Quantum Chess

Quantum Chess, a variant of the chess game invented by Selim Akl, uses the weird properties of quantum physics. Unlike the chess pieces of the conventional game, where a pawn is a pawn, and a rook is a rook, a quantum chess piece is a superposition of "states", each state representing a different conventional piece. In Quantum Chess, a player does not know the identity of a piece (that is, whether it is a pawn, a rook, a bishop, and so on) until the piece is selected for a move. Once a piece is selected it elects to behave as one of its constituent conventional pieces, but soon recovers its quantum state and returns to being a superposition of two or more pieces. Why Quantum Chess? Conventional chess is a game of complete information, and thanks to their raw power and clever algorithms, computers reign supreme when pitted against human players. The idea behind Quantum Chess is to introduce an element of unpredictability into chess, and thereby place the computer and the human on a more equal footing. Because a true quantum board may be a few years in the future, for her summer project, Alice Wismath, an undergraduate in the School of Computing, and a summer NSERC student working with Dr. Akl, created a program to model one variation of Quantum Chess, as well as a computer strategy to play the game. See: http://research.cs.queensu.ca/home/akl/techreports/quantumchessTR.pdf for Dr. Akl's paper "On the Importance of Being Quantum".

Online Quantum Chess

Play Alice's variation of Quantum Chess HERE

Be sure to read the rules below before playing.

Rules

Pieces

Each Player has sixteen pieces.
Pieces are in a quantum superposition of two piece type states: a primary type and a secondary type. Pieces can be in either quantum (unknown) state or classical (known) state.

When a piece collapses to classical state, it becomes one of its two piece types with equal probability.

The king is an exception – it is always in classical state. Each player always has exactly one king on the board, and its position is always known.

The remaining fifteen pieces are assigned the following primary piece types: left rook, left bishop, left knight, queen, right knight, right bishop, right rook, and pawns one through eight. Secondary types are then randomly assigned from this same list of piece types, so that each type occurs exactly twice in the player's pieces.

Pieces are created at game start up, and the superpositions do not change throughout the game.

Each player's pieces are initially positioned as in traditional chess, on the first two rows, according to their primary piece type, with all the pieces except for the king in quantum state (see figure 1).

When a piece in quantum state is touched (i.e. chosen to move) it collapses to one of its two piece type states, and this type is revealed to both players.

Board

The board consists of the usual 64 squares of alternating black and white.

When a piece lands on a white square, it remains in its classical state.

When a piece (excepting the king) lands on a black square, it undergoes a quantum transformation and regains its quantum superposition.

Play

On a player's turn they choose a piece to touch. Once the piece has been touched, the player must move that piece if it has any possible moves. If a quantum piece collapses into a piece type with no possible moves, then the player's turn is over. Pieces in classical state with no possible moves may not be chosen.

The pieces move as in regular chess, with the following exceptions:

- The en passant rule for pawn capturing is left out.
- Castling is not allowed.
- The king may be placed or left in check.

Pieces capture normally. When a quantum piece is captured it collapses before it is removed from the game. Captured pieces may be seen in the panels at the sides of the board.

If a player touches a quantum piece which collapses to a piece state in which it puts the opponent's king in check, this counts as their move, and it becomes the opponent's turn. (However it is not enforced that the opponent must then get out of check).

A pawn reaching the opposite side of the board may be promoted to a queen, bishop, rook, or knight, regardless of the number of pieces of that type already in the game. If a piece in quantum state on the far row is touched and revealed to be a pawn, it is promoted, but the promotion takes up the turn. The superimposed piece type is not affected.

Ending the Game

A player wins when they capture the opponent's king. (Unlike in traditional chess, checkmate is not detected, and the king may be moved into check.) The game is designated a draw if both players have only the king remaining, or if 100 consecutive moves have been made with no captures or pawn movements by either side.

Quantum Chess Competition

Posted on August 26, 2010 by news

Dear all,

As part of our research in quantum computation, a Quantum Chess competition was held recently in the Queen's School of Computing. I would like to thank the participants who played the new game with passion and skill. Congratulations to our two winners Ernesto Posse and Frank Qi.

My appreciation goes to Alice Wismath (2010 NSERC USRA) who wrote the computer simulation, developed a playing strategy, and organized the competition. For technical and promotional support, I am indebted to Dave Dove and Ben Hall (School of Computing) and to Kristyn Wallace (News and Media).

You can read about the competition here: http://www.cs.queensu.ca/aboutus/highlights/put_item.php?year=2010&highlight=QuantumChess.php

A Queen's News story on Quantum Chess is here: http://www.queensu.ca/news/articles/queens-school-computing-takes-quantum-leap

For the technically oriented, the original paper is here:
http://research.cs.queensu.ca/home/akl/techreports/quantumchessTR.pdf

And finally, you can play Quantum Chess here:
http://research.cs.queensu.ca/Parallel/QuantumChess/QuantumChess.html

Cheers,
Selim

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Quantum Chess Competition

On Friday the 13th of August 2010, 14 volunteers gathered in the School of Computing to participate in the first ever Quantum Chess Competition. The competition was organized by Alice Wismath, a fourth year undergraduate in the School of Computing and a summer NSERC student working with Selim Akl.

Quantum Chess, a variant of the chess game invented by Selim Akl, uses the weird properties of quantum physics. Unlike the chess pieces of the conventional game, where a pawn is a pawn, and a rook is a rook, a quantum chess piece is a superposition of "states", each state representing a different conventional piece. In Quantum Chess, a player does not know the identity of a piece (that is, whether it is a pawn, a rook, a bishop, and so on) until the piece is selected for a move. Once a piece is selected it elects to behave as one of its constituent conventional pieces, but soon recovers its quantum state and returns to being a superposition of two or more pieces.

Why Quantum Chess? Conventional chess is a game of complete information, and thanks to their raw power and clever algorithms, computers reign supreme when pitted against human players. The idea behind Quantum Chess is to introduce an element of unpredictability into chess, and thereby place the computer and the human on a more equal footing. Because a true quantum board may be a few years in the future, for her summer project, Alice Wismath created a program to model one variation of Quantum Chess, as well as a computer strategy to play the game.

The competition consisted of each person playing three games against the computer and scoring points based on the number of games won or lost. The two winners of the competition won two of their three games against the computer, with many players losing all three games.

For details of the rules or to play Alice's game online visit HERE

Queen's School of Computing takes a quantum leap

2010-08-26

School of Computing Director Selim Akl and undergraduate student Alice Wismath show off their version of Quantum Chess.

For a long time, chess has been considered the ultimate game of strategy. But computers, like IBM's Deep Blue, have become stiff competition for humans. There are now only a handful of people in the world who can beat the best computers.

Now, researchers at the School of Computing at Queen's University have come up with a game that puts the person and the machine on equal footing. It's called Quantum Chess, and it throws the conventional rules of chess out the window.

"We are bringing an element of unpredictability to chess," says Queen's School of Computing Director Selim Akl, who authored a paper on how to bring "quantum weirdness" to the traditional game.

Developed by undergraduate student Alice Wismath, who selected the new rules from the endless possibilities suggested in Akl's paper, the electronic game has the same number of squares and the same pieces as original chess. But each piece has both a primary and a secondary type – a rook can also be a pawn, a queen can also be a knight, and so on. When the pieces are on white squares, the player can see what the piece is at that particular moment. But when moved to a black square, the piece shifts to a quantum state. The player has no way of knowing what the piece will be until he or she attempts to move it.

Because of this, it's possible for there to be as many as four queens – or as few as none – on the board at a time. It also means that the forethought that is so coveted in traditional chess is not nearly as effective in the quantum version.

Ms Wismath's game has so many variations and possibilities that it is nearly impossible, the researchers say, to program a computer that could play the game consistently well.

"You can throw away all the strategies you used before, because this is a completely new game and it puts the player and the computer on equal footing," says Dr. Akl.

The Quantum Chess project is part of the on-going research on quantum computation being carried out in the Queen's School of Computing. The current computer program is only a simulation; the ultimate goal of the project is to produce a true physical board for the game.

You can play Ms Wismath's version of quantum chess here.

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Quantum chess puts new spin on old game

Stundent-created game combines quantum physics and chess to outsmart computers

BY HOLLY TOUSIGNANT , SUPPLEMENTS EDITOR

A computer science professor and one of his students have collaborated to revolutionize a centuries old game.

Fourth-year computing student and quantum chess creator Alice Wismath, right, brought to life the ideas of her thesis supervisor Selim Akl, left. (Supplied)

Professor Selim Akl and fourth-year computing student Alice Wismath are the minds behind quantum chess, the latest talk of the online gaming world. The concept for the game is borrowed from quantum physics, which is also the source of its name.

“We are told by quantum physics that when the smallest particles are in quantum state they are more than one thing at one time,” he said. “The moment you make an observation they then settle on one of the states and they stay like that for the rest of their life.”

The idea began with Akl, who wrote a paper about the proposed game. Akl said he got the idea when he was teaching a course on natural computing.

“The issue of intelligence came up, human intelligence, and usually when intelligence comes up chess comes up,” he said. “Unfortunately chess is no longer the measure [of intelligence] because computers can beat most humans and my students were not very happy about this.”

Because of the nature of quantum chess, the game is not a runaway win for the computer as it usually is with standard chess.

“In conventional chess, a computer can essentially tell all future possibilities and make a very good move and therefore defeat most humans,” Akl said. “With quantum chess, the computer is faced with this uncertainty.” Computers create trees that map all possible outcomes. The trees for quantum chess are much more complicated due to the changeability of the game pieces, so the computer is put at less of an advantage.

The first ever quantum chess tournament was held in Kingston over the summer. The game was a challenge for players due to the unpredictability of the pieces, but Akl said the computer vs human success rate was about 50/50.

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“This game places humans and computer on the same footing.” Akl said initially no one was interested in his paper, but when Wismath earned an NSERC (Natural Sciences and Engineering Research Council) grant, she decided to pursue his idea.

“She wanted a supervisor to supervise her project so she came to me and I said ‘Alice, I wrote a paper on quantum chess and nobody paid attention, nobody cared, so I need you to bring it to life.’”

Wismath programmed the game, which puts a few major twists on classic chess.

“In the new version the piece can be more than one piece at a time and so you don’t know when you’re looking, what is what,” Akl said. “So what might be a pawn could be also, at the same time, might be a knight. And so when you touch the piece it reveals itself to you as one of its characters.”

Just as quantum physics states that the smallest particles stick to a state once observed, the chess pieces in quantum chess stick to their identity if they land on a white square. It is when they land on a black square that their identity can change.

Another twist in quantum chess is that players must capture the king, which never becomes another piece, rather than simply deliver a checkmate.

Wismath, CompSci ’11, said she was intrigued by the opportunity to make Akl’s idea a reality.

“I was looking for a summer in computing and I went to talk to Selim and he mentioned this as a project and I thought it sounded really cool,” she said. “I got to come up with rules to make it actually playable and to write the program to simulate the game to allow you to play and to come up with the computer strategy.”

Wismath said her involvement with continue into the future.

“I’m doing my ... honours fourth-year project, so I’m going to be continuing on quantum chess,” she said, adding that Akl is her thesis supervisor. “I’ll be trying to add something like castling, maybe something with tanglements. ... Obviously I just kind of want to make something that works as simple as possible.”

Castling is a special move in chess that uses the king and a rook of the same colour, while entanglement is a property of quantum physics.

Akl said he hopes to see quantum chess commercialized in the future, either as an online game, board game or both.

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Quantum physics adds twist to chess

| Last Updated: Monday, September 6, 2010 | 9:25 AM ET By Emily Chung, CBC News

In the quantum chess computer game created by computer science student Alice Wismath (right), a piece that should be a knight could simultaneously also be a queen, a pawn or something else. Wimath based the game on an idea proposed by computer science professor Selim Akl, left. (Kristyn Wallace/Queen's University)

The unpredictable nature of quantum physics has been mimicked by Queen's University computer scientists to invent a new version of chess.

In the quantum chess computer game created by undergraduate computer science student Alice Wismath, a piece that should be a knight could simultaneously also be a queen, a pawn or something else. The player doesn't know what the second state might be or which of the two states the piece will choose when it is moved.

"It was very weird," said Ernesto Posse, a Queen's postdoctoral researcher who took part in a recent "quantum chess" tournament at the university in Kingston, Ont. "You only know what a piece really is once you touch the piece. Basically, planning ahead is impossible."

Wismath wrote the game based on ideas proposed by Selim Akl, a computer science professor at Queen's, in a paper that will be published in September in a special issue of Parallel Processing Letters. Akl is editor-in-chief of the journal, but not that special issue.

Computers can search all possible outcomes of all possible moves in conventional chess and beat even top human players, so Akl wanted to make the computation more difficult.

Quantum quirks

According to quantum physics, very small particles behave according to principles that give them characteristics very different from the behaviour of larger objects. Here are a few properties of those quantum objects:

- Quantum superposition: A quantum object may

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- Waterloo institute seeks to unlock secrets of subatomic world
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exist in multiple states at the same time.

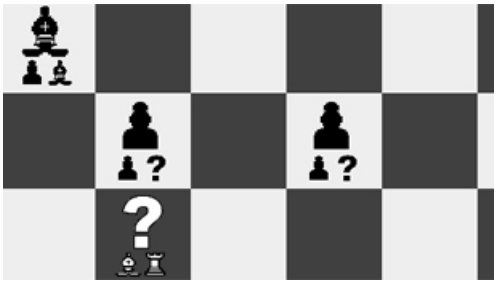
- Wave function collapse: An observer's interaction with a quantum object in a superposition of states, such as an attempt to measure its position or momentum, will make it "collapse" into a single state.
- Quantum entanglement: Two or more quantum objects may be linked so that any change to one is immediately experienced by another, no matter how far apart they are from one another.

He decided to have the pieces mimic the behaviour of very small particles such as atoms and electrons, which follow the laws of quantum mechanics. According to the principle of superposition in quantum physics, such particles can simultaneously be in multiple states at once, but collapse into a single state when an attempt is made to measure their position, momentum or some other aspect.

"I thought of a game that provides the same kind of unpredictability to both players," Akl said. "The computer cannot possibly search all the possibilities because we can show there are an uncountable number of them."

Wismath, who is starting the fourth year of her computer science degree program in September, had to decide how the computer would deal with that. It was "pretty hard," she said.

Normally, computers create "trees" of possible outcomes for each move, looking many moves ahead.



