Monday,
January 6,
1992!
Volume III
Issue 4

The
NORMAL
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Perpendicular
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This issue:
- Survey Results
- Stones
- Yearbooks

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C E
University of Alberta **MATHEMATICAL SCIENCES SORORITY** Σ∫∫

Hi Ma!

SHOCKING SURVEY RESULTS

Possible New Year Coup

ROTOR REUTER – On the week of October 26 to November 1, a poll was conducted on the performance of the Mathematical Sciences Society (MSS) governing body. The results cover the period up to this point of the academic year and are considered accurate within ε, as long as δ is sufficiently small.

1. How would you rate the MSS Executive's performance thus far?

Satisfactory	**53%**
Unsatisfactory	**26%**
Don't Care	**21%**

2. Would a change of leadership improve the condition of the MSS for the better?

Yes	**53%**
No	**26%**
Don't Know	**21%**

3. Would one of these leaders make that difference?

	YES	*NO*
a) Saddam Hussein	**79%**	**21%**
b) Dave Yadalee	**31%**	**69%**
c) Dan Quayle	**1%**	**99%**
d) Krusty The Klown	**98%**	**2%**

4. Have you been reading these questions or are you just putting down any answer?

Yes	**63%**
No	**21%**
Don't Know	**16%**

5. Should the President wear more revealing clothes? (eg. peek-a-boo mini skirts, etc.)

Yes	**72%**
No	**9%**
Who Should?	**19%**

6. Should the President wear any clothes at all?

Yes	**21%**
No	**67%**
Who Shouldn't?	**12%**

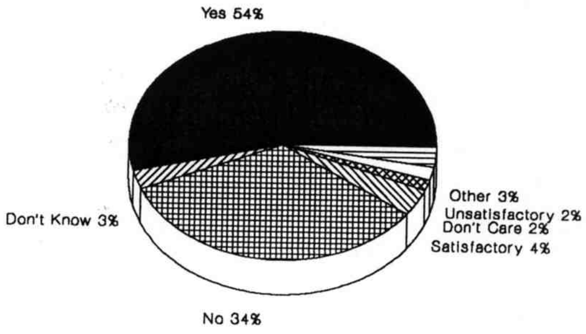
7. Should the President have a hired para-military guard to perform assassinations?

Yes	**12%**
No	**81%**
What Clothes Would They Wear?	**7%**

8. Should this para-military guard assassinate:

	YES	*NO*
a) Saddam Hussein	**69%**	**31%**
b) Dave Yadalee	**86%**	**14%**
c) Dan Quayle	**74%**	**26%**
d) All of the Above	**97%**	**3%**

Shallow Analysis of Poll Results



Sept Pete n' Me Research 1991

LOUNGE THEORY

[Editor's Note: The NORMAL VECTOR *is proud to premiere its first academic article. It has always been the hope of the publishers to attract bright, young researchers to write about their groundbreaking work..]*

AXIOMS

A1. $\exists$ Quiet $t \in [8,17]$
A2. $\exists$ Door $\ni$ $(\text{Door})^c$ is open
A3. let $S = \{GSA\} \cup \{MSS\} \cup \{MATH\}$
$\forall k \in S$, k permitted on an orthonormal basis $\{e_k\}$
A4. let $\exists$ f 1-1 and onto $\ni$
$f(\text{PLAY}) = f(\text{PUT AWAY})$
A5. $\exists$ at least one baseball bat $b \in S$
A6. $\text{card}(S) < \aleph_0$
A7. $\{\text{MAPH}\} \cap \{\text{Intelligent People}\} = \{\text{MAPH}\}$

THEOREM 1.4 (Peter Brown's Theorem)
$\forall\ p \in S^c\ \exists$ a baseball bat $b \in S \ni$
$p \bullet b = b \Leftrightarrow b$ clobbers p

proof: left as an exercise for p

LEMMA 1.4.1
if $b \cap Y \cap P \cap \{CAB_{549}\} = \emptyset$ where
$b \equiv$ baseball bat
$Y \equiv$ Dave Y.
$P \equiv$ Peter B.
Theorem 1.4 $\Rightarrow$ A4

