

Professional Development Final Report

Evolution of Sport: Dynamical Systems Perspective

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Arkansas Association for Health, Physical Education, Recreation, and Dance Convention

Hot Springs, Arkansas, November 3, 2006

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Education, Arkansas Tech University, Russellville, Arkansas 72801 or e-mail  
([sjackson@atu.edu](mailto:sjackson@atu.edu)).

B. Restatement of problem researched, creative work, or professional enhancement opportunity

The purpose of this program was to present how sport has evolved using the multidisciplinary perspective of Dynamic Systems. Historical, sociological, psychological, and biomechanical disciplines were included.

C. Brief review of the research procedure, creative work, or enhancement opportunity

Through an intensive review of the literature, the top athletes, significant sporting events, changes in equipment and techniques were identified. Using historical, sociological, psychological, and biomechanical perspectives, how and why these athletes, events, and/or equipment and techniques changed sport were theorized and presented.

D. Summary of findings or outcomes

Sport has evolved because of the impact of a variety of disciplines. Historical events (e.g., Title IX), sociological perspectives (e.g., Jesse Owens performances at the Berlin Olympics), biomechanical techniques (e.g., high jump), and technological advances (e.g., poles, bats, racquets) have all led to changes in who participates in sport, what is used to perform sport, and how sport is performed. Therefore, it was concluded that the Dynamic Systems perspective was supported.

E. Conclusions and recommendations

This program was presented in Hot Springs, AR on November 3, 2006 at the Arkansas Association for Health, Physical Education, Recreation, and Dance State Convention. A copy of the program page, slide presentation, presenter notes, and handouts are attached on the following pages.

FRIDAY, NOVEMBER 3

SESSION 6

9:00 - 9:50

LOCATION

#21 Student Section

*Captain's Quarters*

**Student Research Symposium** - Various students will present their research.

Presenters:

Presider: Bennie Prince

#22 Physical Education/Dance

*Lakeview Ballroom A*

**GeoFitness** Getting fit and having fun on GeoMats with new moves in hip hop, Latin dancing, kickboxing, children's games and more! (This is a repeat of Thursday's session)

Presenter: Ralph Santana, Orlando, Florida

Presider: Angie Smith-Nix

#23 General Division

*Lakeview Ballroom C*

**Evolution of Sport: Dynamical Systems Perspective** - This program will look at how sport has changed with regard to techniques, equipment, rules, and participants and the influence of biomechanics and society on these changes.

Presenter: Shelia Jackson, Arkansas Tech University

Presider: Valarie Hilson

#24 Athletics/Sports

*Clipper*

**Coaching the Parents of High School Athletes** - This program explains how to deal effectively with parents of high school athletes, and how to conduct a parent meeting.

Presenter: Mike Nelson, Bentonville, Arkansas

Presider: Christy Ralph

## Evolution of Sport: A Dynamic Systems Perspective

Shane Bauman  
Adjunct Professor of Biology



### Introduction

- When you were in high school...
  - How many people were on the BB court?
  - How were people high jumping?
  - What materials were racquets made of?
  - What was the size of the basketball?
  - Did you have varsity sports for girls?
  - Were your sports integrated?
  - Who was your favorite athlete?

### Dynamic Systems

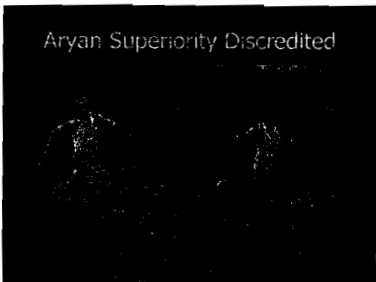
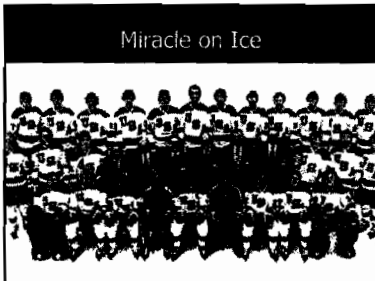
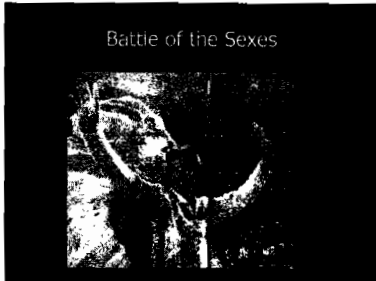
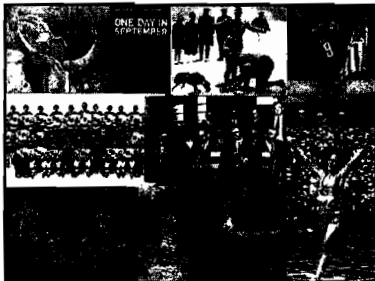
- A Multidisciplinary Perspective
  - Physics
  - Biology
  - Chemistry
  - Mathematics
  - Communication