'You only know what a piece really is once you touch the piece,' researcher Ernesto Posse said after he tried the game. 'Basically, planning ahead is impossible.' (CBC)

Each outcome is scored based on how many pieces each player has left on the board and their positions. The tree for quantum chess ended up being much more confusing, Wismath said, especially since the piece on any given square could become a pawn or a bishop or a knight.

"How do you score it when you're not sure what it is?"

She decided to limit the computer's calculations to the next possible move and the human response immediately after that.

Wismath also chose new rules to make the game workable with its quantum twist. For example, her version of quantum chess requires a player to capture the king, which never changes to another piece, instead of merely delivering a checkmate. Also, pieces change states only when they land on black squares.

Posse, who has been playing chess for 15 years, said the new game doesn't much resemble the classic contest he likes for its tactics, strategy and history: "I would say it's 'chess-inspired.'"

He was one of the winners in the tournament , but credits luck.

Room for strategy

"You try to apply some ideas of normal chess, but they rarely work out," Posse said.

But Chris Perez, a master's student in computer science who also took part in the tournament, said "there's still definitely a lot of room for

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Bob McDonald's Blog

Canadian science on show in Vancouver

Feb. 17, 2012 9:16 AM

The largest annual gathering of scientists in the world is happening in Vancouver this week, as delegates from almost 60 countries assemble for the American Association for the Advancement of Science (AAAS) meeting. Canadians should be proud of our science, yet most people are unaware of the fine work that goes on from sea to shining sea.

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Feb. 17, 2012 4:56 PM

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strategy."

For example, he said you can use your memory to deduce which pieces are still hidden on the board and plan your moves to maximize the chance of turning a weak piece into a better one.

"Adding an element of chance makes things more fun," he said.

Perez hopes to help Akl create a non-computerized version of the game.

Akl plans to use the new game to teach students about concepts in quantum physics.

And he's already planning ways to make the game more complex, such as changing the probabilities for each state so they aren't exactly 50-50 and including rules to mimic other quantum physics concepts, such as entanglement.

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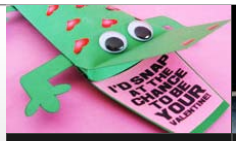

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Quantum chess adds uncertainty

By Duncan Geere | 08 September 10

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The rules of chess have remained relatively static since the 16th century, but that hasn't stopped numerous variants from being proposed, including hexagonal chess, multiplayer versions and random starting layouts.

The latest has been created by an undergraduate student named Alice Wismath and her professor Selim Akl, from Queen's University in Canada, who've introduced concepts from quantum mechanics into the game. Quantum Chess gives each piece two states -- a classical known state and an unknown quantum state. As a result, a queen could also be a bishop, a pawn could also be a knight, and so on.

As long as you move between white squares, the piece remains static, but when a piece is moved to a black square, it starts fluctuating between the two states. When it's touched the next time, one of the two states is chosen at random, with an equal chance of both. However, it won't break the rules -- you can't end up with three queens, for example. Also, the king is always the king.

Akl came up with the idea of the game while trying to make the prediction of chess moves by computers more difficult. "I thought of a game that provides the same kind of unpredictability to both players," Akl said. "The computer cannot possibly search all the possibilities because we can show there are an uncountable number of them."

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As a result, one of chess' defining features -- planning ahead -- is excised in favour of trying to remember which pieces have been revealed and which are yet to reveal what type they are, and betting on the chance that an opponent's strong pieces might actually turn out to be weak ones.

You can try out Quantum Chess for yourself on the web. I've never been a big chess-player, but if you are, then let us know in the comments below how it compares to the regular game.

Story
Written by Duncan Geere

Photo
CC-licensed: Nestor Galina

Tags
Games, Quantum, Chess, Physics, Uncertainty, Alice Wismath

Comments

> Try playing the japanese version, Shogi, in which captured pieces can be deployed by the capturing player. Great fun...more like close-quarter street fighting than abstract artillery.
>
> Carl | Sep 8th 2010

Upte Downt Reply

> "Alice Wismath from Queen's University in Canada, who's introduced concepts from quantum mechanics into the game."
> She didn't introduce these concepts, Quantum Chess was invented by Selim Akl. Alice just implemented it in a program.
>
> the who | Sep 8th 2010

Upte Downt Reply

> It's semantics as to which of those things is "introducing" the quantum element into the game, but I've edited the story a little to clarify the role of both.
>
> Duncan | Sep 8th 2010

Upte Downt Reply

> I've played chess all my life. I'm a pretty average strength club level player and like many experienced players I've always enjoyed chess variants. This quantum variant is an interesting idea but I'm not really sure about a couple of the implementation details. My feeling, after one game, is that too many of the normal chess rules have been abandoned.
>
> Firstly, the board is oriented differently to normal chess, with a white square in the lower left hand corner and the white king on the left hand side. That may have been a deliberate design decision but setting the board up that way is also a typical beginner's mistake and it is not the decision I would have made. I've not come across another 8x8 board chess variant that does this; it doesn't inspire confidence.
>
> I played and won a game before having read over all the rules and was quite enjoying it until I

Upte Downt

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had a piece captured by the king while it was protected by a quantum knight on a white square in the knight state. To win the game I had to actually capture the king. This astonished and disappointed me.

Finally reading the rules page I found that major rule changes have been made in addition to the quantum piece variance rule: moving into check is allowed, there is no requirement to move out of check, and checkmate does not exist; capturing the king is the win condition. There is no mention of the non-standard board orientation. Additionally, en passant and castling have been removed.

I can't see why any of these extra changes have been made. Castling could easily be retained, substituting 'piece that starts in corner' for 'rook'. En passant could easily be retained, perhaps with the proviso that it only applies if both quantum pawns remain in the pawn state. Simply abandoning these rules comes across as lazy more than anything else, but they are not game-changers, so to speak.

Changing the rules about check and checkmate, however, is a very big deal. Checkmate is the object of the game of chess; the rules around check play an enormous part in all aspects of standard (and variant) chess strategy. Remove check and checkmate and, to me at least, it is just not chess any more.

I can see that there is a hard question which arises when devising quantum chess rules: what do you do when a piece in a quantum state may or may not be giving check? Surely the game would work just as well if a straight answer either way was arbitrarily given to this question as a further rule. Given that a single move can consist of touching a piece and putting it in a quantum state that gives check, it would make sense that the rule be 'a piece in an indeterminate state cannot give check.' After that, normal rules of check and checkmate can apply. You would then have an actual chess variant.

In sum Quantum Chess a fun idea but the thing that makes other chess variants such as exchange, mini-chess etc, for chessplayers, is that as much as possible of original chess is retained - the variant rules add spice but the game itself remains intact. This game may use a chessboard and chess pieces but without check and checkmate it just doesn't feel like chess any more, and I am left feeling slightly cheated.

It's a shame because right now I'd really like to play a version of quantum chess using these piece changing rules that actually also retains the rules of chess. A further variant might be to have the pieces change state on every move, not just on black squares. Why not?.

Wayne Myers | Sep 8th 2010

Reply

Ugh, no paragraphs for comments. Apologies. Won't do that again.

Wayne Myers | Sep 8th 2010

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CHESS

Quantum Chess Kills Computers

An undergraduate computer science student has created a "quantum chess" game that stumps computers' ability to search all possible outcomes of possible moves by having chess pieces mimic particles that are subject to quantum mechanics.

The chess pieces follow the principle of superposition: they can exist in multiple states until you try to move them (or in the case of quantum physics, until you try to measure a particle's position or momentum).

Alice Wismath, the game's creator, kindly showed some compassion for human players of the game though, by setting up some rules so the pieces don't morph completely randomly. Based on these rules, participants in the quantum chess tournament (which was held in Kingston, Ontario) were still able to use strategy to try to beat the game. So if you've grown tired of regular old chess games and are looking for a more intense challenge, maybe you should enter the next competition. [CBC News via Geekosystem]

BY CHRISTINA BONNINGTON

SEP 7, 2010 10:00 PM

Contact Christina Bonnington: EMAIL THE AUTHOR COMMENT

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The Game of Physics

A quantum spin on chess

If a game becomes too easy, you simply need to change the rules to make it more difficult. A researcher and a student from Queen's University have taken key concepts of quantum physics and applied them to chess to make it more unpredictable. Now, even the most formidable opponents–supercomputers–are having to rethink how the game is played.

Selim Akl is an NSERC-funded computer science professor who invented the concept of quantum chess in his paper, "On the Importance of Being Quantum". By applying principles of quantum physics to chess, Akl devised a new form of the classic game that keeps players from planning moves too far in advance. His goal was to level the playing field between humans and computers. Using ideas proposed in the paper, Alice Wismath designed a quantum chess computer program while working as an undergraduate summer student in Akl's lab at the Queen's School of Computing.

Chess as we know it today evolved in the 15th century, though its roots go back to the early 6th century. Long considered a game of strategy and intellect, the world of competitive chess was rocked in 1997 when World Champion Garry Kasparov famously lost a match against IBM's supercomputer "Deep Blue". With the ability to store vast amounts of information and calculate numerous strategies and their outcomes, computers have a clear advantage over human chess players. Now, quantum chess has brought computers back to square one nearly 15 years after Deep Blue's victory.

Wismath's program uses superposition, a concept in quantum physics in which small particles such as atoms and electrons exist in multiple states at the same time until they are acted upon in some way, at which point they collapse into a single state.

In quantum chess, each piece exists in two states: quantum (unknown) or classical (known). When a piece is in the quantum state, the player doesn't know its identity until it is moved. For example, a pawn could also be a queen, and a knight could also be a rook. A piece can change its state again after it has been moved, making it impossible for players to plan ahead. In 1997, Deep Blue calculated as many as 20

moves deep against Kasparov. In a game of quantum chess, the supercomputer would not be able to make any predictions beyond its next move and the human's response.

Though Wismath was able to keep many of the characteristics of chess, she devised a few new rules to accommodate the quantum spin. For instance, when a piece is moved to a white space it remains in a classical state but when moved to a black space it fluctuates between its two forms. When it is moved again, the piece has an equal chance of changing into either of its two states. The King is the only piece that is always known and, in another variation on traditional chess, players cannot win with a "mere" checkmate. Instead, they must physically capture the King.

Quantum chess forces players to completely rethink their approach to the game. Rather than plan out strategies and tactics in advance, they must remember which pieces are still in play on the board and find moves that will turn weak pieces into stronger ones.

Wismath presented her work at the Ontario Celebration of Women in Computing Conference in Kingston, Ontario. Her computer program has gained the attention of international media and received write-ups in *Gizmodo* and in the UK edition of *Wired*.

Akl plans to use quantum chess to teach his students about concepts in quantum mechanics. He is also working to make the game more unpredictable by adding other aspects of quantum physics to the game, such as entanglement, where two or more objects are linked so that when a change happens to one, it happens simultaneously to the others.

Click here to read the rules of Quantum Chess.

Click here to play the game.

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Le jeu de la physique

Un spin quantique dans les échecs

Quand un jeu devient trop facile, il suffit de changer les règles pour le rendre plus difficile. Un chercheur et une étudiante de la Queen's University ont appliqué des concepts clés de la physique quantique aux échecs afin d'accroître l'imprévisibilité de ce jeu. Aujourd'hui, même les adversaires les plus redoutables – les superordinateurs – doivent repenser leur façon de jouer.

Selim Akl, un professeur d'informatique appuyé par le Conseil de recherches en sciences naturelles et en génie du Canada, a rédigé un article intitulé *On the Importance of Being Quantum*, dans lequel il parle du concept des échecs quantiques qu'il a inventé. En appliquant les principes de la physique quantique aux échecs, il a donné à ce jeu classique une nouvelle forme qui empêche les joueurs de planifier leurs coups longtemps à l'avance. Il voulait ainsi égaliser les règles du jeu entre les humains et les ordinateurs. S'inspirant des idées proposées dans cet article, Alice Wismath a conçu un programme d'ordinateur d'échecs quantiques alors qu'elle était étudiante de premier cycle et qu'elle occupait un emploi d'été dans le laboratoire de M. Akl, à la School of Computing de la Queen's University.

Le jeu d'échecs que nous connaissons aujourd'hui remonte au XVe siècle, mais son origine date du début du VIe siècle. Il a été longtemps considéré comme un jeu qui fait appel à la stratégie et à l'intelligence. C'est pourquoi le monde des tournois d'échecs a été ébranlé en 1997 lorsque le champion mondial Garry Kasparov a perdu une célèbre partie contre le superordinateur d'IBM *Deep Blue*. À ce jeu, les ordinateurs sont clairement avantagés par rapport aux humains, car ils ont la capacité de stocker de grandes quantités d'information, de concevoir de nombreuses stratégies et d'en calculer les résultats. Maintenant, près de 15 ans après la victoire de *Deep Blue*, les ordinateurs reviennent à la case départ grâce aux échecs quantiques.

Le programme de M^{me} Wismath est basé sur la superposition, un concept de la physique quantique selon lequel les petites particules telles que les atomes et les électrons peuvent avoir de multiples états simultanément jusqu'à ce qu'une intervention les ramène à un état unique.

Dans les échecs quantiques, chaque pièce peut avoir deux états : l'état quantique (inconnu) ou l'état classique (connu). Lorsqu'une pièce se trouve dans l'état quantique, le joueur n'en connaît l'identité que lorsqu'elle est déplacée. Ainsi, un pion pourrait aussi être une dame et un cavalier pourrait aussi être une tour. Après avoir été déplacée, la pièce peut changer encore une fois d'état, ce qui empêche les joueurs de planifier leurs coups. En 1997, l'ordinateur *Deep Blue* avait réussi à calculer jusqu'à 20 coups à l'avance. Dans un jeu d'échecs quantiques, le superordinateur ne peut que prédire le coup qu'il jouera et la réponse de l'humain.

M^me^ Wismath a pu conserver un grand nombre des caractéristiques du jeu d'échecs traditionnel, mais elle a tout de même ajouté quelques nouvelles règles pour l'adapter au spin quantique. Par exemple, lorsqu'une pièce est déplacée sur une case blanche, elle conserve l'état classique, mais lorsqu'elle est déplacée sur une case noire, elle fluctue entre les deux états. Lorsqu'elle est de nouveau déplacée, elle peut prendre l'un ou l'autre des deux états. Le roi est la seule pièce dont l'identité est toujours connue. Autre variante du jeu d'échecs traditionnel : les joueurs ne peuvent pas gagner la partie « simplement » en faisant échec et mat. Ils doivent physiquement capturer le roi.

Les échecs quantiques forcent les joueurs à repenser entièrement leur stratégie. Au lieu de planifier leurs tactiques, ils doivent se souvenir des pièces qui sont encore sur l'échiquier et trouver les coups qui transformeront les pièces mineures en pièces lourdes.