THEOREM 1.5
let $\alpha = \text{card}(S^c) \Rightarrow \alpha = \aleph_0$

proof: comes from A6

THEOREM 1.6
$\{\text{MAPH}\} \cap S \neq \emptyset$

proof: by example

COROLLARY 1.7
let $I = \{\text{Intelligent People}\}$
$\Rightarrow I \cap S \neq \emptyset$

proof: goes easy from Th$^{\underline{m}}$ 1.6 & A7

THEOREM 1.8
$I^c \cap S \neq \emptyset$

proof: by example

c/o $\{\text{ROSHKO}\} \cup \{\text{STUBER}\} \cup \{\text{BASINGER}\}$

BOARD & STONE GAMES

By Marcus Pivato

A board and stone game (my jargon - there is, to my knowledge, no single accepted name for this type of game) is a strategic game played upon a ruled board of some size. The strategy of the game lies in the placement of tokens, or "stones", in positions upon the board. To generalize (since, recently, n-dimensional extrapolations of most common "stone" games have become popular) it is a game involving the placement of tokens upon individual n-dimensional space. In two dimensions, this tiling is usually by hexagons, triangles, or (in the overwhelming majority of cases) squares.

Perhaps one of the most attractive features of these games is the simplicity of their construction. It is possible to construct a game simply by scraping out the board on the ground, and finding a number of small pebbles of two distinct colours (or m distinct colours, in an m-player game). It is fascinating that such complicated and involving games and strategies can arise from such simplicity.

There are a number of popular stone games, and, of course, their infinite variations. What follows is a description of a few such games.

TIC-TAC-TOE GAMES

Okay, we all know the rules for tic-tac-toe. Players alternately place stones on a 3 by 3 grid. A win is achieved by placing three stones of the same in a row, diagonally, vertically, or horizontally. The original, 3 x 3, version of tic-tac-toe is pretty boring. It is provable that, assuming both players play rationally and make no "stupid mistakes", the games will always end in a draw. Some variations on the theme provide greater interest.

Variations on Board Size & Row Length:

One way of varying the game is to increase the board size. This introduces a further element of interest into the game. One specific example is a game called "Go-moku" (also known as "Go-bang", "5-stones", "Ristinolla", etc.).

CONTINUED ON PAGE 4

IN LIEU OF MY OWN JIVE

Dere's some lady who's sho' nuff
All dat glitters be gold
And she's stealin' some stairway t'heaven. 'S coo', bro.

When she gits dere she knows
If de sto'es are all closed
Wid some wo'd she kin git whut she came fo'.

And she's stealin' some stairway t'heaven. 'S coo', bro.

Dere's some sign on de wall
But she be hankerin' aftah be sho' nuff
'Cause ya' know sometimes wo'ds gots' two meanin's.

In some tree by de brook
Dere's some songbird who sin's,
Sometimes all uh our doughts are misgiven. 'S coo', bro.

It makes me wonder,
It makes me wonder. Ah be baaad...

Dere's some feelin' ah' get
When ah' look t'de west,
And mah' spirit be cryin' fo' leavin'.

In mah' doughts ah' gots' seen
Rin's uh smoke drough de trees,
And da damn voices uh dose who stand lookin'.

It makes me wonder,
It really makes me wonder. Ah be baaad...

And its whispuh'ed dat soon
If we all call de tune
Den de pipuh' gots'ta lead us t'reason. 'S coo', bro.

And some new day gots'ta dawn
Fo' dose who stand long
And da damn fo'ests gots'ta echo wid laughter. Ah be baaad...

If dere's some bustle in yo' hedge-row
Don't be alarmed now,
It's plum de sprin' clean fo' de May Queen. 'S coo', bro.

Yes, dere are two alleys ya' kin go by
But in de long run
Dere's still time t'change da damn road youse on. 'S coo', bro.

And it makes me wonder. Ah be baaad...

Yo' 'haid be hummin' and it won't go
In case ya' duzn't know,
De pipuh"s callin' ya' t'join him. 'S coo', bro.