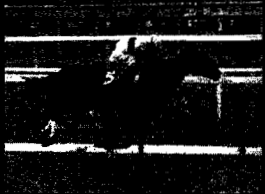




What, Where, and When?  
Major Events in Sport



July 6, 1975 Ruffian's Last Race



1936 Berlin Games Helene Mayer



August 6<sup>th</sup>, 1926, First Woman to Swim Across the English Channel



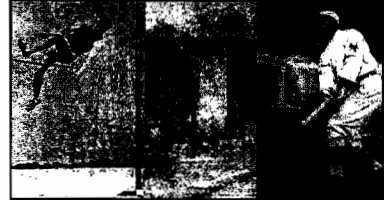
1975 Navratilova Defects



1976 Montreal 1<sup>st</sup> Perfect 10



Jim Thorpe



1984 L.A. 1<sup>st</sup> Women's Marathon Champion

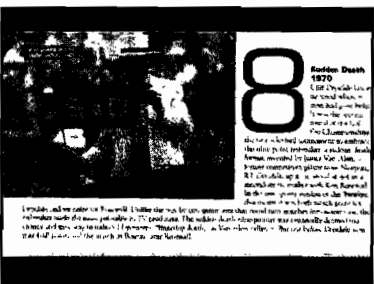
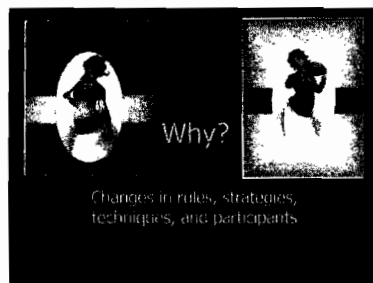
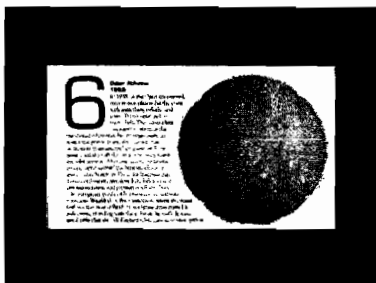
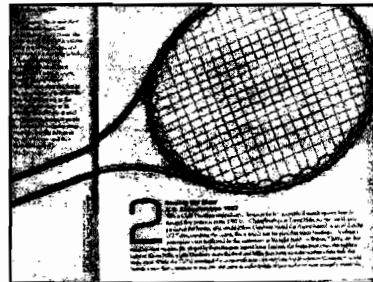
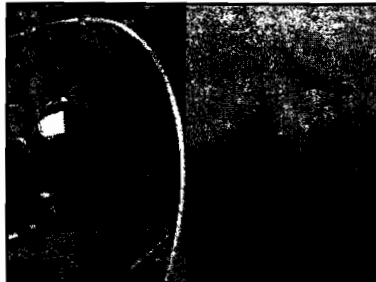
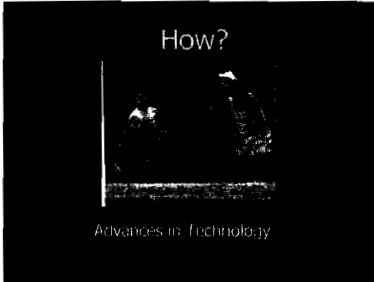


1968-1991

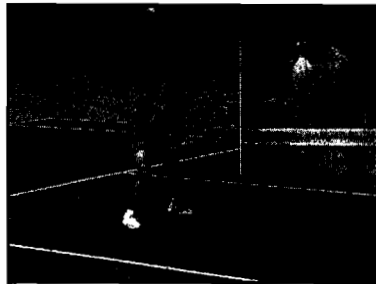


2004 Olympics Athens









1. **Evolution of Sport: A Dynamic Systems Perspective**

2. What made Bonnie Blair Such a phenomenal speed skater?  
How did Billie Jean King impact women's sport?  
What technique is best for high jumping and who came up with it?  
Can women overcome biomechanical disadvantages to pole vault and dunk?  
What athletes were way before their time in demonstrating the athletic abilities of women?  
What record stood untouched for 25 years and why?