M^me^ Wismath a présenté ses travaux dans le cadre de l'Ontario Celebration of Women in Computing Conference, qui s'est déroulée à Kingston (Ontario). Son programme d'ordinateur a attiré l'attention de journalistes étrangers et fait l'objet de reportages dans *Gizmodo* et dans la version de *Wired* destinée au Royaume Uni.

M. Akl prévoit se servir du jeu d'échecs quantiques pour enseigner à ses étudiants les concepts de la mécanique quantique. Il a aussi l'intention d'accroître l'imprévisibilité du jeu en y appliquant d'autres concepts de la physique quantique comme l'intrication, un lien qui unit deux ou plusieurs objets et qui fait en sorte que lorsqu'un des objets subit un changement, tous le subissent simultanément.

Consultez les règles officielles des échecs quantiques (En anglais seulement).

Jouez aux échecs quantiques.

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CHESS NEWS BLOG: chessblog.com

Daily Chess News Blog, Informative, Fun, and Positive
hosted by Chess Queen™ & 12th Women's World Chess Champion
Alexandra Kosteniuk

MONDAY, SEPTEMBER 6, 2010

Quantum physics applied to chess

In the quantum chess computer game created by computer science student Alice Wismath (right), a piece that should be a knight could simultaneously also be a queen, a pawn or something else. Wimath based the game on an idea proposed by computer science professor Selim Akl, left. (Kristyn Wallace/Queen's University).

Hello Everyone,

What if while playing chess your Queen is also a Rook, a Bishop, a Knight or a Pawn but you don't know which till you touch it?

Fascinating. And, really crazy? Right? Welcome to the world of quantum physics and chess.

How would you ever plan ahead in such a chess game?

A computer professor and his student have just created a fantastic program that applies the laws of quantum

physics to chess.

Computers can search all possible outcomes of all possible moves in conventional chess and beat even top human players, says the computer science professor Salem Akl.

He decided to have the pieces mimic the behaviour of very small particles such as atoms and electrons, which follow the laws of quantum mechanics. According to the principle of superposition in quantum physics, such particles can simultaneously be in multiple states at once, but collapse into a single state when an attempt is made to measure their position, momentum or some other aspect.

"I thought of a game that provides the same kind of unpredictability to both players," Akl said. "The computer cannot possibly search all the possibilities because we can show there are an uncountable number of them."

Wow!

You can read the full story here.

From Alexandra Kosteniuk's
www.chessblog.com
Also see her personal blog at
www.chessqueen.com

Labels: physics, Quantum Chess

posted by Chess Blog Admin @ 12:11 PM

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NEWS

Quantum Chess Changes The State Of The Game

2:40AM September 8, 2010 | Mike Fahey

Top players have spent lifetimes mastering the subtle nuances of chess, but when a quantum physics twist is added to the age-old classic, it's anybody's games.

A quantum object can exist in more than one state. When you attempt to interact with it, the wave function collapses and the object settles into a single state. This is the theory applied to Quantum Chess, a new twist on the classic game created by Queen's University undergraduate computer science student Alice Wismath.

Wismath wrote the game based on ideas from computer science professor Selim Akl at Queens. Akl wanted to make the process of predicting chess moves using computers more difficult. In order to achieve this, he decided to have the pieces mimic the way particles like electrons and atoms behave according to the laws of quantum mechanics.

Any given piece (aside from the king) has multiple quantum states. A pawn might also be a queen; a knight a bishop and so on. The player doesn't know how the piece is going to move until he or she touches it, which forces it to settle into one state.

> "I thought of a game that provides the same kind of unpredictability to both players," Akl said. "The computer cannot possibly search all the possibilities because we can show there are an uncountable number of them."

The twist makes it nearly impossible to plan ahead in a game. Wismath, who programmed the computer to attempt to predict a player's movements, had to limit its calculations to the next possible move and the human response after it. Normal computer chess calculations rely on an outcome tree, scoring the potential moves according to the pieces involved. When you don't know what piece is going to pop up, it becomes extremely tough to calculate scores.

Ernesto Posse, a Queen's postdoctoral researcher and long-time chess player won a recent Quantum Chess tournament held at Queens University in Kingston, Ontario, but he doesn't attribute the win to skill.

> Posse, who has been playing chess for 15 years, said the new game doesn't much resemble the classic contest he likes for its tactics, strategy and history: "I would say it's 'chess-inspired.'"
>
> He was one of the winners in the tournament , but credits luck.

Other players, like Chris Perez, a master's student in computer science, say there is still room for strategy. He suggests using your memory to figure out which pieces on the board have yet to be revealed, planning out your moves on the chance that a weak piece might be hiding a much stronger one.

> "Adding an element of chance makes things more fun."

Quantum physics adds twist to chess [CBC News]

QUANTUM PHYSICS COMPUTERS SCIENCE BOARD GAMES QUANTUM STATES QUANTUM MECHANICS QUANTUM CHESS

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Adam Ruch
September 8, 2010 at 9:32 AM
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/feels intellectually inferior.

BANG!

Doug Sherry
September 8, 2010 at 1:34 PM
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However is unharmed due to quantum tunnelling undergone by the projectile.

Leon
September 8, 2010 at 2:13 PM
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Wow this resembles chess how? The fact that its played on the same board has the same pieces…but you dont know what the pieces are untill you touch them? WHat the hell is this crap! Thats like playing chess after drinking a bottle of vodka

natasha
September 14, 2010 at 1:42 AM
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An earlier article than the CBC is at the Kingston Herald.

It has a link to the rules for Quantum Chess and an online version you can play against the AI (which is pretty good!):
http://kingstonherald.com/news/queens-quantum-chess-pawns-computer-ai-201031861

FYI.

POST YOUR COMMENTS

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Anyone for quantum chess?

That's just showing off

AS IF CHESS wasn't already hard enough, boffins at Queens University have added a quantum dimension.

According to CBC news, an undergraduate at Queens University is playing her chess quantum physics style. Sounds like attention seeking behaviour to us. But it turns out that geek girl Alice Wismath - yes, that's really her name - wrote a quantum chess program based on a paper her professor Selim Aki had written.

The program was written to create a state of constant flux for every chess piece on the board. The idea is to make it much harder for computers to logically read the outcome of every move on the table.

So applying the principle of superposition in quantum physics, a piece can exist simultaneously in several states, meaning a pawn can be a king, horse or any other piece on the board. Sounds more like chaos theory and it might as well be backgammon or draughts instead.

However, the programmer hasn't thrown the chess rulebook out the window. Apparently, there are certain guidelines you must follow, if you can follow them, and it's possible to apply strategies using the program.

In this game boffins have to capture the King, which can't morph or it could well be the longest game of chess ever played. The chess pieces also don't morph randomly at any point during the game. They only reveal their new state when they land on the black squares.

The team is planning to make it even more complicated, using mind-blowing quantum physics rules. µ

Wed 08 Sep 2010, 14:37

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@Rocket_surgeon

Just incidentally back here, hope you return too.

The universe not only works by magic, but *is* magic. However, whether it can be manipulated under human control doesn't look likely. You make *assertions* without considering what's

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IMPROBABLY CONNECTED THINGS OF THE DAY

Quantum Physics Added to Standard Chess

Alice Wismath | chess | Chris Perez | computer science | quantum chess | quantum physics | Selim Akl

by James Plafke | 2:37 pm, September 7th, 2010

Queen's University undergraduate computer science student Alice Wismath has added a bit of quantum physics to the game of chess, creating a style of chess where the identity of nearly every piece is in a state of constant flux.

Wismath's quantum chess program is based on a paper written by a Queen's University computer science professor, Selim Akl, in which he discusses how computers can see every possible outcome of every possible move when playing chess and wanted to make the computer's task a little more difficult. He settled on having the pieces mimic particles that can simultaneously exist in multiple states.

Wismath had to create a few rules in order for quantum chess to be playable. First off, the king has to be captured, rather than put into checkmate, and it can't morph into another piece. Equally important, the pieces only change states when they land on black squares and only change when they're touched by a player. Also, the pieces don't morph 100% randomly, as what piece they change into is based on a calculation of how many pieces are left on the board and their respective positions. These rules make the game somewhat playable, though much more playable than a game where every single piece changes every single time someone touches it.

14 OF THE BEST GEEKIEST BEERS

Given beer's pervasive place in human history, it's not surprising that the geeky pastimes of drinkers would eventually rub off on the beers themselves. The result is a veritable cornucopia of nerdy beers, 14 of which are right here.

TWEETOSYSTEM

Max (I'm old)
permalink favorite retweet reply

Chris Perez, a participant in a quantum chess tournament held in Kingston, Ontario, claims there is still strategy involved in the game, despite the morphing pieces, which involves attempting to morph weaker pieces into stronger ones based on the morphing calculations.

(via CBC News)

Max I just looked at http://t.co/EXD81Ynn for the first time in easily ten years and I am saddened how I recognize so few of the animes

permalink favorite retweet reply

Eric Limer I like that the general consensus regarding rules of grammar is that they don't apply so long as you're sufficiently badass.

permalink favorite retweet reply

Eric Limer Well, I guess I don't need a good graphics card to read books. :/

permalink favorite retweet reply

Max Leafing through the Airbender comic @NerdGerhl loaned me. It's actually very visually appealing, I'm

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Quantum mechanics meets computer chess to defy physicists, computers and grandmasters alike

Sep. 9, 2010 (5:30 am) By: *John Brownlee*

The inexorable multiplication of transistors predicted by Moore's Law always predicted the toppling of human chess grandmasters by dedicated machine thinkers. At this point, companies like IBM have proved that brute force coupled with a playbook of every chess game ever is enough to defeat even the best players. It's a simple matter of processing power: there's only a finite number of moves on the board, and the real trick of chess is predicting where those same pieces will be down the line. Give a computer enough processing power and it can chunk through almost all the possible permutations while most human players are still trying to remember how to *en passant*.

What if you change the rules of chess, though, specifically to make them harder for computers to predict? That's just what an undergraduate computer science student has done, coming up with quantum chess… a variant of chess where pieces like the knight, rook, queen and king mimic particles subject to quantum mechanics. In other words, the chess pieces can exist in multiple states up until the point you move them.

That might sound like a variant of chess that would be impossible to play without a computer, which would, of course, be besides the point, so the variant's creator, Alice Wismath, has set up some rules so the pieces' transformations aren't completely random. That ultimately means strategy still applies, since it's not just a game of chance… but it also means that Moore's Law can probably again crack it, since quantum chess is just one more layer of calculation on top of a game computers have already mastered.

Read more at CBC News (via Gizmodo)

Tags: *chess*, *computer chess*, *deep blue*, *ibm*, *Physics*, *quantum chess*, *quantum mechanics*

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Levelling the playing field

By Rachael McKinnon and Rachael Darcie McKinnon
10:38 AM Thursday Sep 9, 2010

When quantum physics meets chess, the results can be chaotic. Photo / Bradley Ambrose

If you're sick of smug, arrogant computers predicting the outcome of your digital chess game before it's even begun, then a new concept of the game – quantum chess – might help level the playing field.

You might want to practise your meditation and learn to clear your mind because machines might soon be able to translate the activity in your brain into speech. It's still only being tested but the experiments might make a great difference to people who suffer from "locked-in" syndromes who can't communicate verbally.

Unrelated to America's Proposition 19, patients may one day find medicinal roaches in their local hospital. Scientists from the University of Nottingham have discovered some antibiotic-like properties in the brains of cockroaches which turn them from pests into pain-relief.

On the flip-side, pesky bugs – well, at least their pesky noises – have been embraced in Washington to discourage young loiterers from hanging around where they're not wanted.

However, the high-pitched "mosquito" is annoying more people than just the restless youths they target.

Someone who is more interested in encouraging the

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presence of the younger generations is 71-year-old composer Jonathan Harvey. He believes that the amplification of classical music in concert-halls plus a more relaxed "attendance" policy will be effective in winning over youth.

Finally, some of the world's most patient gardeners have arguably just had the best pay-off they could wish for. The Franklin Tree has flowered for the first time in around 200 years and more blooms are yet to come.

By Rachael McKinnon and Rachael Darcie McKinnon | Email Rachael

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Quantum Chess

By **John Farrier** in **Entertainment**, **Gaming** on Sep 7, 2010 at 9:14 am

Alice Wismath, a computer science student at Queen's University in Canada, has developed a form of chess in which the type of a given piece on the board is in a state of flux:

> *In the quantum chess computer game created by undergraduate computer science student Alice Wismath, a piece that should be a knight could simultaneously also be a queen, a pawn or something else. The player doesn't know what the second state might be or which of the two states the piece will choose when it is moved.[...]*
>
> *Wismath also chose new rules to make the game workable with its quantum twist. For example, her version of quantum chess requires a player to capture the king, which never changes to another piece, instead of merely delivering a checkmate. Also, pieces change states only when they land on black squares.*

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COMMENT

1. **Nicholas Dollak**
   Sep 7th, 2010 at 12:43 pm

   I couldn't help but notice how aptly-named Alice Wismath is. (Wismath = Math Whiz. Also, Alice plays a wonky game o' chess in "Through the Looking-Glass.")

2. **lewis82**
   Sep 7th, 2010 at 4:00 pm

   "Also, pieces change states only when they land on black squares."

   So basically, the bishops on white squares are non-quantum?

3. **cryptonomico**
   Sep 7th, 2010 at 4:38 pm

   Yes! More chess. This and the twelve awesome chess sets posted earlier help show KIDS THESE DAYS some of the infinitude to be explored in chess. MORE please. BTW there was a 'fake advertisement' for Quantum Chess in Games Magazine years ago.

4. **ted**
   Sep 7th, 2010 at 6:51 pm

   Not sure how much tougher it is to actually capture the king. It's merely the next move after checkmate.

5. **Ezence**
   Sep 8th, 2010 at 4:12 am

   @ted: lol good point, but flawed. What if then next time you go to move the chess piece that has the king in check mate and it turns into a pawn? Then its no longer check mate. I guess you'd need a lot of luck with RNGs.

6. **ted**
   Sep 8th, 2010 at 8:28 pm

   I know what you mean. Just don't land 'em on a black square, I guess.

   But if you've got him in checkmate, your next move is to take the king, and that would be the end of the game, no matter what the piece turns into after you've moved.

   No need to make the game so complicated, though. Seems kinda silly.