Dear lady, kin ya' hear de wind blow,
And dun did ya' know
You's stairway lies on de whispuh'in' wind.

And as we wind on waaay down de road
Our shadows talla' dan our soul.
Dere walks some lady we all know
Who shines honky light and wants's show
How ev'rydin' still turns t'gold.

And if ya' listen real hard
De tune gots'ta come t'ya' at last.
When all are one and one be all
To be some rock
And not t'roll.

And she's stealin' some stairway t'heaven. 'S coo', bro.

The Editor Wishes To Extend His Most Humble Apologies to J. Page

LOST

The Dead Sea Scrolls. Contact Jurgen F.

The combination to my suspender-belt lock. Gerry R.

FOR SALE

30 000 pairs of socks. Jack T.

30 000 copies of Nonrelativistic Quantum Mechanics. The errors make it a collector's item! Zizi.

ANNOUNCEMENTS

I spell it with a "J". George Talbott.

BOARD & STONE GAMES

CONTINUED FROM PAGE 2

Go-moku is played on a 19 by 19 grid (a standard Go board). The object is to get a 5-stone row. Players alternately set stones on the board, attempting to trap each other and to block the opponent's strategies. A win is achieved when one player gets five stones of his/her colour in a row: vertically, horizontally, or diagonally. Although it is thought that the first player can force a win in this game, no proof is known to me. However, in my personal experience with the game, it seems that, like tic-tac-toe, two players who are thinking ahead and evading each other's traps can play almost indefinitely, at least until they run out of space on the board.

There are clearly an unlimited number of variations in this direction. Obviously, however, as the required row-length increases, it becomes exponentially more difficult to win, and I suspect, after a certain row length, a draw is virtually guaranteed.

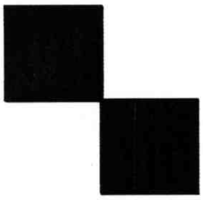
N-Dimensional Tic-Tac-Toe:

An obvious expansion is to play on a three by three cube, allowing rows to run diagonally in two and three dimensions, as well as in the three cardinal directions. In three dimensions, a win is assured for the first player, unless the central cube on the "board" is disallowed as a move in the game until it is a winning move. This is fairly easy to see - a game in which the first player starts with the central place moves fairly rapidly to its conclusion. Because of this situation in three dimensions, all higher dimensional 3 x 3 x ... x 3 games are also wins for the first player. According to Martin Gardner, a 4 x 4 x 4 x 4 game is believed to be a sure win for the first player, but a 5 x 5 x 5 x 5 may be a sure draw.

Polyomino Tic-Tac-Toe:

These variants vary the shape of the object required to win. A "polyomino" is any collection of squares of unit side-length (however you define "unit") which are edge-wise connected. For example:

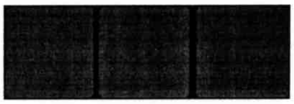
is a polyomino of order 2; but



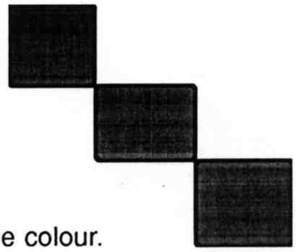
is not.

Two polyominos which are the images of one another (under a rotation or reflection) are considered identical. There is one distinct monomino (order 1), one distinct domino (order 2), two distinct trominos, four distinct tetrominos, and twelve distinct pentominos. To date, no formula has been developed to predict the number of distinct n-minos for fixed n, however.

For our purposes, we will generalize the definition of polyomino to include corner-connected structures. Hence, under this definition, we can say that standard tic-tac-toe defines a win as the achievement of a tromino of the form:



or



which is filled by stones of one colour.

We can vary the rules by changing the polyomino which a player has to achieve to win. For the standard polyomino (under the original "edge-connected" definition), these games have been analyzed to determine the smallest board size upon which the first player has an assured win. Refer to Martin Gardner's Fractal Music, Hypercards, and More ... (chapter 13) for details.

