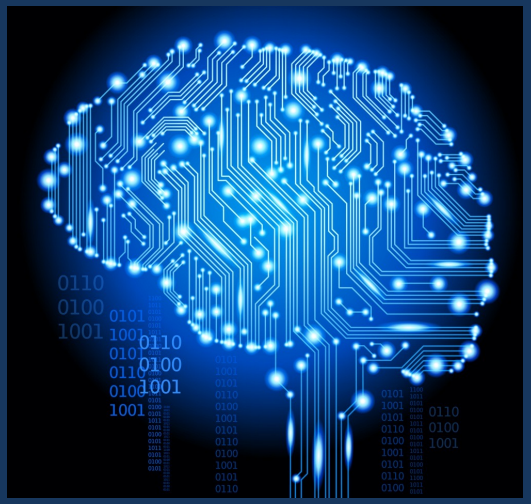
The Effect of Percentage of Attack and Defense Value on Chess Computer Performance

Winter (2012) – Spring (2013)

Kevin Huang



Outline

- Introduction
  - ❖Chess and Computers
- Experimental Design
  - ❖Hypothesis, Materials, and Procedures
- Data Analysis
  - ❖Results and Interpretation
- Conclusion
  - ❖Significance, Application, and Future Direction
- Acknowledgements

Chess and Computer

- Overview
  - Principles of Chess
  - Style/strategy: Attack vs. Defense
- Computer Chess vs. Human Chess
  - Calculation and Stability
  - Strategy and Pattern recognition
- Artificial Intelligence
  - Decision-making and Problem-solving

Hypothesis

If the computer has more attack value, than the computer will perform stronger than the same computer that has more defense value.

Materials

- 1 computer (Windows XP)
- 1 computer software - Chessmaster 3000
- Data collection tools (varies)