3. **Introduction**

When you were in high school...  
How many people were on the BB court?  
How were people high jumping?  
What materials were racquets made of?  
What was the size of the basketball?  
Did you have varsity sports for girls?  
Were your sport integrated/  
Who was your favorite athlete?

4. **Dynamic Systems**

Magill (2007) defines the Dynamic Pattern Theory as “an approach to describing and explaining the control of coordinated movement that emphasizes the role of information in the environment and the dynamic properties of the body and limbs” (p. 95).

The purpose of this program is to present how sport has evolved using the multidisciplinary perspective of Dynamic Systems. Historical, sociological, psychological, and biomechanical disciplines will be included.

5. **Who? How many can you identify?**

In the following slides, you will see the top 50 male and female athletes as determined by Sport Illustrated for Women and ESPN.  
Many of these athletes were pioneers for developing specific techniques, bringing attention to their respective sports, or breaking gender and/or racial barriers.

Clockwise starting top left: Wayne Gretzky, Nadia Comaneci, Carl Lewis, Sonya Hennie, Greg Louganis, Althea Gibson, Eric Heiden, Joan Boinet, Jim Brown, Mia Hamm, Hank Aaron, and Teresa Edwards.

6. **Runners and Jumpers.**

Clockwise starting from the top left: Jesse Owens, Jackie Joyner-Kersey, Edwin Moses, Wilma Rudolf, Fanny Blanders-Koen, Wyomia Tyus, Carl Lewis, Mary Decker Slaney, Rafer Johnson, Joan Benoit, Florence Joyner, Grete Waltz and Babe Didrikson Zaharias.

7. **Tennis Players**  
Steffi Graff, Pete Sampras, Martina Navratilova, Margaret Court, Suzanne Lenglen, Chris Evert, Maureen Connolly, Billie Jean King, Bill Tilden, and Althea Gibson.
8. **Sliders and Gliders**  
Rosi Mittermaier, Lyubov Egorova, Eric Heiden, Wayne Gretsky, Bonnie Blair, Picabo Street, Gordie Howe, Mario Lemieux, and Bobby Orr.
9. **Figure Skaters**  
Sonya Henne, Tenley Albright, Katrina Witt, Peggy Flemming, and Dorothy Hamill.
10. **Gymnasts**  
Ogla Korbut, Nadia Comaneci, and Larissa Latyning.
11. **Soccer**  
Mia Hamm and Michelle Akers
12. **Golfers**  
Ben Hogan, Bobby Jones, Arnold Palmer, Mickey Wright, Nancy Lopez, Kathy Whitworth, and Jack Nicklaus.
13. **Men's Basketball**  
Larry Bird, Magic Johnson, Julius Erving, Bill Russell, Wilt Chamberlin, Abdul-Jabbar, and Michael Jordan.
14. **Women's Basketball**  
Ann Meyers, Teresa Edwards, Nancy Liberman-Cline, Cheryl Miller, and Anne Donovan.
15. **Swimmers**  
Gertrude Elderle, Amy Van Dyken, Pat McCormick, Mark Spitz, Mary Meagher, Dawn Frazer, Greg Louganis, Janet Evens, and Tracy Caulkin.
16. **Riders and Drivers**  
Lynn Hill, Julie Krone, Jean Driscoll, Susan Butcher, and Secretariat.
17. **Baseball Players**  
Babe Ruth, Joe DiMaggio, Hank Aaron, Lou Gehrig, Mickey Mantle, Willie Mays, Sandy Koufax, Ty Cobb, Ted Williams, and Jackie Robinson.
18. **Football Players**

Johnny Unitis, Jim Brown, Lawrence Taylor, Red Grange, Jim Thorpe, Jerry Rice, OJ Simpson, Walter Payton, Joe Montana.

19. **Boxers**

Jack Dempsey, Muhammad Ali, Joe Lewis, Rocky Marciano, and Sugar Ray Robinson.