This can also be extended to higher dimensions (achieving "poly-cubes", on an m x m x m board, for example). Also, it may make for an interesting game for the two players to be attempting to achieve DIFFERENT polyominos in the same game.

One other variation arises by changing the tiling. In two dimensions, for example, players can attempt to achieve "polyiamonds" (edge-connected triangles) on a triangularly-tiled board, or "polyhexes" (edge-connected hexagons) on a hexagonally-tiled board.

CONTINUED ON PAGE 5

BOARD & STONE GAMES

CONTINUED FROM PAGE 4

Othello® or Reversi®

Players alternately place stones on a board. When a player places his stone on the board, if a line can be drawn horizontally, vertically or diagonally between his stone and another stone of the same colour, and all tiles on that line (except for the two end tiles) are occupied by stones of the opposite colour, then these intermediate stones are changed to the player's own colour ("reversed"). The player can ONLY make a move which causes such a reversal to take place at some point on the board - if no such move can be made, he/she then forfeits the turn. The game ends when all positions on the board have been filled, and the victor is the one with the most stones of their colour on the board. NOTE: Only stones which are on a line with the new stone placed on the board change colour due to the placement of that stone. A variation, called "transitive Othello", allows chain reactions; if the placement of stone "A" causes stone "B" to change from one colour to the other, then stone "B" acts as a new focus for changes to occur from. Changes thus propagate around the board. This version is good for laughs, but is probably difficult to play for strategy.

Othello is normally played on an 8 x 8 grid. The starting configuration of the game I am familiar with is:

```
W B
B W
```

Four stones, as shown, in the 2 x 2 square in the very centre of the board. According to Martin Gardner, however, the opening of the game is as follows; the board starts with no places on it, but the first two moves of each player are confined to the central square (so that the above configuration only possibly results). These first four moves, of course, do not have to cause a reversal to be allowed.

Ataxx® or Ceaser®

This game is similar to Othello in its habit of "reversing" stones. The rules are different, however. Players start with some configuration of stones on the board (which varies from version to version, game to game). Usually, each player has two stones on the board, which are placed as far from each other, and as far from the opponent's, as possible. Stones (better considered to be "cells") can "move" in two manners.

Budding:

A stone can "bud", or divide (like an amoeba), and occupy any of the eight adjacent squares; assuming the said adjacent square is currently empty. The original square remains occupied and the new square becomes occupied as well.

Leaping:

Rather than budding to an immediately adjacent square, a stone can "leap" to a square in the outer perimeter of the 5 x 5 square surrounding its present location. In doing so, the new square is occupied, but the original square is vacated. Stones cannot bud to "leaping squares", and cannot leap to "budding squares". Hence, the configuration is as follows:

●●●●●
●☻☻☻●
●☻☹☻●
●☻☻☻●
●●●●●

Where
☹ is the position of the stone,
☻ is a "budding square", and
● is a "leaping square".

Reversals:

When a stone buds or leaps to a new position, ALL stones of the opposite colour in the eight squares immediately surrounding the new position are changed to the same colour as the said stone (they are "corrupted" by its presence).

Like Othello, the game ends when all places on the board are occupied, and the winner is the one with the most occupied places. Often, Ataxx is played with certain places on the board occupied by inhabitable "rocks", which neither player can move onto. The rocks make a good defensive position with which to build against, since a stone cannot be "attacked" from at least that direction. Likewise, the edges of the board are defensively strong.

Unlike Othello, the player can move anywhere on the board which he/she is capable of budding or leaping to. A capture does not have to be made for a move to be valid.

CONTINUED ON PAGE 6

BOARD & STONE GAMES

CONTINUED FROM PAGE 5

Hex or Polygon

A standard game of Hex is played on a ragged-edged diamond assembled out of hexagonal tiles (11 tiles on a side). Two opposite sides are assigned "white", and the other two sides are assigned "black". The players take turns placing stones on the board. The object of the game for each player is to form a path of hexagons, which are edge-wise connected, that connect his/her two opposite sides of the board, and upon which all tiles are occupied by stones of his/her colour. Clearly, a draw is impossible; one player wins if and only if it is topologically impossible for the other player to do so.