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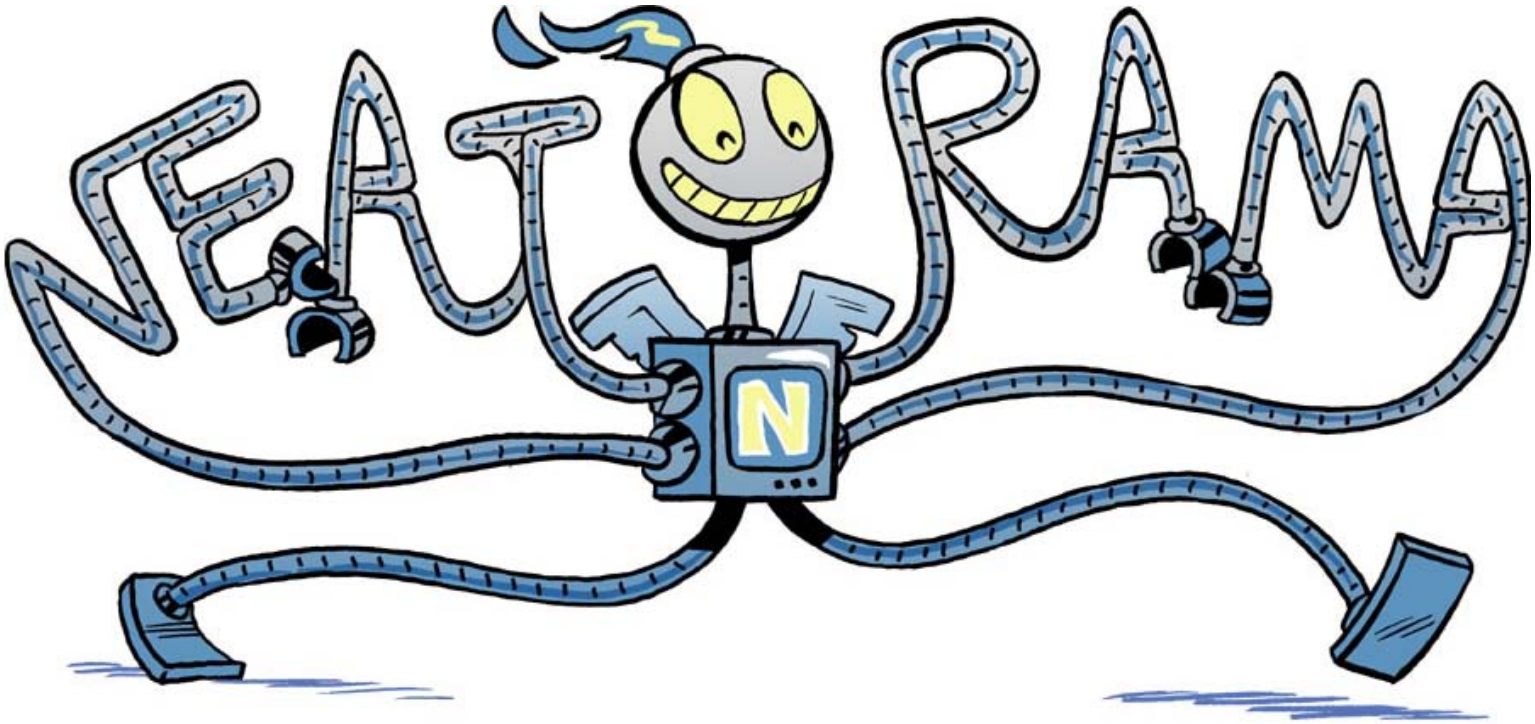

Design by **Adam Koford**

THE CLOSET GRANDMASTER

"CHESS IS VERY SIMPLE. HE GOES THERE, I GO HERE. I GO THERE, HE GOES HERE."

TUESDAY, SEPTEMBER 07, 2010

Weird Quantum Chess

As if regular chess wasn't hard enough. These geeks had to go on and invent a new form of chess - Quantum Chess. In this format, a queen, say, could also be another piece, maybe even a pawn. And, according to one of this game's makers, "You only know what a piece really is once you touch the piece. Basically, planning ahead is impossible."

> Computers can search all possible outcomes of all possible moves in conventional chess and beat even top human players, so Akl wanted to make the computation more difficult.
>
> He decided to have the pieces mimic the behaviour of very small particles such as atoms and electrons, which follow the laws of quantum mechanics. According to the principle of superposition in quantum physics, such particles can simultaneously be in multiple states at once, but collapse into a single state when an attempt is made to measure their position, momentum or some other aspect.

Read more in Quantum physics adds twist to chess.

POSTED BY THE CLOSET GRANDMASTER AT 11:41 PM

1 COMMENTS:

Tor Hershman said...

Moi much prefers checkers.

7:44 AM, SEPTEMBER 09, 2010

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geekology.

SEPTEMBER 7, 2010 - 1:45PM

Wrap your head around 'Quantum Chess'

BY: JOSH HARRISON

I shouldn't have to tell you, Geekologists--let the Wookiee win!

[Image Source]

Chess can be tough to wrap your mind around. The basic rules of movement are pretty easy to pick up, but the nuances of strategy and decision-making can take a lifetime to master. True chess champions are capable of nearly superhuman feats of concentration and mental acuity. For centuries, chess has been the definitive arena for mind-to-mind combat, the ultimate test of tactical genius.

Then somebody had to go and add *experimental physics to it.*

Wasn't chess hard enough, guys? Wasn't it difficult enough to plan ahead when the board was operating under the *basic rules of everyday reality*? Or are you really so smart that plain old chess--the quintessential 'mind game'--became too elementary? Don't get me wrong--I'm not denying that "Quantum Chess" is freakin' cool. But the game's creator, Queen's University student Alice Wismath, is gonna have to understand that most of us may need a minute to get our heads around the rules.

The basic twist that Quantum Chess puts on the familiar board game is as follows: In quantum physics, an object can exist in more than one state. Only when you interact with such an object does it collapse and settle into a single, consistent state. This is the idea at the heart of Quantum Chess: Unlike in the normal game, a piece can have more than one identity. A lowly pawn might have the potential to be a queen--but you won't know until you touch it. Each player has no idea what's at his or her disposal, and is thus completely unable to lay down the complex contingencies so common in chess strategy. Unlike its older and more predictable cousin, Quantum Chess forces its players to make decisions based on unknown quantities. Send a powerful piece into the fray, and you may discover that it's ill-equipped to handle frontline combat. Even your most clever ambush may be undone by a knight becoming a pawn, or a bishop trading in his awesome hat for a horse.

Quantum Chess originates from the work of Queen's computer science professor Selim Akl, who

inspired Wismath with his efforts to make computer predictions of chess moves more difficult. Akl brought in the quantum theory; Wismath refined it into the crazy-go-nuts game it is today.

You can challenge the computer to a round or two of Quantum Chess at the homepage for Winsmath's research. Good luck, Geekologists!

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Quantum chess gives humans a fighting chance

A computer scientist has developed a new form of chess in which players can't really tell a given piece's identity until they move it. The game, which mimics the uncertainty principles that underpin quantum physics, is designed to introduce enough uncertainty that computers can't beat humans simply by calculating the consequences of every possible move. "The computer cannot possibly search all the possibilities because we can show there are an uncountable number of them," the researcher explains.

CBC.ca (Canada) | 9/6 SHARE

This story published in SmartBrief on Leadership on 09/08/2010 SEE THE FULL ISSUE

MATT PURKEYPILE ON QUANTUM COMPUTER PROGRAMMING

A COLLECTION OF THOUGHTS ON QUANTUM COMPUTER PROGRAMMING AND RELATED TOPICS.

FRIDAY, AUGUST 27, 2010

Quantum Chess

This is pretty cool, quantum chess, by Akl and Wismath out of Queens University. Interesting change to the game: pieces can be in superposition, say queen and knight.

POSTED BY MATT PURKEYPILE AT 08:54

LABELS: AKL, QUANTUM CHESS, QUEENS UNIVERSITY, WISMATH

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Quantum physics adds twist to chess

September 8th, 2010 Share Share Goto comments Leave a comment

Quantum physics, the mysterious concept that is only comparable to the Big Bang theory, has been making huge waves of debates and spurn out many new concepts and ideas. They might even create reverse-engineering for food, or help us win the fight against zerg rush. Who knows? The unpredictable nature of quantum physics has been so unique, that it has been mimicked by Queen's University computer scientists to invent a new version of chess AI.

In the quantum chess computer game formed by undergraduate computer science student Alice Wismath, a piece that should be a knight could concurrently also be a queen, a pawn or something else. The players would not know what the AI's next step is, as it is rather unpredictable, unlike conventional AIs that have mapped out steps and waypoints that are dead.

"It was very weird," said Ernesto Posse, a Queen's postdoctoral researcher who took part in a recent "quantum chess" tournament at the university in Kingston, Ont. *"You only know what a piece really is once you touch the piece. Basically, planning ahead is impossible."*

SOURCE via *CBC Canada*

Rie

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Weekend links: two on chess

Posted on September 10, 2010 by Jason McIntosh

Via the New York Times' "Gambit" chess blog, we learn of a new controversy surrounding... well, not so much a very old game as a set of very old game pieces, with new evidence causing some to question the national origin of the celebrated Lewis Chessmen.

But really, I just wanted to take the opportunity to mention these extraordinary game pieces on this blog. Even though they've been known to the modern world since the 19th century, I first learned about them only some months ago while kicking around Wikipedia. While they like look like the whimsical work of a modern sculptor — at least to my unschooled eye — they were actually carved some 800 years ago.

I showed pictures of these little guys to a friend this morning, one who actually does know something about art history. She tried to add a little perspective to my astonishment, noting how a lot of medieval artwork looks comically cartoony by modern standards. But while she spoke, all I could think was: boy, I'd love to just reach over and pick one of these pieces up. I recognize intention in their squat, chunky shapes: they were made to thunk down on the board, decisively. I bet they make a really satisfying sound when that happens.

Heading away from the past and into an uncertain future, we discover quantum chess, a computer game by Queen's University student Alice Wismath, based on a concept by Selim Akl, a computer science proessor at Queen's. It appears to be an academic work in progress, though one fun enough to have gained a bit of media traction. Certainly, it's an intriguing idea, using the notion of quantum superposition to add a (perhaps rather thick) layer of tactical surprise to an otherwise pure strategy game:

> *A piece that should be a knight could simultaneously also be a queen, a pawn or something else. The player doesn't know what the second state might be or which of the two states the piece will choose when it is moved.*

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> *"It was very weird," said Ernesto Posse, a Queen's postdoctoral researcher who took part in a recent "quantum chess" tournament at the university in Kingston, Ont. "You only know what a piece really is once you touch the piece. Basically, planning ahead is impossible."*

Like a lot of geeks, I'm enamored with the twisty little passages that represent quantum physics (or at least the closest representation a layman like me can grasp). But even moreso, any science that can plug itself into a cultural foundation of gaming to produce wacky chess variants is my kind of science.

This entry was posted in Uncategorized and tagged board games, chess, chess variants, computer games, games, history, links, variants. Bookmark the permalink.

2 Responses to ***Weekend links: two on chess***

Marc Moskowitz *says:*
September 11, 2010 at 8:06 AM

Two notes on the Lewis chessmen:

1. The Scottish singer Dougie MacLean actually wrote a song about them: Marching Mystery.

2. They make replica sets of the chessman, one of which we have. They are very neat to hold.

Reply

Andrew Plotkin *says:*
September 11, 2010 at 12:37 PM

Someone at PAX had a lovely spherical chessboard -- that is, logically spherical. It was two circular boards on rotary bearings, gear-toothed so that they turned in sync. With beautiful turned-brass pieces. I was not clever enough to take a photo. (Nor to find a photo on the Web. Anybody?)

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GAMING

The Kotaku Guide To Fall Video Games

11:40AM September 29, 2010 | Stephen Totilo

Fall (or spring in the southern hemisphere) is supposed to be the best time of the video game year, the entrée and the dessert after the first nine month's meagre salad and interactive appetiser. But in 2010, winter and spring were bountiful and fall is at risk of seeming pathetic. Could it be? These are your fall games of 2010. More »

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SCIENCE

Quantum Chess Kills Computers

12:00PM September 8, 2010 | Christina Bonnington

An undergraduate computer science student has created a "quantum chess" game that stumps computers' ability to search all possible outcomes of possible moves by having chess pieces mimic particles that are subject to quantum mechanics. More »

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Quantum Chess - You don't know what the piece is going to be until you touch it.

(kotaku.com)

submitted 1 year ago by basscadet

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sorted by: best

[–] **Deimorz** 10 points 1 year ago

That article is a terrible summary of how the game actually works. Read the rules on the actual site. There's quite a bit more to it.

Interesting idea, I suppose, but I don't imagine it's actually that much fun to play. Yes, they've made the game very difficult for a computer to be good at, but they did that by almost completely removing strategy. I don't think that's a very good trade. Computers are going to be extremely good at (most) games with perfect information, that's just a fact. I don't know why it always seems to upset so many people.

permalink

> [–] **zurratype** 2 points 1 year ago
>
> http://arimaa.com/arimaa/ this game is really interesting. Computers are not that great at it yet people can pick it up relatively easy.
>
> permalink parent
>
> > [–] **Merew** 1 point 1 year ago
> >
> > That was his point. Computers are great at things when they have all the information. This game is totally luck based. You could get all queens with every piece every turn, or you could get all pawns. Let's say the king is checkmated by the basic rook strategy.
> >
> > Suddenly, one of the rooks is a bishop.
> >
> > The only constant in Quantum Chess is the king. So a champion chess player has the same chance of winning as a rock as far as the game's concerned.
> >
> > *edit* Failed to java.
> >
> > permalink parent
> >
> > > [–] **Nikoras** 1 point 1 year ago
> > >
> > > It's actually pretty impossible to design a good AI for an RTS like starcraft(1 and 2). That's why the insane AI in SC2 cheats with resources, and you can still kill 2 of them pretty easily. It would be pretty impossible to teach them all the situational positioning and micro techniques
> > >
> > > permalink parent
> > >
> > > > [–] **angstywhiteman** 1 point 1 year ago
> > > >
> > > > AI for real-time works differently than turn-

based. Turn-based works as I described above, whereas real-time AI works by following a set of principals and rules. The game is so complex that it is very difficult to come up with a set of rules good enough to consistently beat a strong player, so it has to cheat to still be challenging.

permalink parent

[–] **Quantris** 1 point 1 year ago

Well there's a little more to it than that; you can use the fact that pieces only randomize on black squares strategically. It makes attacking on black diagonals a matter of luck, though.

permalink parent

[–] **zurratype** 1 point 1 year ago

I was talking about the game I linked to. I wanted to tell the person above me/everyone else about the neat little gem of a game that is easy to get into, hard to master, but easy to destroy computers at. Was your edit referring to not realizing I was talking about something else?

permalink parent

[–] **angstywhiteman** 1 point 1 year ago*

How good a computer is at a game depends on how far into the decision tree it can look. The decision tree is just a tree that branches at each possible decision that either player can make. Each node is a game state that's value can be calculated, and the computer picks the branch that yields the best outcomes. The specifics of this implementation vary from game to game but how far into the future the computer can look depends on the width of the tree, with the width determined by the number of possible branches. The decision tree for a complete game of tic-tac-toe can be drawn on a sheet of paper. Since the computer can hold the entire problem space in memory, it will never lose.