20. **What? Where? and When? Major Sporting Events**

21. Each of these pictures depict a major event in sport.  
Can you identify what, when, and where each occurred?  
What impact did these events have on sport?

22. **Chicago Black Sox Scandal.**

1919 Series was fixed by eight players-  
Eddie Cicotte, Joe Jackson, Fred McMullin, "Swede" Risberg, Oscar (Happy) Felsch, Claude Williams, George (Buck) Weaver, and Arnold (Chick) Gandil.

Led to the reorganization of professional baseball and the first commissioner, Judge Kenesaw Mountain Landis of the United States District Court in Chicago. He banned the eight White Sox players from professional baseball for life.

23. **Battle of the Sexes**

1973 in the Houston Astrodome, Billie Jean King played and defeated Bobby Riggs 6-4, 6-3, 6-3.

24. **Miracle on Ice**

1980 Winter Games in Montreal, Canada  
The USA Olympic Hockey Team defeated the stronger, older, and more experienced European and Soviet teams to claim the gold medal.

25. **Dream Team**

**Many consider it the greatest team ever assembled, in any sport.**

The original Dream Team, the U.S. basketball team that won the gold medal at the 1992 Olympics in Barcelona, was a phenomenon on and off the court. Beating its eight opponents by an average of 44 points, the Dream Team was the first U.S. Olympic team to include NBA stars and gave fans a glimpse of basketball at its finest.

Since 1992, basketball has exploded in popularity around the globe, rising to a place where it truly challenges soccer's status as the world's most popular sport. Much of that is due to the impact of the Dream Team, which attracted fans and followers wherever it went.

Michael Jordan, Magic Johnson, Larry Bird, Charles Barkley, David Robinson, Patrick Ewing, Karl Malone, Scottie Pippen, Chris Mullin, Clyde Drexler, John Stockton, and the best college player of 1991-92 Christian Laettner.

26. **Aryan Superiority Discredited**  
“As if to discredit Hitler’s theory of Aryan superiority, the star of the 1936 Berlin Olympic Games was the black American, Jesse Owens winning gold medals in the 100-meter and 200-meter sprints, the long jump, and the 400-meter relay” (Spears and Swanson, 1978, p. 372).
27. **One Day in September**  
Munich, West Germany, Tuesday, September 5th, 1976- eleven members of Israel’s Olympic team and four Arab terrorists were killed in a 23-hour drama which began with an invasion of the Olympic Village and ended in a shootout at a military airport 15 miles away.
28. **July 6, 1975 Ruffian’s Last Race**  
As a two-year-old, Ruffian won each of her first five starts by an average of over seven-and-a-half lengths before her season was cut short by a hairline fracture in her right rear leg. Over the next year, she cruised to another five victories before facing her biggest challenge and, tragically, her downfall. On July 6, 1975, Ruffian was set for a match race at Belmont Park against Foolish Pleasure, a colt who had won the Kentucky Derby just two months earlier. In front of a national television audience of 18 million, she stumbled less than a half-mile into the race, shattering both sesamoid bones in her right foreleg.
29. **1936 Berlin Games Helene Mayer**  
In 1936, Helene Mayer was asked by the Nazi regime to return to her country to compete in the Berlin Games (the Nazis were trying to maintain the facade that Jews were not automatically barred from selection for the German national team and were lenient towards Mayer, who despite her Jewish decent, had two Aryan grandparents). Mayer won the silver in Berlin and even gave the obligatory "Heil Hitler" salute while on the winner's platform.
30. **August 6<sup>th</sup>, 1926, First Woman to Swim Across the English Channel**  
Before Ederle, then 19, set out to tackle swimming's Everest, only five men had successfully completed the Channel swim. On August 6, 1926, nearly one year after she was dragged from the same icy, gray waters during a previous attempt, Ederle plunged into the water at Cape Gris-Nez in France at 7:08 a.m. By mid-afternoon she was being pelted by wind, rain and heavy swells. The weather would force her to swim the equivalent of 35 miles to cover the 21-mile distance. She reached Kingsdown on the English coast at 9:04 p.m for a time of 14 hours, 31 minutes, shattering the existing record by more than two hours.  
This remarkable achievement often overshadows the fact that Ederle won three medals at the 1924 Paris Olympics: a gold in the 4x100-meter relay and bronze in the 100 and 400 freestyle.