Players proceed by attempting to build a path and at the same time block the opponent's path-building schemes.The first player is thought to have a fairly significant advantage in this game. Indeed, it is provable that some "winning strategy" must exist for a board of any size - there is some algorithm the first player can follow which guarantees a win! This is an existence proof, however; for small boards (2 x 2, 3 x 3, 4 x 4, etc.) it is trivial to formulate the algorithm, the situation becomes exponentially more complex with board size. No specific algorithm is known for the 11 by 11 case.

General Variations on Stone Games

Certain parameters can be varied in any game to make interesting variations. We have already seen some examples of this. This is a list of the most common "variations" made. Some are, of course, meaningless when applied to some games (or render the game trivial or impossible).

- Changing the board size or dimensionality.
- Changing the board tiling (eg. squares to hexagons).
- Adding impenetrable/inhospitable barriers at certain locations on the board. These give the board a certain structure, and can significantly alter the entire strategy of the game.
- Changing the board shape. The standard board shape is usually the simplest shape tiled by the tile in question. Fun can be had by varying the shape of the board, adding alcoves or extensions from certain walls, etc. There is unlimited possibility for variation in this direction. Very complex structures can, of course, be made by varying the shape of the board's border, and placement of internal barriers. Care must be taken that the game can actually still be played in the context of these structures.
- Changing the initial configuration of stones on the board. This can be done to give an inferior player an advantage, for example. In Go, this system is formalized so that the number of stone's advantage a weaker player gets is based upon the difference between the perceived "ranks" in game-playing ability.
- Changing the meaning of the borders. In most games, the boundaries of the board are fixed and impenetrable. Interesting variations can be achieved by "mapping" one boundary to another, so that the board "wraps" in one way or another.

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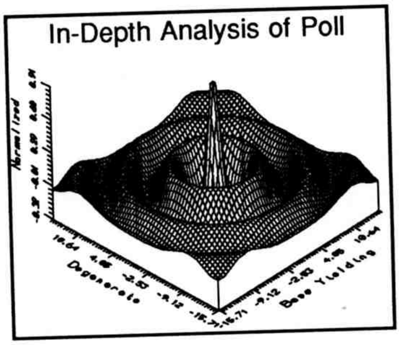
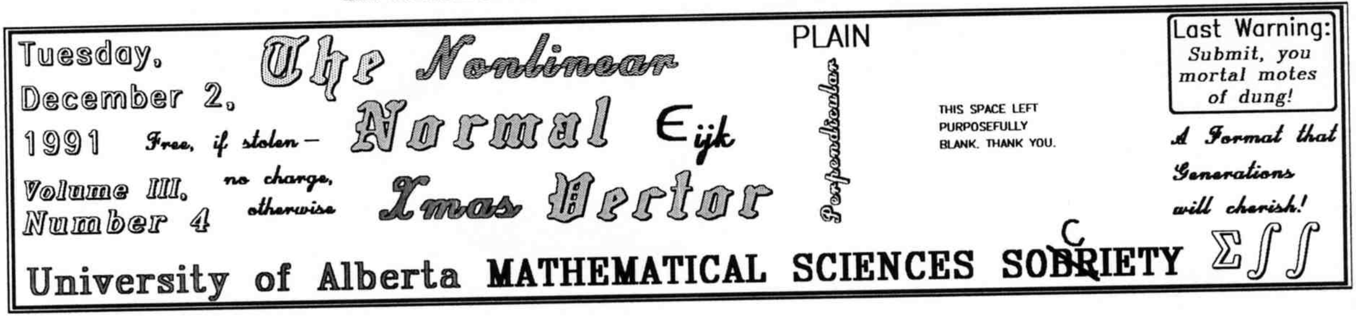

In-Depth Analysis of Poll

In Memoriam .... Cut Down In Its Prime



Tuesday,
December 2,
1991
Volume III,
Number 4

Free, if stolen – no charge, otherwise

The Nonlinear Normal ϵ_{ijk} Xmas Vector

PLAIN
Perpendicular

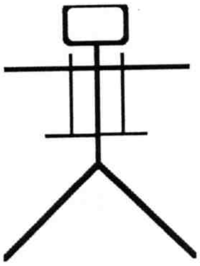
THIS SPACE LEFT PURPOSEFULLY BLANK. THANK YOU.