No computer can calculate the entire problem space for chess, so they cannot make perfect decisions. However, they can hold a very large chunk of that problem space which lets them see many moves into the future (was ~15 when I studied AI, probably several more now). They've gotten to the point where the can see further than any human, and thus they almost always win.

With Arimaa and Go there are many more starting configurations and possible moves which means the largest decision tree will be shallower. In these games, computers don't see as far into the future and can still be beaten by very competent humans.

Quantum Chess uses randomness to create an impossibly wide decision tree. The computer can barely see into the future at all and isn't at much of an advantage over the average person.

TL;DR: If there are a lot of possible moves the computer can't see as far ahead. In some games there are enough possibilities that humans can still

win.

permalink parent

[–] **manifestsilence** 1 point 1 year ago

Looks like a great game! :)

permalink parent

[–] **nulspace** 6 points 1 year ago*

Here's to Queen's! ...For breaking chess.

But here's to Queen's!

edit: I just played a game. Every single piece of mine turned into a pawn, and the computer erased my very existence with about 5 queens.

I hate quantum chess.

permalink

[–] **AlwaysLiteral** 0 points 1 year ago

> here's to Queen's!

That really looks wrong. I know it isn't, but it took me a good five seconds to realize you weren't abusing apostrophes there. It just doesn't look right.

permalink parent

[–] **nulspace** -1 points 1 year ago

That's the beauty of Queen's!

permalink parent

[–] **Deafiler** 4 points 1 year ago

When you so completely eliminate skill as a factor, no game is fun anymore.

permalink

[–] **I_love_energy_drinks** 4 points 1 year ago*

Here's the link to the actual game

*Edit: Beat by the computer... didn't seem fair. 5/10

permalink

[–] **[deleted]** 2 points 1 year ago

There's no mention of whether or not different chess pieces can be entangled.

permalink

[–] **goodbyebluesky** 2 points 1 year ago

Do you know *where* the piece will be before you touch it?

permalink

[–] **G_Morgan** 1 point 1 year ago

No but I know exactly how fast they are moving.

permalink parent

[–] **ThePsion5** 2 points 1 year ago

So it's Chess but with 95% of the skill replaced with a random number generator. Awesome?

permalink

[–] **[deleted]** 2 points 1 year ago

Since there's no entanglement and the "superposition" is just a random 50/50 chance assigned at the beginning of the game which quickly decays, a more appropriate title would be "random chess, which we call 'quantum' because it's a buzzword that makes this sound important".

permalink

[–] **gaymathman** 2 points 1 year ago

Why would there be an uncountable number of possible configurations? There are a finite number of pieces on a finite grid with finite possibilities for each piece. I'm pretty sure that the number of configurations are not infinite, much less uncountably infinite.

permalink

[–] **MBuddah** 2 points 1 year ago

"Congratulations, you've destroyed chess."

permalink

[–] **basscadet** [S] 1 point 1 year ago

hehe, I agree, it is not really Chess anymore. Still, it is a neat concept.

permalink parent

[–] **[deleted]** 1 point 1 year ago

Bobby Fischer already tried...

permalink parent

[–] **Teh_Pwnererer** 1 point 1 year ago

That guy was the nicest most enthusiastic prof ever

permalink

[–] **SteamComesToMac** 1 point 1 year ago

That shit's confusing as hell! 3 moves and I should have had their king in checkmate... but nope... My queen mysteriously transformed into a bishop and got wtfbbqpwned in the face!

permalink

[–] **Pastasky** 1 point 1 year ago

Hmmm They should give you two options for each piece

1. Move the piece, moving the piece disrupts it's piece state, meaning until some other piece moves into it's square it has no defined piece.
2. Observe the piece, making it move randomly but you will know what piece it is.

So you could have something that is initially a pawn, move it, then it would be anything. Then next turn you could choose to observe it, meaning it would become a different piece and move randomly.

permalink

[–] **Boorian** 1 point 1 year ago

Reddit! Try a few games!

It takes a while to get the hang of the modifications of the rules. You also develop a few strategies.... For example, once you get a good piece, you might want to keep it on white, so it never goes into quantum state.

permalink

[–] **Grym** 1 point 1 year ago

I think it would have been much more interesting if he had done it so you know what the pieces are and you pick which piece to move like Chess **but you wouldn't know which move it will make**. In other words, you can only pick the piece you want to move. Which of the possible moves it would make would be random.

That way, there is actual strategy involved. You could box your pieces in to increase the chances of success. Or, you could position yourself so that no matter where your piece moved, it would be effective.

Ironically, the more I think about it, computers would probably be better at that kind of game than people.

permalink

[–] **sir_tyrion** 1 point 1 year ago

They went through all the work and then setup the freaking board wrong. White to the right people!

permalink

[–] **MrSnoobs** 1 point 1 year ago

I move my knight and take your queen and I don't.

permalink

[–] **AnthroUndergrad** 1 point 1 year ago*

> "I thought of a game that provides the same kind of unpredictability to both players," Akl said. "The computer cannot possibly search all the possibilities because we can show there are an uncountable number of them."

Actually, although the explanation is pretty crap, I'm rather sure there is a very countable number of possibilities, and as a programmer I bet it's possible to actually make the AI very hard to beat.

I see it like this: The chess pieces are not only finite, there is a finite number of each one, unless they mean each piece can be anything, but you can still know what each one is (between the pre-determined possibilities). Not only can you tell with enough practice which pieces will be forgotten most often by humans, you can also calculate your chances of winning based on the position of each random piece. Sure, it might take a lot of calculations, but I think quantum computers ought to do it pretty fast, and I'm rather sure today's high-end PC's could do it in like 5 minutes, maybe 2-3 with expert optimization.

Edit: After reading the rules and the research paper, I may be wrong, but can't think properly right now due to fatigue... What do you think? Does this make sense?

permalink

[–] **paolog** 1 point 1 year ago

Maybe you don't know what the piece is going to be until you touch it, but you can always say "*j'adoube*".

permalink

[–] **funk_king** 1 point 1 year ago

I crashed it my 2nd turn by selecting a rook that couldn't move. Whups. BACK TO CISC121 for you!

permalink

SCIENCE

Quantum Chess Changes The State Of The Game

Top players have spent lifetimes mastering the subtle nuances of chess, but when a quantum physics twist is added to the age-old classic, it's anybody's games.

BY MIKE FAHEY SEP 7, 2010 12:40 PM

37,188 231

A quantum object can exist in more than one state. When you attempt to interact with it, the wave function collapses and the object settles into a single state. This is the theory applied to Quantum Chess, a new twist on the classic game created by Queen's University undergraduate computer science student Alice Wismath.

Wismath wrote the game based on ideas from computer science professor Selim Akl at Queens. Akl wanted to make the process of predicting chess moves using computers more difficult. In order to achieve this, he decided to have the pieces mimic the way particles like electrons and atoms behave according to the laws of quantum mechanics.

Any given piece (aside from the king) has multiple quantum states. A pawn might also be a queen; a knight a bishop, and so on. The player doesn't know how the piece is going to move until he or she touches it, which forces it to settle into one state.

> "I thought of a game that provides the same kind of unpredictability to both players," Akl said. "The computer cannot possibly search all the possibilities because we can show there are an uncountable number of them."

The twist makes it nearly impossible to plan ahead in a game. Wismath, who programmed the computer to attempt to predict a player's movements had to limit its calculations to the next possible move and the human response after it. Normal computer chess calculations rely on an outcome tree, scoring the potential moves according to the pieces involved. When you don't know what piece is going to pop up, it becomes extremely tough to calculate scores.

Ernesto Posse, a Queen's postdoctoral researcher and longtime chess player won a recent Quantum Chess tournament held at Queens University in Kingston, Ontario, but he doesn't attribute the win to skill.

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> Posse, who has been playing chess for 15 years, said the new game doesn't much resemble the classic contest he likes for its tactics, strategy and history: "I would say it's 'chess-inspired.'"
>
> He was one of the winners in the tournament , but credits luck.

Other players, like Chris Perez, a master's student in computer science, say there is still room for strategy. He suggests using your memory to figure out which pieces on the board have yet to be revealed, planning out your moves on the chance that a weak piece might be hiding a much stronger one.

> "Adding an element of chance makes things more fun."

Want to try it out for yourself? Play Quantum Chess here.

Quantum physics adds twist to chess [CBC News]

Contact Mike Fahey: EMAIL THE AUTHOR COMMENT FACEBOOK TWITTER

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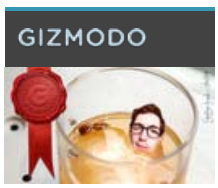

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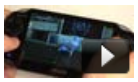
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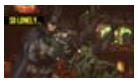
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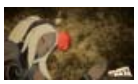
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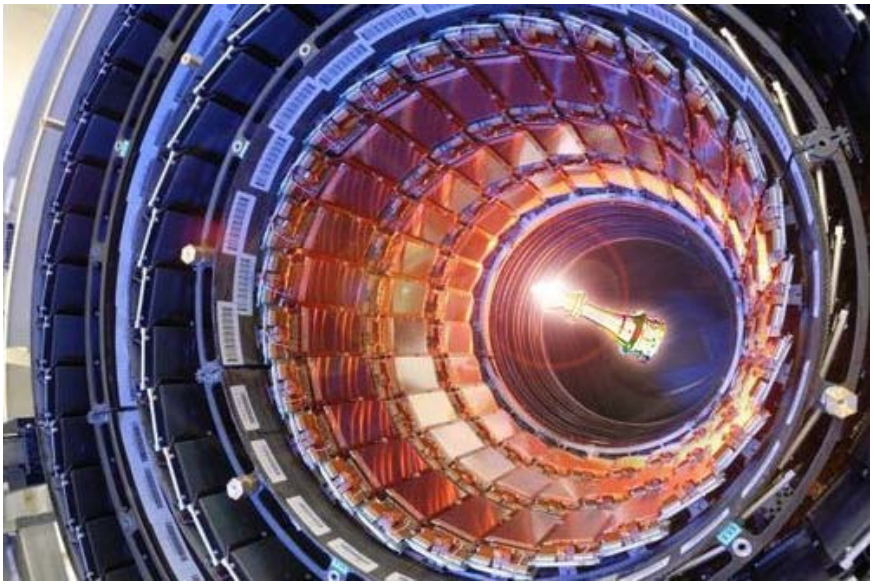
Quantum Chess Kills Computers

Gizmodo Australia | September 7th, 2010 at 10:00 pm |



An undergraduate computer science student has created a "quantum chess" game that stumps computers' ability to search all possible outcomes of possible moves by having chess pieces mimic particles that are subject to quantum mechanics. (more...)

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Quantum Chess Changes The State Of The Game [Science]

Quantum Chess Changes The State Of The Game [Science]

9/7/2010

Top players have spent lifetimes mastering the subtle nuances of chess, but when a quantum physics twist is added to the age-old classic, it's anybody's games.

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Quantum Chess

Nerds...

http://kotaku.com/5631851/quantum-ch...te-of-the-game

"QUOTE"

09-07-2010 #2

Psycho Alchemist
Fug-I
Fug Knight

Psycho Alchemist
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[OFFLINE]

my brain died ater the first par.....

"When you attempt to interact with it, the wave function collapses and the object settles into a single state"

"QUOTE"

09-07-2010 #3

Willy Wonka
Residential Candyman
Fug Queen

William 'Dr. Slamdunk' Wonka
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Tournaments Won: 1

Join Date: Jan 2010
Location: The candyfactory(wherever it is)
Posts: 2,141
Chats: 82650

[OFFLINE]

You don't know what a piece is, until you touch it. Basically it's all based on luck and random chance. Add in the word quantum physics and it just sounds a lot more fancy. It's like rolling the dice to see what piece it really is.

"QUOTE"

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COMBINATORIAL GAME THEORY

THOUGHTS ON GAMES (WITH PROBABLY TOO MUCH COMPUTATIONAL COMPLEXITY) EVERY TUESDAY AND FRIDAY DURING THE SCHOOL YEAR

Showing posts for query **quantum chess**. Show all posts

WEDNESDAY, SEPTEMBER 15, 2010

Quantum Chess

Recently there was some cool board game buzz about combining quantum super-positions and chess: Quantum Chess.

The game was designed by Selim Akl as a response to the brute-force superiority of computers in standard chess. Alice Wismath, working with Dr. Akl, implemented a non-quantum version (they point out: "a true quantum board may be a few years in the future") as a Java 1.6 applet (I had to upgrade my browser's Java).

The basic idea behind this game is that the identity of each piece (aside from Kings) exists in a super-position before it is moved. The actual piece will be one of two different options (for example, either a rook or a knight) which is only known once you decide to move that piece. Thus, each turn consists of first choosing a piece to move, then determining what type of piece it actually is, then moving that piece.

Naturally, since the value of the pieces is based on some randomness (quantumness is considered randomness, right?) this is not strictly a combinatorial game. Until we have quantum boards, it's not exactly a board game either... Still, we can implement this in a non-quantum way using a big checkerboard and two sets of chess pieces. By putting two pieces on the same square to indicate the super-position for non-collapsed pieces, you can then decide the actual value by flipping a coin once the piece is chosen.

In any case, this is an extremely original game and an excellent work

COMBINATORIAL GAME MAN

artist: Molly Dannaher

WHAT IS THIS NONSENSE?

This blog is devoted to Combinatorial Game Theory! Combinatorial games are two-player games with no randomness, perfect information (no one has any hidden information) and no draws allowed, though sometimes topics stray into other types of games as well.

To keep track of some CGT facts I'm interested in, I started this table of game properties.

Please let me know if you are interested in either writing a guest post or suggesting a topic. I would like this to be more reflective of CGT

by Akl and Wismath. With any luck this will bring interest into both games and general quantum... ness. As you can see, I need a lesson on quantum mechanics and quantum computing!

