McKenna's Timewave

Printing Problems?

Conventional King Wen Tabulation								
	000	110	101	011	111	001	010	100
000	1	34	5	26	11	9	14	43
110	25	51	3	27	24	42	21	17
101	6	40	29	4	7	59	64	47
011	33	62	39	52	15	53	56	31
111	12	16	8	23	2	20	35	45
001	44	32	48	18	46	57	50	28
010	13	55	63	22	36	37	30	49
100	10	54	60	41	19	61	38	58

The I Ching is an ancient chinese oracular system wherein six coins (or similar) ar consulted to obtain an allegedly mystically-relevant maybe-not-random number in the range 0 to 63 inclusive, known as a *hexagram*.
The (binary) bits of this number (or hexagram) are conventionally represented as either broken or unbroken horiontal *lines* stacked vertically. Hexagrams are often considered as the combination of two three-bit *trigrams*.
The traditional ordering of the sixty four "hexagrams" is usually attributed to King Wen circa 1150 BC.

This ordering, essentially one of $64! > 10^{89}$ permutations of the set $Z_{64} = \{0,1,2,....,63\}$ is the numerical starting point of Terrance McKenna's TimeWave theory. I will write $W(i)$ for the i'th element of the cyclic *King Wen Ordering*, starting with i=0 and with the understanding that $W(i) = W(i_{\text{ Mod64}})$ for $i > 63$ and for i<0.

I will represent a broken *yang* line with the symbol '1' representing the phallus and an unbroken *yin* line by '0' representing the yoni.
W is sufficiently abstruce that most guides to the I Ching include a table such as this one from the Richard Wilhelm traslation. The bit pattern for the "upper" trigram appears on the top row, and that of the "lower" trigram i the leftmost column. Like most such books, it ennumerates the hexagrams from 1 to 64 rather than from 0 to 63.

Constructing ***L***unar from *W*en (A new formulation)

McKenna first uses W to generate a sequence of 64 integers in the range 0 to 6 by considering the unfortunately named *First Order Difference* of W, which will henceforth be written as $\boldsymbol{D}(W)$. This is the number of bits (lines) which change as one moves from *W*(*i*-1) to *W*(*i*) and is conventionally refered to as h(*i*) in the TimeWave literature, definable using C array notation as:

```
int h[65]= {
3,6,2,4,4,4,3,2,  4,2,4,6,2,2,4,2,  2,6,3,4,3,2,2,2,  3,4,2,6,2,6,3,2,
3,4,4,4,2,4,6,4,  3,2,4,2,3,4,3,2,  3,4,4,4,1,6,2,2,  3,4,3,2,1,6,3,6,
3 };
```

with h[64] existing and =h[0] merely for programming convenience.

Tabulated Derivation of ***D***(*W*)(*i*)

000 000	- 6-	111 111	- 2-	101 110	- 4-	011 101	- 4-	101 000	- 4-	000 101	- 3-	111 101	- 2-	101 111	- 4-
001 000	- 2-	000 100	- 4-	111 000	- 6-	000 111	- 2-	000 010	- 2-	010 000	- 4-	111 011	- 2-	110 111	- 2-
100 110	- 6-	011 001	- 3-	111 100	- 4-	001 111	- 3-	010 110	- 2-	011 010	- 2-	011 111	- 2-	111 110	- 3-
000 110	- 4-	011 000	- 2-	011 110	- 6-	100 001	- 2-	101 101	- 6-	010 010	- 3-	100 011	- 2-	110 001	- 3-
000 011	- 4-	110 000	- 4-	010 111	- 4-	111 010	- 2-	001 010	- 4-	010 100	- 6-	101 011	- 4-	110 101	- 3-
011 100	- 2-	001 110	- 4-	100 000	- 2-	000 001	- 3-	100 111	- 4-	111 001	- 3-	100 101	- 2-	101 001	- 3-
100 010	- 4-	010 001	- 4-	110 110	- 4-	011 011	- 1-	001 011	- 6-	110 100	- 2-	110 010	- 2-	010 011	- 3-
001 001	- 4-	100 100	- 3-	001 101	- 2-	101 100	- 1-	001 100	- 6-	110 011	- 3-	101 010	- 6-	010 101	- 3-

Whether *W* iself is algorithmically generable is currently unknown. It manifests order of a sophisticated nature and seems likely to have been carefully chosen.

A basic principle of *W* is that every second hexagram is either the reflection of its predecessor (when ***D***(*W*)=2 or 4 or 6), or (in the case of palindromic bitpatterns) the ones's compliment of its predecessor (***D***(*W*)=6).

Further, the absence of 5 s in ***D***(*W*)(*i*) is likely to be either deliberate, or the consequence of another deliberate criteria. Some research by Pavel Luksha suggests that the sequence is likely to be an empirically derived approximation to the probabilistic ordering for certain traditional non-uniform hexagram generation systems.