Last Warning:
Submit, you mortal motes of dung!

A Format that Generations will cherish!

University of Alberta MATHEMATICAL SCIENCES SO~~BR~~CIETY Σ∫∫

ROY'S PRAYER (As transcribed by Brother Jorge)



Slog Bong Zonk Zippity Doo
Dah!
Chugga Chugga Chugg Chugg
Schlog Bung Whap Womp
Wimby
Chocka-block
Bzap Roiling Blat
Zip Womp Bing Bing Bing
Bing Bing Bing Bing
Wizby! Shootin' match
Sharkwize! Herring-off
WACK!

The CHESS DICTIONARY for The Unenlightened

By David E. Adams
Edited by George Jalbott

The following is a list of terms not understood by people who do not seriously play chess (or, in simpler terms, not fanatics).

Fool's Stalemate: A situation where a player obtains an overwhelming material advantage, yet fails to successfully bring the opponent's King into checkmate.

Miracle: See above. The actual name of this situation is dependent upon which player was winning at the time. This term is also known as The Fish That Got Away.

Fried Liver: Not to be confused with the food item of the same name (although they are similarly distasteful), an opening through which the player seeks to gain a positional advantage by the sacrifice of a Knight. However, this opening also serves a psychological purpose: to make the opponent look and feel good. Thus it is ideally used when playing your boss, but it is not much use for any other opponent.

Mirror Chess: Also known as Mimic's Gambit: an opening in which a player imitates everything that his opponent does, until the latter makes an obvious blunder. The only drawback is that the mimicking player is often turned into goulash before this ever happens.

Full Contact Chess: Not to be confused with Touch Chess, Full Contact is instead when a player takes great offense at the other's psychological tactics, and decides to end the game quickly - by default. The theory is quite simple; the other player loses when he is unable to breathe, much less move a piece.

Kibitzer: This is a general term for almost all games, but especially in chess. A Kibitzer is a bystander who offers (often unsolicited) "advice" to one of the players ("Move that pawn there ... no! Wait. Move the knight there to stop him!"). Thus, a Kibitzer is considered to be a nuisance. Several Kibitzers are another matter entirely (see Gang-Up Chess).

Gang-Up Chess: Also known as the A.K.S. (Active Kibitzers Syndrome), several bystanders offer suggestions to one player who is being seriously beaten by a much superior opponent. This often results in a major shift of the balance of power in favour of the losing player because now he has the help of several others (often to the chagrin of the loner).

Strategical Paranoia: A player suffers from this condition when he believes that a superior opponent is offering bait or a sacrifice to execute a cunning plan, when in reality the same superior opponent has made a serious blunder. In simpler terms, the master fucked-up big time, and the player doesn't realize it!

STUDENT INVOLVEMENT

Every Students Union slogan seems to proclaim the phrase "get involved". Within the MSS, we too want substantial student involvement. Our MSS operates on volunteered suggestions, participation and spirit. Now, I could give you every cliché about making the most of your time, meeting people, having fun, etc., but I will not do so today. Every member is creative and able to propose new activities and goals - but don't stop at the idea stage.

Become a co-ordinator for the vent and organize a committee to make your idea a reality. Making posters, advertising in class, recruiting people, distributing newsletters, recycling cans, and the list goes on. The possibilities are only limited by each member's desire to be an active, integral part of the MSS. Let us make sure that this year, this limit is infinity!*

* I'm sorry, I can't help but include a math pun.

[Editor's Note: This article was discovered in the NORMAL VECTOR mailbox just after the New Year had begun. Additionally, I was unable to determine who the author is since no name was written on the sheet of paper the article was written on. Finally, at the top of the page was written, "Normal Vector Article due Wed Sept 25". I cannot help but be touched by such dedication.]