Note: I will be out of action on Tuesday, so the next post will probably not occur until next Friday.

POSTED BY KYLE AT 10:51 AM 0 COMMENTS 
LABELS: CHESS

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as a whole and not restrict it to my take on things. Additionally, please help me fill out the table of game properties, either by suggesting games or letting me know about results!

WHO AM I?

KYLE

Kyle got his PhD in board games from Boston University in 2009 and is now an assistant professor of Computer Science at Wittenberg University. He has helped develop some games, most notably Atropos, a game played on the Sperner Triangle.

VIEW MY COMPLETE PROFILE

GAMESTERS AND OTHER COMBINATORIAL GAME LINKS

Aviezri Fraenkel
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Combinatorial Game Suite
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Robert Hearn
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Wikipedia: Combinatorial Game Theory

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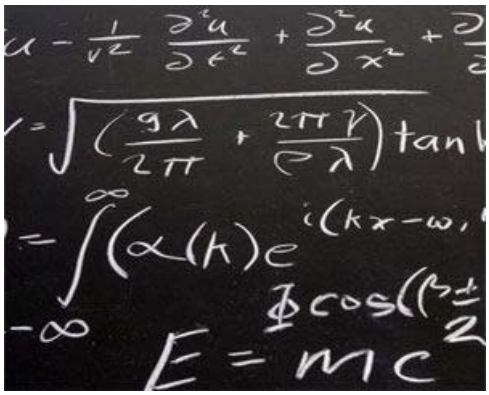
Project Risk Management
Matthew Peters' Blog



About

Welcome to the Project Risk Management Blog – a resource I hope you will find delivers insight into the practice of Risk Management from a unique perspective.

To start, let's talk about who I am. I work for CAI, a private IT services and consulting firm, in a Research Engineering/IP Development capacity. My interest in Risk Management for projects is focused largely on Risk Identification and Risk Measurement (how can you manage a risk if you don't know what it is or how "big" it is?). My background is industrial and academic – I am currently ABD for a PhD in Information Sciences & Technology at Penn State University, and during my tenure there I also had the opportunity to do consulting work for large clients in a variety of areas of Information Science.

That's enough history – the more important topic is the collection of assumptions I'm making in writing this blog, so let's get into them to level-set:

1) "You can't manage what you can't measure." It's not my quote, but I do agree (in fact, I'm not sure who it does belong to – in various wordings it's been attributed to a lot of people, the most common of which seems to be Peter Drucker, and the oldest of which seems to be Galileo Galilei).

2) Academic research has more to offer industry than many people in industry seem to realize.

3) Several of the most difficult problems

Quantum Risk

Computer scientists at Queen's University have developed a new form of chess in which players (including computers) can't identify a chess piece until they move it. They call it Quantum Chess, and it's amazing because taking the knowledge of the piece out of the equation actually makes the combination of potential moves incalculable – without being able to project movements based on piece locations, a computer can't rule out any possible moves, thereby making the total possibilities nearly infinite. You can check out the whole story here.

The story caught my eye because I think it's so similar to risk management strategies of today. How often do organizations actually know enough about their risks to predict the potential outcomes? Queen's University worked very hard to take measurement out of the chess equation. We often don't work hard at all to bring measurement to the project risk equation – as a result, both of our outcomes are pretty much the same: unpredictable.

Fortunately for us, we don't actually have to work as hard as the CS folks at Queen's to bring measurement to IT projects. For us, a little bit of measurement can go a long way. Even without a firm plan, collecting data will yield a positive result – although you're better off with a plan if you want to get better ROI on that data. But the fact of the matter is, even some very simple project performance baselining will help you start to predict how similar projects may perform in the future – which is exactly how the early

Ask Matthew

If you have any questions about the blog content or specific questions on how CAI's Project Risk Management can help your organization, "Ask Matthew."

Question :

i'm a student on project risk management research work. Is there a way you can help me on this research work?

Answer :

There are lots of resources available for project risk research. I would propose the IT Metrics & Productivity Institute's back catalog of presentations on the topic (http://www.itmpi.org/webinars/defau...

Read more

Question :

Hi - I think I attended a presentation you did at a conference in Manhattan. You talked about a software product that could help with risk idnt. and mit. Could you tell me what that was?

Answer :

I think you're correct - I've presented on that topic and similar ones at several conferences, so odds are good it was me! To answer your question, the solution I referenced is called Automated Project Office. It's a SaaS ...

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industry has to tackle (Risk being one of them) are research problems at their core.

4) Academic research isn't perfect, and in fact, it commonly does not tell a consumer what they can actually do about the problem being reported.

5) Risk can never be eliminated – and this shouldn't be our goal. Our goal should be to know as much about the risk as possible (because this is how we make informed decisions about the risk, i.e. – manage it).

My objective with this blog is to start a conversation about how to make Risk Management a manageable activity for projects. I'll be pointing readers to current events that give some perspective on Project Risk Management, and also to papers and research efforts that bring new knowledge and methods about Risk to the table.

This is obviously a very big topic, so day-by-day I'll take on a little bit at a time.

I hope you'll choose to participate in the conversation, or that you find it useful in the very least.

Continue Reading

chess playing computer designs started.

Continue Reading

Corporate Training Keyword Cloud

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Does Every Organization Have the Same Risks and Make the Same Mistakes?
Does Every Organiz...
One of our primary contentions is that everyone seems to have the same risk issues and make the same mistakes. Wondering if we could get a summarized listing, we surfed ...

Taking Risks in ...
An article in today's Scientific ...

Automated Logic...
Hi - I think I ...

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Everybody'...

Actions

Wiki Home
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Acknowledgments

Selim G. Akl [3]

Selim G. Akl,
a Canadian computer scientist and Professor at Queen's University in the School of Computing, where he leads the Parallel and Unconventional Computation Group. His research interests covers algorithm design and analysis, in particular parallel and unconventional computing. He made his Ph.D. *Statistical Analysis of Some Properties of Solutions to the Traveling Salesman Problem* under the supervision of Monroe Newborn [1] at McGill University in 1978, where he also researched on the principal continuation and the killer heuristic [2] . As postdoc at Queen's University he published various papers on Parallel Search.

Quantum Chess

Quantum Chess, a variant of the chess game invented by Selim Akl, uses the weird properties of quantum physics. Unlike the chess pieces of the conventional game, where a pawn is a pawn, and a rook is a rook, a quantum chess piece is a superposition of "states", each state representing a different conventional piece. In Quantum Chess, a player does not know the identity of a piece (that is, whether it is a pawn, a rook, a bishop, and so on) until the piece is selected for a move. Once a piece is selected it elects to behave as one of its constituent conventional pieces, but soon recovers its quantum state and returns to being a superposition of two or more pieces [4].

Table of Contents

On New Pages
Recommended Reading
Wikispaces Help

In the quantum chess computer game created by computer science student Alice Wismath (right), a piece that should be a knight could simultaneously also be a queen, a pawn or something else. Wismath based the game on an idea proposed by computer science professor Selim Akl [5]

Selected Publications

[6] [7] [8]

1977

- Selim Akl and Monroe Newborn (1977). *The Principal Continuation and the Killer Heuristic*. 1977 ACM Annual Conference Proceedings, pp. 466-473. ACM, Seattle, WA.

1980

- Selim Akl, David T. Barnard and R.J. Doran (1980). *Design, analysis and implementation of a parallel alpha-beta algorithm*, Department of Computing and Information Science, Queen's University, Kingston, Ontario.
- Selim Akl, David T. Barnard and R.J. Doran (1980). *Simulation and Analysis in Deriving Time and Storage Requirements for a Parallel Alpha-Beta Pruning Algorithm*. IEEE International Conference on Parallel Processing, pp. 231-234.
- Selim Akl, David T. Barnard and R.J. Doran (1980). *Searching game trees in parallel*, Proceedings of the Third Biennial Conference of the Canadian Society for Computational Studies of Intelligence, Victoria, B.C.

1981

- Selim Akl and R.J. Doran (1981). *A comparison of parallel implementations of the alpha-beta and Scout tree search algorithms using the game of checkers*, Department of Computing and Information Science, Queen's University, Kingston, Ontario.

1982

- Selim Akl, David T. Barnard and R.J. Doran (1982). *Design, Analysis, and Implementation of a Parallel Tree Search Algorithm*. IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol 4, No 2, pp. 192-203. ISSN 0162-8828

1985

- Selim Akl (1985). *Parallel Sorting Algorithms*. (Academic Press)

1989

- Selim Akl (1989). *The Design and Analysis of Parallel Algorithms*. (Prentice Hall)

1993

- Selim Akl and Kelly A. Lyons (1993). *Parallel Computational Geometry* (Prentice Hall).

1997

- Selim Akl (1997). *Parallel Computation: Models and Methods* (Prentice Hall).

2006

- Selim Akl (2006). *Even Accelerating Machines are not Universal*. Technical Report No. 2006-508, School of Computing, Queen's University, pdf

External Links

- Selim Akl's Official Home Page
- Selim Akl from Wikipedia
- Non-Universality in Computation: The Myth of the Universal Computer

References

1. ^ Monty Newborn - Ph. D. Students: Current and Former
2. ^ Selim Akl and Monroe Newborn (1977). *The Principal Continuation and the Killer Heuristic*. 1977 ACM Annual Conference Proceedings, pp. 466-473. ACM, Seattle, WA.
3. ^ Selim Akl's Official Home Page
4. ^ Quantum Chess
5. ^ Quantum physics adds twist to chess, CBC News - Technology & Science, September 6, 2010
6. ^ Selim Akl - Publications
7. ^ Selim Akl - Technical Reports
8. ^ ICGA Reference Database (pdf)

What links here?

Page	Date Edited
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Selim Akl	Apr 7, 2011 2:22 pm

Up one level

The Great Gatsby Plays To Mate

By Jennifer Shahade
September 29, 2010

Dr. Graham Burnett

Have you ever wondered how *Crime and Punishment* would fare against *Madame Bovary* in a chess match? OK, maybe not. But after meeting Princeton professor D. Graham Burnett, you may find your chess & literature merging in more contexts than overcrowded bookshelves. Together with philosopher and programmer W.J. Walter, Dr. Burnett created Novel Chess, a program that turns novels and other texts into chess competitors. They first described novel chess in "Reading to the Endgame" in the Fall 2009 edition of the art & culture magazine, Cabinet.

A chessboard consists of sixty-four squares commonly designated by alphanumeric coordinates (a-h across the x-axis and 1-8 up the y-axis). If one were to replace the numerical assignations with a continuation of the alphabet (running, for instance, i-p up the y-axis), each square would be designated uniquely by a two-letter coordinate that we will call a "tuple." Now imagine setting up a simple computer program that knows the rules of chess-nothing more. It knows, for instance, all the moves that are makeable by a given piece, and it can keep track of a chessboard (updating what pieces are on which squares as moves are made). Suppose further that this program takes directions for making moves in the form of a pair of "tuples"-namely, one letter-pair designating the coordinates of a square occupied by a movable piece, and then a second letter-pair designating the coordinates of a square to which that piece can be legitimately moved.

White Spiral

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3	45	22	7	6	5	16	35	62
2	44	21	20	19	18	17	36	63
1	43	42	41	40	39	38	37	64
	a	b	c	d	e	f	g	h

Black Spiral

8	64	37	38	39	40	41	42	43
7	63	36	17	18	19	20	21	44
6	62	35	16	5	6	7	22	45
5	61	34	15	4	1	8	23	46
4	60	33	14	3	2	9	24	47
3	59	32	13	12	11	10	25	48
2	58	31	30	29	28	27	26	49
1	57	56	55	54	53	52	51	50
	a	b	c	d	e	f	g	h

We now have everything in place to convert two texts into a game of chess: we simply feed the program the two novels, asking it to play one text as "white" and the other as "black"; the program searches through

Live from Siberia!

World Youth Delegation Set

Lahno Wins World Women's Blitz

Irina Krushing at the World Women's Blitz

The US Chess Scoop on Magnus vs. the World

US Class Champs Set for Oct 1-3 in Houston

US Chess School Comes to Seattle, Part II

Back to Scholastics: National Youth Action and K-12s Set for 2010

Application Deadline Approaches for Schein-Friedman Scholastic Project

Bent Larsen Dies at 75

Magnus Faces World in G-Star RAW Chess Challenge

GM Pascal Prevails in The Battle of the Border

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the white text until it finds the first tuple corresponding to a movable piece (in the case of an opening move, either a pawn or a knight), and then, having settled on the piece that will open, continues searching through the text until it encounters a tuple designating a square to which that piece can be moved. When it has done so, the computer executes that move for white, and then goes to the other text to find, in the same way, an opening move for black. And so it goes: white, black, white, black, until-quite by accident, of course, since we must suppose that the novels know nothing of chess strategy (and our program cannot help them, since it knows only the rules of the game)-one king is mated.

There are more details on how this all works in the full Cabinet Magazine piece (for which Burnett is also an editor) and you can try the game out for yourself at novelchess.org.

Burnett also introduced the game to art lovers and chessplayers at the New York City non-profit Chess-in-the-Schools' (CIS) Associate Board benefit, "The Algorithm", held this summer at the White Box Gallery.

NM Laura Ross and FM Andrei Zaremba at the Chess-in-the-Schools Event, The Algorithm, Photo Theo Morrison

Burnett talked to CLO about his own background in chess, the CIS event and the critical *Huckleberry Finn--Metamorphosis* face-off.

Jennifer Shahade (JS): How did you come up with the idea of Novel Chess?

Dr. Graham Burnett (DGB): I suppose the whole thing probably emerged out of a long-standing interest in codes and cryptography. Not a scholarly interest or anything. Just an ordinary preoccupation. Having read a bit about various ways of encoding information within what appears to be plain old writing, I began to play around with various more and less paranoiac ways of "reading." Reading for "hidden" messages. The origin of Novel Chess lay in these experiments. What would it be like to try to "find" the chess matches encoded in *War and Peace*? It was at this point that I teamed up with my dear friend and collaborator W. J. Walter, a philosopher who lives in Paris, is pretty good at chess, and a skilled programmer. We went to work.

2006
Chess Life for Kids

Announcements

- **Thanks to our USCF Benefactors!**
- Interested in being a TD at a USCF National Event? **Click Here!**
- **National K-12** (Minneapolis, April 13-15), **National K-9** (San Diego, CA April 27-29) **National K-6** (Nashville, May 11-13)
- **All-Girls Championship** (Chicago, April 20-22)
- US Championship activity rules, changes to Olympiad Qualification and World Youth rules.
- TD Certification Rules and Rulebook changes updated (pdfs)
  - USCF Fees for FIDE Change
  - USCF National bidding brochure
  - Reports & Standings pages for Grand Prix, JGP, MAP, top players by state, etc.

