Council.

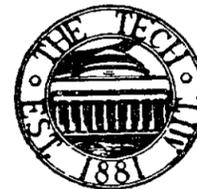
Group Investigates Small Businesses

A group known as the 1961 Business Search group is reversing the usual procedure of job recruiting. The group has organized to search out job positions in small companies throughout the U.S.

Members of the group are completing graduate courses leading to the M.S. degree in Industrial Management in June. They feel that a smaller company offers a better chance to use the varied tools of Industrial Management's diversified program.

The Tech Discloses Vol. LXXXI Board

At a special all-staff banquet on January 20th, *The Tech* made known the names of the newly elected Board of Directors of Volume LXXXI. This year's chairman, Linda G. Sprague, acting as master of ceremonies, announced the following new officers: Chairman, Charles Muntz '62; Managing Editor, Thomas Brydges '62; Editor, Carl Wunsch '62; News Editor, Edward Goldblum '63; Sports Editor, Sandy Wagner '61; Business Manager, Pete Thurston '62; Photography Editor, Curtiss Wiler '63.



Foundation Awards MIT \$475,000 For Center

The Carnegie Corporation of New York announced Monday the award of a \$475,000 grant to MIT for studies in connection with the Center for International Studies. The grant is to be used for research into the politics of transitional societies. The work deals with the problems encountered in "nation-building," particularly in the emerging nations in Africa and Asia.

The grant will facilitate enlargement of the graduate instruction and research in this field. Eight fellowships annually will include both professional and student research at the Center for International Studies. The members participating in this program will include sociologists, historians, economists, political scientists, and anthropologists.

Goldwater Lectures On Conservatism At Kresge Tonight

Republican Senator Barry M. Goldwater of Arizona will speak tonight at 8 p.m. in Kresge Auditorium in a free lecture presented by the Lecture Series Committee. Senator Goldwater is said to be the most outspoken proponent of the conservative school of government currently in the public eye. He is the author of the best-selling political work, *Conscience of a Conservative*.

The name of Senator Goldwater was placed in nomination in opposition to that of Vice-President Nixon for the Presidency, at the Republican Convention, and although he did not receive the nomination, his name appeared in the November election when unpledged electors from Louisiana cast their votes for him as Vice-President. Senator Goldwater's address will be titled "Principles of Conservatism" and is expected to be well attended.

In 1960 the Physical Plant consumed 1,668,466 gallons of oil; 26,160 kilowatts of electricity; 397,968,100 lbs. of steam; 267,281, 100 cu. ft. of gas and 3,375 cases of paper towels.

The existing programs in the Center will set the pattern for the expansion of the program. Work has been carried out on the economic development of India, evolution of Indonesian society in the postwar period, the structure of Burmese politics, and the economic and political development of the new African countries.

Part of the work is guided toward an improvement of United States policies toward these emergent nations. The Center is now doing work under the sponsorship of the Senate Foreign Relations Committee on the effects of American foreign policy.

MIT Offers Course On Arms Problems

Thanks to the efforts of Dick Stein '62 and Don Shakow '62, MIT now has a course on arms control, more formally known as "Problems of Armaments and Arms Control in the Context of the Present World Struggle." Last term, the movement to create such a course was begun by these two juniors, and as a result of their work, the Department of Economics and Social Science decided to offer an eight hour course on this subject. It will be taught by Professor L. P. Bloomfield who is associated with MIT's Center for International Studies and a former member of the State Department as well.

Enrollment of the courses was made available to anyone interested, as no prerequisites were required "other than a general knowledge of current events." Due to this, as well as to the fact that students from Harvard were permitted to enroll, the group taking this course will come from varied backgrounds.

The course will be centered about weekly seminars, with lectures by noted speakers arranged whenever possible. The two-hour weekly sessions will commence with a lecture by Professor Bloomfield, proceeding then to discussions with groups of six or seven, each group hopefully chaired by a faculty member.

Students Protest Rockwell



Many MIT students participated in the demonstration against Nazi picketing of the movie *Exodus* last month. See page 3 for story and more photos. — Photo by Curtiss Wiler '63