A Theory of the Qinghuajian (V.4) "Divination Method"

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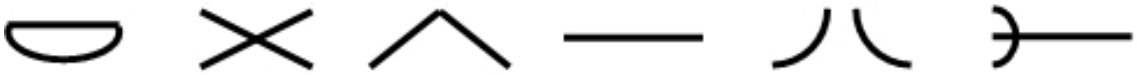
The QHJ divination material contains valuable new information about numerical divination during the Warring States, including details about the numbers used to record divinations as well as various ways to interpret those numbers and the trigrams and hexagrams that they form. However, the material is very lacking in information about how the numbers were generated. Unfortunately, the QHJ were obtained by the university as bundles of bamboo strips that had already been unearthed from an unknown location at an unknown date. Therefore we lack any knowledge about other grave goods that might have accompanied the literary artifacts such as divination equipment in the form of boards, divination straws, containers, and so on, not to speak of identifying the original owner of the books.

In the absence of such equipment and/or until evidence of such contemporary equipment related to the QHJ methodology is unearthed, we may only speculate as to how the divination proceeded. The following is a simple system that works and can produce the numbers that we find recorded on the QHJ strips. It also matches a system of throwing sticks used by the ancient Egyptians for gaming and divination and adapts very easily to the Chinese game and divination system known as *Liubo* 六博 that was developed during the Warring States period at the same time the QHJ divination method was in use.

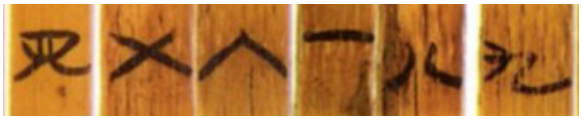
The Divination Numbers (DNs)



四 五 六 七 八 九

4 5 6 7 8 9

We know from the QHJ strips that six divination numbers (DN) were used: 4, 5, 6, 7, 8, and 9. These numbers were written on the bamboo strips in a simplified manner for ease of writing and for rapid and precise encoding of the numerical information. The number 7 was simplified to be written like 1 (—). The numbers 2 and 3 were not used, because they were made from two and three horizontal lines respectively (二、三) and could be confused as multiple iterations of the number 7, which was already a single horizontal line.



4 5 6 7 8 9

The simplification of the numbers (note how 4 and 9 were further flattened as divination numbers) made them easy to write quickly and they more neatly fitted onto a bamboo strip stacked vertically into the formation of a trigram or a hexagram. This simple

calligraphic consideration seems to be the primary explanation for the way the numbering system evolved and also suggests why they did not use ten  as a divination number.

This gives us six digits to work with. The six digits are then divided into *yang* and *yin* according to whether they are odd or even numbers.

The next questions we must address are how the Chinese generated those numbers, and then how they determined whether the numbers were considered stable or unstable. We can think of the range from 4 to 9 as a probability bell curve. This idea matches the other (later?) system that generated all hexagram lines from the DNs 6, 7, 8, or 9. In that system 7 and 8 are stable and 6 and 9 are unstable. Numbers 7 and 8 are in the middle of the distribution, whereas 6 and 9 are at the extreme ends. The extreme numbers were considered unstable and also less likely to occur. The middle range was considered more stable and also more likely to occur. This is the bell curve notion, and also matches the Chinese Doctrine of the Mean. Moderation is a more stable condition than an extreme position, simply because it has more microstate possibilities that generate roughly equivalent macrostates. In a dynamically changing system, and extreme microstate becomes a rapidly evanescent macrostate.

1, 3, 3, 1
The Probability "Bell" Curve for Zhouyi DNs

The same principle applies to our range from 4 to 9. In this range 4 and 9 are the extreme values with the least probability, 6 and 7 are the mid-range values with the highest probability. The values 5 and 8 are between the lowest and the highest probability. Mathematically speaking we can express the two contrasts of *yin* and *yang* using the binomial formula $(a + b)^n$. In this case we want to have 6 different conditions, one for each of the divination numbers 4, 5, 6, 7, 8, and 9. Thus we select $n = 5$, and then expand out the polynomial and examine the coefficients.

$$(a + b)^5 = a^5 + 5\,a^4b + 10\,a^3b^2 + 10\,a^2b^3 + 5\,ab^4 + b^5.$$

The coefficients of our new bell curve are:

1, 5, 10, 10, 5, 1.

Multiplication being commutative the exponent of the polynomial tells us how many of *a* or *b* (*yang* or *yin*) will show up, regardless of the order of *a* and *b* in a given term, :

aaaab = aaaba = aabaa = abaaa = baaaa.
There are 5 possibilities in this example.