JS: When Garry Kasparov lost to Deep Blue in 1997, the press went wild. Since then, computers have furthered their dominance. What does novel chess add to the idea of artificial intelligence?
DGB: I think we are more interested in intelligent artifice than artificial intelligence. The "game" of Novel Chess involves a reimagining of works of literature through the chess board. Our little algorithm "reads" a pair of novels against each other on the board, converting strings of text into sequences of moves.

Novel Chess turns the basic engine at the heart of a computer chess program into a tool for the production of a new kind of writing. Not wholly new, of course, since we have been inspired on this project by the work of George Perec, François Le Lionnais, and others-the French experimental writers who worked under the collective program known as OuLiPo, the "Ouvroir de Littérature Potentielle," or the "Workshop of Potential Literature." These guys, who were most active in the 1960s and 1970s, had a strong interest in the intersection of mathematics and language, and they were especially obsessed with games-chess above all. They liked the idea of "story-making machines," and that is sort of what we are after with this project. A machine that makes new stories out of old stories, and that sets constraint conditions for rewriting old stories so that they can do new tricks.

JS: What types of texts seem to do well in competition?
DGB:Well, as we write in our little essay on the experiment, it seems as if French novels do particularly well. Go figure. We're still running larger batch matches to see if that finding is robust. We'll see.

Dr. Burnett explaining Novel Chess at the CIS event, Photo Theo Morrison

JS: If you were to design a book to defeat all comers in Novel Chess, how would you go about it?
DGB: In the newest version of the software-the one currently online -you can actually upload any text you want. This makes it possible to write novels or short stories specifically structured to defeat others. This is a

moderately entertaining, if slightly insane, exercise. At one level it's a little like writing poetry, since you have to encode the moves in particular letter combinations, and you have to do so while keeping track of the overall frequencies of letters in the text, since these ultimately determine the coordinate plane on which the games play out-a recursive problem. It is a bit of a mind-screw. It is easier to make editorial "adjustments" to a given novel, to help it defeat some other one. In our original version Kafka's *The Metamorphosis* defeated *Huckleberry Finn*. That drove us crazy. So we tarted up the first chapter of Huck Finn so it could mop the German. Very satisfying. Could you write a novel or short story that was especially good against various opponents? Maybe, but it would be very tough. What gets selected as a possible move changes depending on the configuration of the board, and that is a function of the opponent.

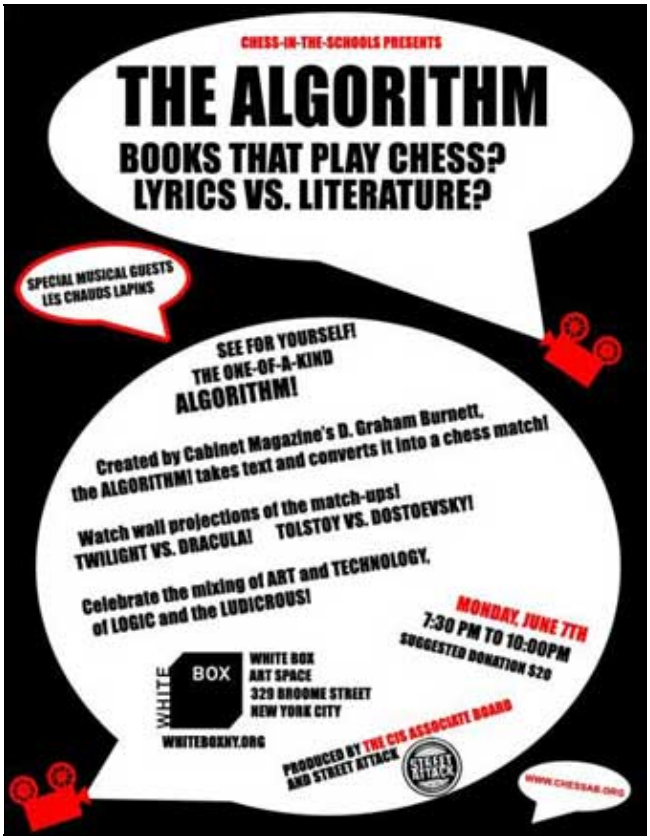
JS: What is your background and interest in chess itself?
DGB: Actually I learned the game from Walter himself, who taught me as a boy. I am a solidly poor player. But a wannabe. The kind of guy who shows up at the chess clubs in the West Village, gets humiliated, goes home, goes back. I used to think someday I might be good, and in college I used to play these endless games with another guy who thought he was a genius. We took it very seriously. Games went on for days. We both sucked, of course. I have a chess clock on a shelf in my living room, but it is basically for show.

JS: I recently read an article about a chess program in which people did not know which piece they were playing with until they clicked on it! This reminded me of your project and also two of mine, roulette chess & poker chess, since they all play with randomness and chess. Critics of such projects say that chess is a pure game because it's 100% skill and that introducing randomness into it makes it like so many other games, backgammon, poker, etc. How would you respond to a statement like that from a chess purist?

Burnett plays online poker with the mysterious W.J. Walter -- Paris-based gamer, programmer, philosopher.

DGB: I love this (Quantum Chess)! Back in college, when I was still fantasizing about my future as a grandmaster, I used to devour myself in towering and preposterous rages when I would lose one of our big showdowns. At the heart of that anger was a sense that chess measured intelligence. This is, of course, quite silly, or at least that's what I like to

say now that I have accepted that I am a crap chess player and always will be. The Italian writer Primo Levi once argued that chess players and writers were both very irritable sorts, because, in his view, they shared a predicament: there is no one but yourself to blame for failure. In that sense, I am with the purist: there is something simultaneously terrifying and magnificent about the games of "pure" skill.



JS: Tell us about the event you partnered with Chess-in-the-Schools with. How did you present novel chess as a public spectacle?

DGB: It was pretty great, I think. We did it at this gallery downtown, and there was a really nice crowd. A French ukulele band played a couple of sets, and they were excellent! The organizers had these huge projection screens on the walls where Novel Chess matches were unfolding at all different speeds-it was a party. I spoke for a while, made people laugh, and eventually got heckled by an intoxicated guy in a cowboy hat who, it turned out, had been Rothko's studio assistant back in the day. Seemed like a bum, but owned the building. Welcome to the Big Apple!

Christina D. Burnett and Dr. Graham Burnett, Photo Theo Morrison

FM Andrei Zaremba and Associate Board member GM Pascal Charbonneau share a laugh before Dr. Burnett's presentation,Photo Theo Morrison

Guest Andrew Jerell Jones with event organizer and CIS Development Associate Claire Wasserman, Photo Theo Morrison

JS: What do you think serious chessplayers can learn from this game?
DGB: I am in awe of competitive chessplayers, and hesitate to project from my pea-sized chess brain any suppositions concerning the inner life of truly skilled players. I guess I would mostly hope that they would find the thing amusing, a little leavening for their grey matter. Those players who have an appetite for experimental literature, literary (post) modernism, and the relationship between contemporary art and information theory may be more patient with the whole madcap enterprise.

Play around with the game yourself at novelchess.org and read the original Cabinet Magazine article. Find out more about D.Graham Burnett on his Princeton homepage.

See more photos from the Algorithm on the CIS Associate Board website. The next event will be held at Mark Murray Fine Paintings on October 14, 6:30-9:30. Contact cwasserman@chessintheschools.org for more info.

Quantum Chess!

September 8, 2010 4:43 PM Subscribe

"Computers can search all possible outcomes of all possible moves in conventional chess and beat even top human players, so Akl wanted to make the computation more difficult." The result? **Quantum chess!** [via]

posted by **brundlefly** (31 comments total) 2 users marked this as a favorite

Tags:
chess
math
programming
quantumphysics

The computer beat me before I even clicked on the link! *Or did it?*
posted by **Blazecock Pileon** at **4:48 PM** on September 8, 2010 [1 favorite]

At least no cats die in this example.
posted by **ALongDecember** at **4:52 PM** on September 8, 2010 [1 favorite]

Rules are **here**.
posted by **Serf** at **4:54 PM** on September 8, 2010 [1 favorite]

Can you program the computer to "accidentally" knock the board over if it's losing?
posted by **The Card Cheat** at **4:57 PM** on September 8, 2010

To my knowledge, even the best computer programs do not search *every* move, which would still take a prohibitive amount of time. Instead they use a database of known positions, heuristics, and general strategy, combined with deep move search, to arrive at their move.
posted by **JHarris** at **4:58 PM** on September 8, 2010 [3 favorites]

... or you could just play **go**.
posted by **tom_r** at **5:01 PM** on September 8, 2010 [1 favorite]

Computers can search all possible outcomes of all possible moves in conventional chess

I'm pretty sure this is a false statement. At least, it's not true that this HAS been done. It's been done for checkers, but not for chess.
posted by **Salvor Hardin** at **5:02 PM** on September 8, 2010

ALongDecember: *At least no cats die in this example.*

You're playing it wrong.

Or are you?
posted by **MCMikeNamara** at **5:05 PM** on September 8, 2010

I played and **reviewed** this earlier today.

tl;dr summary: I can live with taking away castling and en passant, but take away check and checkmate and I'm sorry but that's not chess any more. It's a whole new game that inherits some rules from chess and uses a chess board and chess pieces, but it isn't chess.
posted by **motty** at **5:07 PM** on September 8, 2010

It is an embarrassingly false statement.

It is not true.
posted by **Joe Beese** at **5:31 PM** on September 8, 2010

To be clear...

Although computers now can beat world champions in tournament conditions, their doing so requires a great deal more than simply simulating every possible sequence of moves - which it is computationally unable to do more than several moves out.
posted by **Joe Beese** at **5:34 PM** on September 8, 2010

My dad and my brother and I once made up a game which was sort of like a cross between battleship and chess. Each player had his own board hidden from the other, and would announce when moving a piece what that piece was, and where it was departing from, but not where it was moved to. It's status remained unknown until it was moved again, and then it might collide with pieces which had been moved after it had been moved. I had written up the rules and put them up on geocities ages ago. We never really came up with a proper name for that game, but we considered calling it "quantum chess."
posted by **smcameron** at **5:39 PM** on September 8, 2010 [8 favorites]

Ugh, where'd that extra apostrophe come from?
posted by **smcameron** at **5:41 PM** on September 8, 2010

Metafilter: in a quantum superposition of two piece type states: a primary type and a secondary type.
posted by **blue_beetle** at **5:45 PM** on September 8, 2010

I win! Playing without reading the rules, the first time, was terribly confusing.
posted by **Michael Roberts** at **5:46 PM** on September 8, 2010

Ugh, where'd that extra apostrophe come from?

Your grammatical wave-function collapsed after preview.
posted by **device55** at **6:10 PM** on September 8, 2010 [1 favorite]

Yeah, the search space for chess positions is huge. Crazy huge. I don't remember if it's more-than-the-number-of-atoms-in-the-universe huge, but it's damned big. Checkers is a solved problem; chess is just a problem that we've built really good computers to take approximate

shots at. (And, yes, Go is just completely out of reach.)
posted by **cortex** at **6:14 PM** on September 8, 2010 [2 favorites]

Checkers is a solved problem; chess is just a problem that we've built really good computers to take approximate shots at. (And, yes, Go is just completely out of reach.)

Do any mathematicians/physicists/etc. have any idea if there is a significant difference in complexity for chess and Go? I'm just curious at the mathematical differences between chess and Go's gameplay. Thanks!
posted by **kurosawa's pal** at **7:07 PM** on September 8, 2010 [1 favorite]

Googling suggest that the total permutations of chess positions are 2E+46. More than the number of stars in the observable universe, less than the number of atoms. About 100 million times as hard as brute-forcing a 128-bit key.

Which is to say, there's probably a machine in the basement of NSA that's solved chess by backwards induction.
posted by **ROU_Xenophobe** at **7:10 PM** on September 8, 2010

Do any mathematicians/physicists/etc. have any idea if there is a significant difference in complexity for chess and Go? I'm just curious at the mathematical differences between chess and Go's gameplay. Thanks!

Complexities of some well-known games
posted by **kmz** at **7:20 PM** on September 8, 2010 [1 favorite]

Do any mathematicians/physicists/etc. have any idea if there is a significant difference in complexity for chess and Go?

They do! I'm just an armchair complexity nerd so I can't point you to the state of the art or anything, but as a rough point of scale you can look at raw board states as a point of comparison: chess is a 8*8 matrix, Go is 19*19. A really, really rough napkin calculation might take those numbers and throw them as exponents into a value like 2^n to get a basic sense of scale:

chess as $2^{64} = 1.84467441 \times 10^{19}$
Go as $2^{361} = 4.69708517 \times 10^{108}$

Those are both huge numbers, but the size of the raw Go space makes chess look like tic-tac-toe.

Non-silly approaches to the complexity of the problems are a lot more complex than this; aside from just restricting the board states we consider to actual legal states (as opposed to every possible configurations of pieces on the board), there's a lot of symmetry and subdivision that can with care be done to the board states themselves to further reduce just how many distinct configurations we need to deal with. But so far even all that cleverness applied to either game has only helped reduce somewhat the still-overwhelming burden.

And whereas world-class chess computers can now compete with and beat world-class human players, no existing Go computer yet built can stand up to even reasonably solid players, let alone grandmasters.
posted by **cortex** at **7:22 PM** on September 8, 2010 [1 favorite]

The initial branching factor for chess is 20, which quickly escalates and reaches an average observed branching factor of about 35.

The number of distinct chess positions after N moves are:
After each player makes 1 move: 400
After 2 moves apiece: 72,084
After 3 moves apiece: over 9 million
After 4 moves apiece: over 318 billion
The estimated number of positions after the first 10 moves apiece is:
169,518,829,100,544,000,000,000,000 =~ $10^{29.229}$

By the way, the longest theoretically possible chess game is 5,949 moves.

Let's take a 40 move game with a branching factor of 35 = 35^(2*40)=10^{120} different possible games. This is the **Shannon number**, an estimated lower bound of the number of variations needed to be examined in order to calculate a chess solution. This is commonly compared to the number of hydrogen atoms in the universe, $3*10^{79}$.

There's good news: a recent upper bound on the number of possible positions **has been determined** to be:
4519364062606220521373573917155030904798405071 8 =~$10^{46.65}$
Which is much smaller and won't take as long.