McKenna's original derivation of 64 x 6 = 384 *Lunar* numbers (one for each day in the lunar year) from *W* is both bizarre and cryptically expressed. Dr Matthew Watkins derived the following formulation of McKenna's procedure, expressed here first using substantially similar notation to Watkins':

$$\begin{aligned} \boldsymbol{L}(k) = \; & abs\Big(((-1)^{\wedge}trunc((k-1)/32)) * (h[k-1_{\text{ Mod64}}] - h[k-2_{\text{ Mod64}}] + h[-k_{\text{ Mod64}}] - h[1-k_{\text{ Mod64}}]) \\ & + 3*((-1)^{\wedge}trunc((k-3)/96)) * (h[trunc(k/3)-1_{\text{ Mod64}}] - h[trunc(k/3)-2_{\text{ Mod64}}] + h[-trunc(k/3)_{\text{ Mod64}}] - h[1-trunc(k/3)_{\text{ Mod64}}]) \\ & + 6*((-1)^{\wedge}trunc((k-6)/192)) * (h[trunc(k/6)-1_{\text{ Mod64}}] - h[trunc(k/6)-2_{\text{ Mod64}}] + h[-trunc(k/6)_{\text{ Mod64}}] - h[1-trunc(k/6)_{\text{ Mod64}}]) \Big) \\ & + abs\Big(9-h[-k_{\text{ Mod64}}] - h[k-1_{\text{ Mod64}}] + 3*(9-h[-trunc(k/3)_{\text{ Mod64}}] - h[trunc(k/3)-1_{\text{ Mod64}}]) + 6*(9-h[-trunc(k/6)_{\text{ Mod64}}] - h[trunc(k/6)-1_{\text{ Mod64}}]) \Big) \end{aligned}$$

Progress can be made by rexpressing this using the operators defined by

$\boldsymbol{R}(\boldsymbol{F})(i) = \boldsymbol{F}(-i)$	"Reflection"
$\mathsf{D}(\boldsymbol{F})(i) = \boldsymbol{F}(i) - \boldsymbol{F}(i-1)$	"Difference"
$\boldsymbol{S}(\boldsymbol{F})(i) = \boldsymbol{F}(i) + \boldsymbol{F}(1-i)$	"Superposition"
$\boldsymbol{T}(\boldsymbol{F})(i) = \boldsymbol{F}(i) + 3\boldsymbol{F}(\lvert i/3]) + 6\boldsymbol{F}(\lvert i/6])$	"Threepling"

Writing $|i]$ in place of $trunc(i)$, $|i|$ in place of $abs(i)$, and $\boldsymbol{D}(W)(i)$ for $h[i_{\text{ Mod64}}]$ we have the alternative formulation

$$\begin{aligned} \boldsymbol{L}(i) = \; & \Big| ((-1)^{|(i-1)/32]})\, \mathsf{D}(\boldsymbol{S}(\boldsymbol{R}(\boldsymbol{D}(W))))(i) + 3((-1)^{|(i-3]/96)})\, \mathsf{D}(\boldsymbol{S}(\boldsymbol{R}(\boldsymbol{D}(W))))(|i/3]) + 6((-1)^{|(i-6)/192]})\, \mathsf{D}(\boldsymbol{S}(\boldsymbol{R}(\boldsymbol{D}(W))))(|i/6]) \Big| \\ & + \big| 90 - \boldsymbol{T}(\boldsymbol{S}(\boldsymbol{R}(\boldsymbol{D}(W))))(i) \big| \end{aligned}$$

The powers of -1 in this expression stem from a particular step in McKenna's process now refered to as the (notorious) *half twist* which McKenna fails to convincingly justify and is now loosing favour amoung TimeWave adherents in favour of the "refined" *untwisted* ***L*** defined by

$$\boldsymbol{L}(i) = \big| \boldsymbol{T}(\mathsf{D}(\boldsymbol{S}(\boldsymbol{R}(\boldsymbol{D}(W)))))(i) \big| + \big| 90 - \boldsymbol{T}(\boldsymbol{S}(\boldsymbol{R}(\boldsymbol{D}(W))))(i) \big|$$

By attributing the obvious notational precedence system, we can drop the brackets and represent the 384 points as

$\boldsymbol{L}(i) = | \boldsymbol{T}\Delta \boldsymbol{SRD}W(i) | + | 90 - \boldsymbol{TSRD}W(i) |$

which undoubtedly has a finer aesthetic quality than the *"half-twisted"* function. I leave it to those knowledgeable in such matters to point to the doubtlessly profound significance of the number 90.

A short C routine is presented here which calculates the *"untwisted"* data in accordance with this formulation. It has been confirmed to generate the expected *""Watkins data set""*.

McKenna, however, now apparently endorses a third set of 384 Lunar numbers (known as the Sheliak or *TW1* numbers) generated by
$\boldsymbol{L}(x) = \boldsymbol{F}(x) + 3\boldsymbol{F}(1 + (x-1)/3) + 6\boldsymbol{F}(1 + (x-1)/6)$ where $\boldsymbol{F}(x)$ is the piecewise linear interpolation of
$\boldsymbol{F}(i) = 9 - \boldsymbol{D}(W)(-1-i) - \boldsymbol{D}(W)(i)$.

Constructing *N*ovelty from *L*unar

Having defined $\boldsymbol{L}$ over Z_{384} McKenna then extends $\boldsymbol{L}$ to all integers by $\boldsymbol{L}(i) = \boldsymbol{L}(i_{\text{ Mod384}})$ and thence to the reals by piecewise linear interpolation. The so-called *Novelty function*, N said to correlate with historical events, is defined by
$N(x) = \sum_{i=-\infty}^{+\infty} 2^{6i}\boldsymbol{L}(2^{-6i}x)$
and is bounded since $\boldsymbol{L}(x)$ is non-negative, bounded above, and equal to zero over the range [0,1].

An arbitary *zero date* is chosen (eg. the culmination of the Mayan calender) for the ultimate zero point of N and N is then overlaid over the historical timeline. [Though McKenne claims to have "rediscovered" this date by "fitting" the timewave to recorded history.] Since N has fractal properties, distinct portions of it at distinct scales can resemble eachother and the mathematically illiterate can easily be bamboozled by correlating curve 'similarities' with subjective historical 'parallels'.

Further information on Time Wave theory may be found here. In my view, Time Wave theory is misconceived and does not warrant further investigation.

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