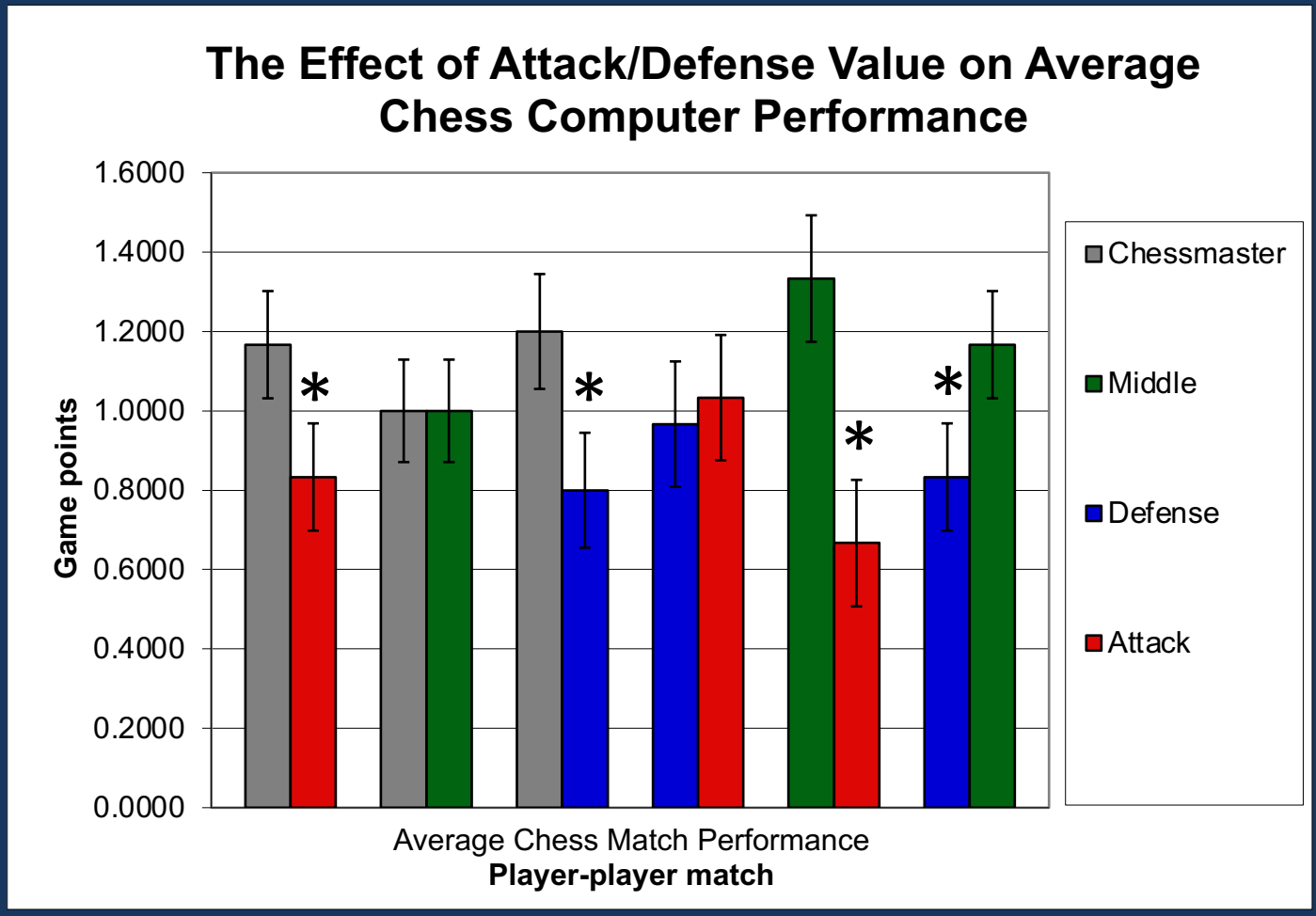
Procedures

1. **Create 3 players of different general-playing styles:**
   - Attack (100% Attack)
   - Middle (50% Attack and Defense)
   - Defense (100% Defense)
2. **Play each of the computer settings against a software default for 15 two-game matches**
3. **Play each setting against each other for 15 two-game matches**
4. **Analyze the results of all the trials**