31. **1975 Navratilova Defects**  
"I wanted my freedom." Navratilova's courageous move helped persuade repressive regimes to loosen the grip they held on star players lest they lose them altogether. Not long after, others, including the Czechs Ivan Lendl and Hana Mandlikova were free to live and play wherever they chose" (Tennis, 2005, p. 48).
32. **1976 Montreal 1<sup>st</sup> Perfect 10**  
When Nadia Comaneci dismounted from the uneven bars in the compulsory round, the scoreboard, lacking the space for the proper number of digits to display her perfect 10.00 score, could only flash 1.00. No gymnast had achieved numerical perfection until Comaneci scored seven 10s in winning five medals, including three golds, in Montreal Olympics.
33. **Jim Thorpe**  
He was voted "The Greatest Athlete of the First Half of the Century" by the Associated Press and became a charter member of the Pro Football Hall of Fame. Thorpe won the decathlon and pentathlon in Stockholm in the 1912 Olympics. Later that year, Thorpe scored 25 touchdowns and 198 points to lead an outstanding Carlisle Indian School team. That launched him toward a pro football career, highlighted in 1920 when he helped found the American Professional Football Association.  
He was stripped of his gold medals in 1913 after it was discovered he had violated amateur rules by being paid to play minor league baseball in 1909 and 1910. Attempts to have the medals returned were not rewarded until 1982, almost 30 years after Thorpe's death.
34. **1984 L.A. 1<sup>st</sup> Women's Marathon Champion**  
In winning the first Olympic marathon for women (in fact, the first race longer than 1,500 meters for women in the Games), Samuelson became a pioneer for the ages.
35. **1968-1991**  
Before Beamon's leap, the farthest long jump had been 27 feet, 4<sup>3</sup>/<sub>4</sub> inches. Jesse Owens had set a record of 26-8<sup>1</sup>/<sub>4</sub> in 1935 that had held up for 25 years. In one jump, Beamon stretched the record by one foot, 9<sup>3</sup>/<sub>4</sub> inches. It was a record Beamon would keep for almost 23 years, until Mike Powell hit 29-4<sup>1</sup>/<sub>2</sub> on Aug. 30, 1991 at Tokyo.
36. **2004 Olympic Athens**  
**Title IX**, is a 37-word law enacted on June 23, 1972 that states: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance." [1]

If you watched the 2004 USA Women's Olympic team play in Athens, you'll no doubt remember the numerous references the announcers made that this was the first group of women who had gone through the public school system with the full benefits of Title IX.

37. **How? Advances in Technology**
38. Pole Vaulting – wood to graphite poles greatly increased the height of jumps
39. Tennis Racquets – wood, steel, aluminum, graphite, etc. New materials, head size, and length of racquets
40. Football helmets and Pads
41. Tennis balls – yellow tennis balls replaced white ones because they were more easily seen on TV
42. Why? Changes in rules, strategies, techniques, and participants
43. Tie Breakers in tennis were introduced to speed up the game
44. High Jump Techniques
45. Pole vaulting techniques
46. Hands on blocking in football has greatly increased the number of passes
47. Net play – with the new and powerful high tech racquets, tennis players play much further back from the net than when racquets were made of wood
48. African Americans  
Josh Gibson- 84 homeruns in one season, 800 career homeruns, died 3 months before Jackie Robinson's debut with the Dodgers.  
Joe Lewis-Joe Louis was the first African-American to achieve hero worship that was previously reserved for whites only. When "The Brown Bomber" avenged his loss to Germany's Max Schmeling -- viewed as a Nazi symbol -- the entire country celebrated, not just African-Americans. Twice he donated his purse to military relief funds. His championship reign, from 1937 until he retired in 1949, is the longest of any heavyweight. The 6-foot-1½ fighter defeated all 25 of his challengers, another record  
Jackie Robinson-Robinson's debut for the Dodgers in 1947 came a year before President Harry Truman desegregated the military and seven years before the Supreme Court ruled desegregation in public schools was unconstitutional.  
Charles Tarzan Cooper was drafted by the Boston Celtics in 1950 who was then playing for the Harlem Globetrotters

Arthur Ashe-late sixties and early seventies, the only black American in the first rank of professional players

Kenny Washington with Woody Strode joined the Rams in 1946

New York Rens- professional black basketball team

Althea Gibson-The first African-American to win the Wimbledon singles title (she did it twice, in 1957 and 1958), she also won the French Open and U.S. Open singles titles.