The age of the universe (according to the Big Bang Model) is about $4.3*10^{17}$ seconds. So, a supercharged nanillion-hertz iPad (10,000 times faster than a mere yottahertz knockoff, and with a more reliable battery) working on this problem since the beginning of time would be just about finished exhausting the search space now. So it's definitely *possible*.

But wait! Where are you going to put your answer, of what move to make every turn? (You don't want to repeat this search this every time you play, do you?). Let's assume that your solution only needs one atom to store the winning response to each position. Realistically, it won't have to store a move for *every* position, but realistically it will need more than one particle per position so let's accept this as a lower bound. The good news is that with $10^{46.65}$ positions to encode, there are more than enough atoms available in the universe to store the entire solution with this method, with enough matter left over to form a physical board, pieces, and maybe an opponent.

However, large, nonrotating masses over the Chandrasekhar limit of approximately $2.85*10^{30}$kg, or about 1.4 solar masses, will suffer gravitational collapse into a neutron star. If the mass is greater than the Tolman-Oppenheimer-Volkoff limit, between 1.5 and 3.0 solar masses, it will collapse into a black hole. So, not only do we not have enough time to calculate the solution, storing the complete solution is impossible with our current understanding of matter.

*All figures from google/wikipedia. For entertainment purposes only.
posted by **ceribus peribus** at **7:53 PM** on September 8, 2010 [26 favorites]

And whereas world-class chess computers can now compete with and beat world-class human players, no existing Go computer yet built can stand up to even reasonably solid players, let alone grandmasters.

In the last few years, Go programs have made it to dan level, largely through the discovery of new Monte Carlo-based techniques. **Zen19**, for example, is currently holding down a 3d rating on **KGS**. So I think they finally have made it to the point where they're standing up to reasonably solid players. It will still be a while before they can compete on even terms with pros, though.
posted by **dfan** at **8:35 PM** on September 8, 2010

Dearest ceribus peribus,
Thank you so much for cementing my faith in Metafilter.

Yours truly,
posted by **kurosawa's pal** at **9:19 PM** on September 8, 2010

Some fun further dorking in **this thread from 2007**, though more conversational than computational in nature.

In the last few years, Go programs have made it to dan level, largely through the discovery of new Monte Carlo-based techniques.

Neat! I am out of date.
posted by **cortex** at **9:31 PM** on September 8, 2010

smcameron - that sounds a bit like **Kriegspiel**, but without having to have a referee.
posted by **labberdasher** at **10:14 PM** on September 8, 2010

"As an online discussion of chess grows longer, the probability of a comparison involving the computational complexity of Go approaches 1." -- **Go wins law**
posted by **logopetria** at **2:10 AM** on September 9, 2010 [3 favorites]

Thank you ceribus peribus, that was very interesting!
posted by **Sutekh** at **5:51 AM** on September 9, 2010

I don't think we've exhausted the checkers search space, either. **Chinook** is the best checkers player. It has apparently been proved mathematically that you cannot beat Chinook under any circumstances. But it didn't do this by exhausting the search space. There's a bunch of known play programmed in. The creator of Chinook wrote **a book** about it. I started to read it once.

Apparently, everybody thought that Checkers was "solved" in the 1950s because of boasts by **Claude Shannon**. It turned out that he had started the science of computer games-playing AI, and made a Checkers program that could beat a reasonable player, but this stuff got overhyped to the point where everybody thought it was all over for human checkers players.
posted by **Galaxor Nebulon** at **7:57 AM** on September 9, 2010

I don't understand how removing check changes anything more than the quantum concept already does. If you have to touch a piece and collapse its waveform in order to make check, you can then proceed to move it to the king's square on the same turn. The rules don't appear to provide for leaving pieces in a classical state in between turns, with the exception of the King.
posted by **LogicalDash** at **10:56 AM** on September 9, 2010

The board consists of the usual 64 squares of alternating black and white... with the usual misplacing of a white square on the player's left.
Each player's pieces are initially positioned as in traditional chess, on the first two rows,... with the traditional swapping of King and Queen positions. (See board, above)
posted by **MtDewd** at **11:01 AM** on September 17, 2010

« **Older** If you loved Stanley Kubrick's 2001: A Space Odyss... | Ganja yoga combines marijuana ... **Newer** »

The Virtuosi

Giving some account of the undertakings, studies, and labors of the ingenious in many considerable parts of the Cornell physics department.

Wednesday, September 8, 2010

Quantum Chess!

Posted by Sam at 9:48 PM

Ever find out when you're playing chess that the Queen you reached for is actually a pawn? Probably not. But most chess games aren't affected by the weirdness of the quantum world. This one is: **http://research.cs.queensu.ca/Parallel/QuantumChess/QuantumChess.html**

| | |

quantum-chess

Chess with the uncertainties of quantum physics

Project Information

Activity None
Project feeds

Code license
Artistic License/GPL

Members
cdmc...@gmail.com,
gathomp...@gmail.com

Links

External links
On the Important of Being Quantum

Quantum chess is an implementation of Chess that incorporates the uncertainties of quantum physics. It is based on the ideas found within the technical report "On the Important of Being Quantum" by Dr. Selim Akl.

Queen’s Quantum Chess Pawns Computer AI

Dick Mathison | 2010/08/26 | 0 Comments

Researchers at the School of Computing at Queen’s University have come up with a version of chess that puts people and machines on equal footing. Called Quantum Chess, it throws the conventional rules of chess out the window.

Long considered the ultimate game of strategy, the best computers – like IBM’s Deep Blue – are able to beat all but a handful of people at this ancient game.

Queen’s School of Computing Director Selim Akl – who authored a paper on how to bring “quantum weirdness” to the game – says “We are bringing an element of unpredictability to chess.”

An electronic game of Quantum Chess was developed by undergraduate student Alice Wismath, who selected the new rules from the endless possibilities suggested in Akl’s paper.

The game has the same number of squares and the same pieces as original chess, but each piece has both a primary and a secondary type: a rook can also be a pawn, a queen can also be a knight, etc.

With the human playing white, they can see what the piece is – at that particular moment – when it is on a white square. But when it is moved to a black square, the piece shifts to a quantum state: the player has no way of knowing what the piece will be until he or she attempts to move it.

That results in the possibility of there being up to four queens – or as few as none – on the board at any given time. It also results in forethought, which is so necessary in traditional chess, to be far less effective in the quantum version.

Ms Wismath's game has so many variations and possibilities that it is nearly impossible, the researchers say, to program a computer that could play the game consistently well.

"You can throw away all the strategies you used before, because this is a completely new game and it puts the player and the computer on equal footing," says Dr. Akl.

The Quantum Chess project is part of the on-going research on quantum computation being carried out in the Queen's School of Computing. The current computer version of Quantum Chess is only a simulation, and the team is hoping to produce a physical board game of QC.

Click here to read the rules for Quantum Chess and to play against a computer opponent

Queen's University student Alice Wismath with computer version of Quantum Chess. Click image for rules and to play computer opponent.

Photos courtesy Queen's University News Centre.
Top caption: *School of Computing Director Selim Akl and undergraduate student Alice Wismath show off their version of Quantum Chess.*

Tags: chess, quantum chess, Queen's University, research

Category: News

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Underground Peep Show Reveals Artifacts of Life LiveScience.com – Thu Sep 23 - Walking along the scrubby countryside of central Turkey, Compton Tucker - bandana draped over his head and under his straw hat - looks like he's hauling a pushmower back to a tool shed. But the boxy equipment that he's dragging isn't cutting down weeds, it's actually a kind of **radar that can see underground**.

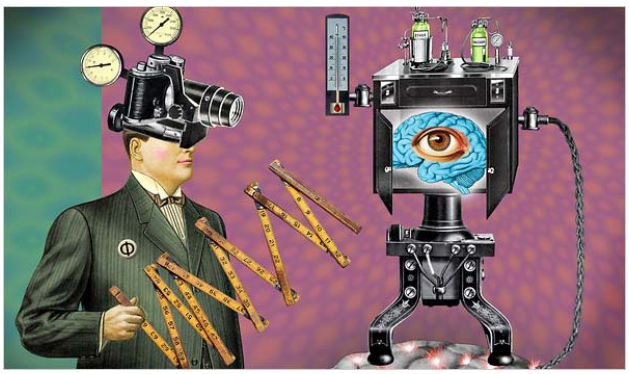
DOWN THE QUANTUM RABBIT HOLE
with Alice at Queens U.

OFF WITH OUR HEADS!

Quantum Chess Changes The State Of The Game

A quantum object can exist in more than one state. When you attempt to interact with it, the wave function collapses and the object settles into a single state. This is the theory applied to **Quantum Chess**, a new twist on the classic game created by **Queen's University** undergraduate computer science student **Alice Wismath**.

Wismath wrote the game based on ideas from computer science professor **Selim Akl** at Queens. Akl wanted to make the process of predicting chess moves using computers more difficult. In order to achieve this, he decided to have the pieces mimic the way particles like electrons and atoms behave according to the laws of quantum mechanics. **Play Quantum Chess**



STUPID QUESTION = STUPID ANSWER DEPT.

(AKA - Geeks gone wild!) **Did Humans Make Tools, or Did Tools Make Humans?** **Is our species, Homo sapiens sapiens, the first cyborg species?** Gizmodo/New Scientist has a fascinating article up about how **humans evolved as a result of technology**.

Publicación: 10/09/2010 11:11 am
Autor: pijamasurf

Estudiante canadiense crea ajedrez cuántico

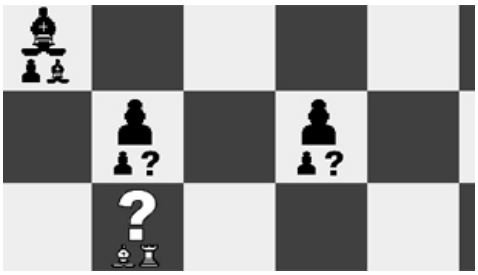
En el ajedrez cuántico las piezas exhiben las propiedades espectrales de las partículas subatómicas.

Una estudiante de computación ha aplicado las propiedades espectrales del mundo subatómico al ajedrez. Históricamente se ha utilizado el juego de ajedrez y su tablero como una metáfora del mundo en el que vivimos, pero ahora ese mundo clásico, con la mecánica cuántica, se ha vuelto más extraño en sus fundamentos, por lo cual Alice Wismath ha buscado reflejar esto en el tablero microcósmico de este juego ancestral.

En el juego de computadora de ajedrez cuántico, una pieza que debería de ser un caballo puede simultáneamente ser una reina, un alfil u otra pieza. El jugador no sabe cual será el siguiente estado o cuál de los estados escogerá la pieza cuando sea movida. Esto representa el estado de superposición en el que se encuentran las partículas (como el famoso gato de Shrödinger, que está vivo y muerto) hasta que son observadas.

“Es muy raro”, dijo Ernesto Posse, un investigador de la Queen’s University en Candá que formó parte del torneo de ajedrez cuántico. ”Sólo sabes que pieza es una vez que la tocas. Básicamente planear con anticipación es imposible”. En el mundo subatómico del cual estamos hechos, una partícula revela su estado solamente al momento de ser observada en un experimento, esto es el colapso de la función de onda, de otra forma la partícula como la pieza de ajedrez, en este caso, es solamente una

probabilidad de ser.



El ajedrez de Alice Wismath se mueve en una especie de país de las maravillas donde no se sabe que esperar de las cosas que siguen su propia lógica invisible: la reina blanca, aunque parecería imposible, en cualquier momento puede convertirse en una torre.

“Pense en un juego que provee un tipo de impredecibilidad para ambos jugadores. La computadora no puede buscar todas las posibilidades (antes de decidir) porque podemos mostrar que existe un número incontable de posibilidades”, dice Alice.

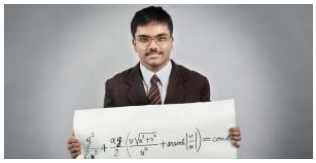
Le creadora del ajedrez cuántico, Alice, fue una de las ganadoras del torneo, pero”fue suerte”, dijo la joven. Aunque por supuesto más que suerte podría haber ocurrido un entrelazamiento cuántico entre los electrones del cerebro de Alice y las partículas informáticas (q-bits) del programa de ajedrez cuántico, lo que le habría otorgado una ventaja microtelepática sobre sus contrincantes: la localía: tener una conexión más robusta con la información diseñada.

Vía CBC

[NOTAS DE Sci-Tech]

El contacto de un hombre incrementa la temperatura en cuerpo de la mujer

Meteorito que extinguió a los dinosaurios pudo sembrar vida fuera de la Tierra



Adolescente de 16 años resuelve problema matemático que permaneció 350 años sin solución

[TAGS]

ajedrez, entrelazamiento cuántico, física cuántica, postulados fisica cuantica, superposición de partículas

[COMENTARIOS]

No hay comentarios.

Scacchi quantistici

9 Ott. 2010 | categoria Fisica, Informatica, Meccanica Quantistica, giochi, logica quantistica | Nessun commento

È una studentessa della Quenn's University di Ontario in Canada, si chiama Alice Wismath e insieme al professor Selim Akl ha inventato un gioco degli scacchi nel quale i pezzi cambiano identità ogni qual volta si posizionano sulle caselle nere, seguendo le leggi della meccanica quantistica. Quale modo migliore di avvicinarsi a questa parte della fisica, se si è già esperti nel gioco classico? Io purtroppo, come mi è successo ai tempi con il cubo di Rubik, ho avuto seri problemi anche con il gioco degli scacchi, mi ricordo che avevo spiegato le regole a un bambino, figlio di amici, di otto anni e quando abbiamo fatto la prima partita… ha vinto lui!! Insomma, me la cavo meglio con la meccanica quantistica

Se però l'idea di provare questo nuovo gioco vi ispira, basta andare nella pagina dei Quantum Chess, leggere bene le regole e cliccare sul link del gioco on line.

Per quanto riguarda l'Informatica teorica, l'aspetto interessante è che il gioco si basa sul calcolo parallelo e non su quello delle cpu standard dei nostri calcolatori, che funzionano come unità centrali. Nel calcolo parallelo invece le operazioni sono svolte allo stesso instante e contemporaneamente in ogni singola cella. Molto più veloce e funzionale, soprattutto nel caso della scacchiera.

Il 13 agosto si è svolto il primo torneo di Scacchi quantistici, che ha visto fronteggiarsi computer ed esseri umani.

Tags: computer paralleli, Fisica, giochi, Informatica, Meccanica Quantistica, scacchi quantistici

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