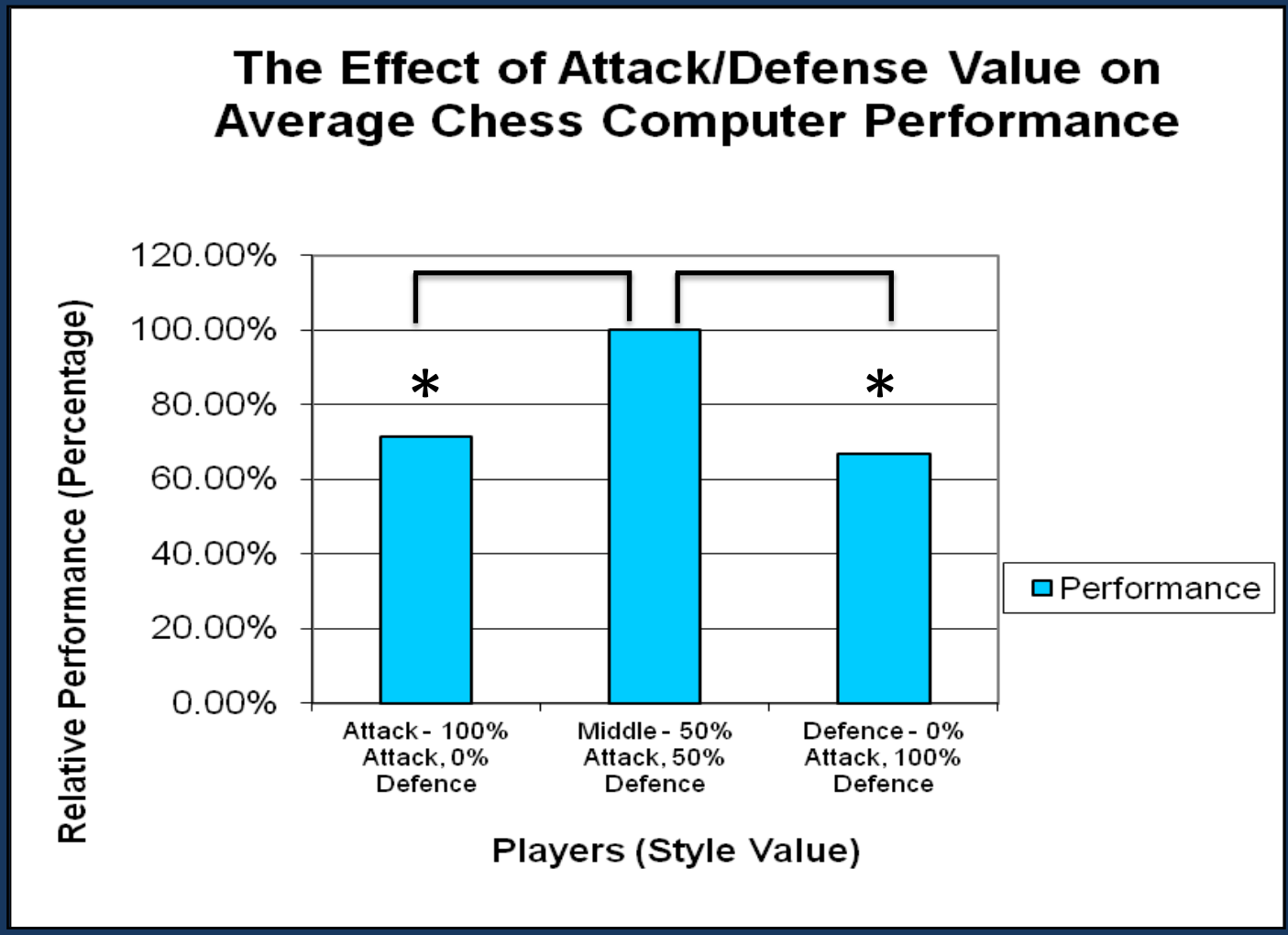
Results

Matches	Average Match Score	Standard Error of the Mean (SEM)
Chessmaster vs. Attack	1.1667 : 0.8333	0.1351
Chessmaster vs. Middle	1.0000 : 1.0000	0.1291
Chessmaster vs. Defense	1.2000 : 0.8000	0.1447
Defense vs. Attack	0.9667 : 1.0333	0.1579
Middle vs. Attack	1.3333 : 0.6667	0.1594
Defense vs. Middle	0.8333 : 1.1667	0.1594

Visual Representation



Interpretation



Conclusion - Significance

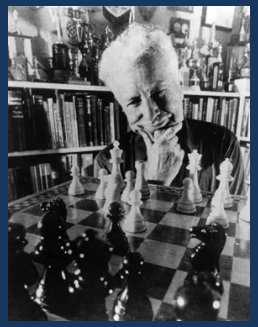
- The data mostly refutes the hypothesis

  - Middle performed best of the three
    - 30% relatively better than Attack and Defense

  - Although Attack performed slightly better than defense, the difference was not statistically significant

Future Direction

- 15 two-game matches is a small sample size. It could be improved with more trials (100-1000).
- Results could be analyzed via real-world chess rating systems such as the Elo or Glicko rating system.
- Compare the single-step style vs. the general-playing style to better study real-world human chess.



Real World AI Application

- Better software for chess community
- This project provided insights into artificial intelligence to enhance human brain power by simulating chess problems and providing a solution
- Other real world A.I. applications include:
  - Self-driving cars
  - Computerized medical devices
  - Military drones

Acknowledgements

- Principal: Mr. M. Goins
- Science teacher: Mrs. M. Long
- Parents