49. Women in nontraditional sports
  - Manon Rheaume – ice hockey
  - Michelle Snow - dunking a basketball
  - Stacy Dragila – pole vaulter
  - Julie Krone - jockey
  - Ila Borders – baseball pitcher
  - Susan Butcher – dog sled driver
  - Shirley Muldowney – race car driver
50. Lifetime participants in sport
51. Thank you!



## 50 Greatest Female Athletes

[http://sportsillustrated.cnn.com/siforwomen/top\\_100/1/](http://sportsillustrated.cnn.com/siforwomen/top_100/1/)

1. Jackie Joyner-Kersey
2. Babe Didrikson Zaharias
3. Billie Jean King
4. Sonya Henne
5. Martina Navratilova
6. Chris Evert
7. Bonnie Blair
8. Wilma Rudolf
9. Nadia Comaneci
10. Tracy Caulkins
11. Florence Griffith Joyner
12. Mia Hamm
13. Nancy Lopez
14. Steffi Graff
15. Cheryl Miller
16. Margaret Court
17. Mary T. Meagher
18. Oglá Korbú
19. Peggy Flemming
20. Joan Benoit
21. Dawn Frazer
22. Teresa Edwards
23. Julie Krone
24. Ann Meyers
25. Jean Driscoll
26. Fanny Blanders-Koen
27. Mickey Wright
28. Maureen Connolly
29. Janet Evens
30. Althea Gibson
31. Mary Decker Slaney
32. Dorothy Hamill
33. Suzanne Lenglen
34. Lyubov Egorova
35. Kathy Whitworth
36. Larissa Latynina
37. Grete Waltz
38. Katarina Witt
39. Amy Van Dyken
40. Michelle Akers
41. Pat McCormick
42. Gertrude Ederle
43. Wyomia Tyus
44. Nancy Liberman-Cline
45. Picabo Street
46. Anne Donovan
47. Tenley Albright
48. Lynn Hill
49. Rosi Mittermaier
50. Susan Butcher

- A. figure skating
- B. diving
- C. basketball
- D. golf
- E. track and field
- F. tennis
- G. swimming
- H. horse racing
- I. rock climbing
- J. skiing
- K. dogsledding
- L. gymnastics
- M. cross country skier
- N. wheelchair racer
- O. soccer
- P. speed skating
- Q. distance running

## Top 50 N. American male athletes of the century

<http://espn.go.com/sportscentury/athletes.html>

1. Michael Jordan
2. Babe Ruth
3. Muhammad Ali
4. Jim Brown
5. Wayne Gretzky
6. Jesse Owens
7. Jim Thorpe
8. Willie Mays
9. Jack Nicklaus
10. Joe Louis
11. Carl Lewis
12. Wilt Chamberlain
13. Hank Aaron
14. Jackie Robinson
15. Ted Williams
16. Magic Johnson
17. Bill Russell
18. Ty Cobb
19. Gordie Howe
20. Joe DiMaggio
21. Sugar Ray Robinson
22. Joe Montana
23. Kareem Abdul-Jabbar
24. Jerry Rice
25. Red Grange
26. Arnold Palmer
27. Larry Bird
28. Bobby Orr
29. Johnny Unitas
30. Mark Spitz
31. Lou Gehrig
32. Secretariat
33. Oscar Robertson
34. Mickey Mantle
35. Ben Hogan
36. Walter Payton
37. Lawrence Taylor
38. Sandy Koufax
39. Julius Erving
40. Bobby Jones
41. Bill Tilden
42. Eric Heiden
43. Edwin Moses
44. Pete Sampras
45. O.J. Simpson
46. Rocky Marciano
47. Jack Dempsey
48. Rafer Johnson
49. Greg Louganis
50. Mario Lemieux

- A. Baseball
- B. Football
- C. Track/Field
- D. Basketball
- E. Tennis
- F. Boxing
- G. Hockey
- H. Golf
- I. Horse Racing
- J. Swimming/Diving
- K. Speed Skating