We distribute the probabilities among the divination numbers as follows:

Exponent of *b* in a given term:	0	1	2	3	4	5
Probability:	1	5	10	10	5	1
Divination Numbers:	4	5	6	7	8	9

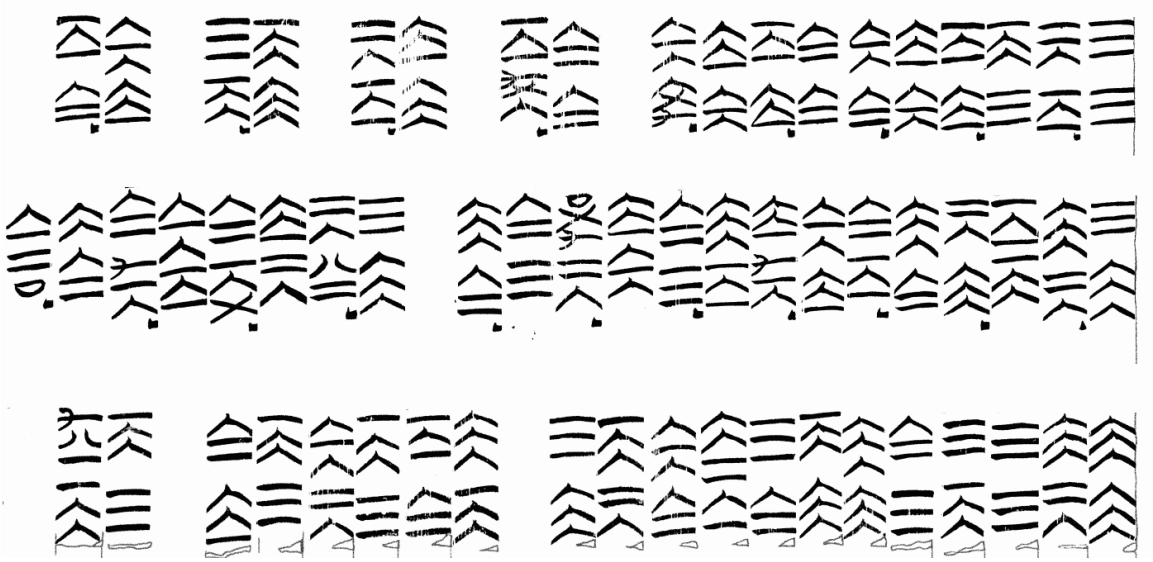
To perform the divination we require five bamboo strips, each with a mark of some kind on one side and no mark on the other side. We will say arbitrarily that no mark represents *yin*. Thus, 5 strips showing no mark means a 4; 1 strip showing a mark means 5; 2 strips showing a mark means 6; 3 strips showing a mark means 7; 4 strips showing a mark means 8; and all five strips showing a mark means 9. Clearly 0 marks and 5 marks are the least probable outcomes, each with one possibility out of 32. Obtaining 2 marks or 3 marks is the most likely probability, each outcome having 10 out of 32 possibilities. Obtaining 1 mark or 4 marks each has 5 out of 32 possibilities.

We might suppose that the highly probable 2 marks (a 6 DN) or 3 marks (a 7 DN) will represent stable lines in this system. Do all the other outcomes represent unstable lines? That would be how the Zhouyi system would do it. The QHJ documents almost surely were frequently generating a basic hexagram and a changing hexagram in line with the received tradition, although almost certainly (from the examples in the document) by a very different method. The internal evidence for this in the document is the habitual arrangement of divination examples in pairs of hexagrams. In example 7 of Section 2 the text may give us a tiny clue. Section 2 discusses the notion of a win or a loss, -- that is, the attainment or not of the preferred outcome of the divination inquiry. At the end of example 7 the text says, "His loss is 13" 其失十三. Changes expert and popularizer "Jack" (aka Nan Guo-zi 南郭子 "Explaining the Secrets of the *Qinghuajian* Divination Method Numerical Hexagrams" 清華簡《筮法》數字卦解密 http://www.eee-learning.com/article/3629) says, "the loss may be a probability of three times in ten times (3 in 10 [i.e., 30%]). From reasoning backwards the probability [of a win] is 7 in 10 [70%], so it says "also attainment"".

Jack's hypothesis is reasonable, and so is his analysis that 1 is shorthand for 7 in the divination numbers. If we use five bamboo strips each with a mark on one side, each toss of the strips will lead to an outcome in a balanced distribution of probable *yin* and *yang* numbers. We might initially assume that 6 and 7 are stable and that 4 and 9 are also stable in this system. That leads to 22 out of 32 outcomes that are stable "wins", and leaves 5 and 8 as unstable outcomes that lead to "losses", 10 out of 32 lines that will flip into their opposite value and lead to another trigram or hexagram. We get 68.75% wins and 31.25% losses. This is very close to a 70/30 distribution of wins and losses – stable and unstable lines.

Such a system works well enough. However, the distribution of pairs in the examples provided by the QHJ document does not support this hypothesis if we assume that the pairs represent outcomes obtained by such a divination method. So we have to look deeper.

Examining the pairs of example hexagrams provided in the document, a pattern appears that the hexagram on the right always (with certain special exceptions to be discussed later) consists only of 6's and 7's. That suggests strongly that in a pair of hexagrams according to the QHJ document the hexagram on the left is the initial hexagram representing the situation or problem, and the hexagram on the right is the changed hexagram that shows the evolution of the situation to some sort of outcome. You can verify this from the chart transcribed below by Jack. This conclusion is also reached by Jack in his article.



As Jack points out, this means the document text is read from right to left, but the hexagram pairs are read from left to right. Jack also reasonably assumes that the hexagrams are drawn from the bottom up in the same way they are in the received tradition -- although in his discussions he reads the numbers off from top to bottom. He also points out that it makes "sense" to draw them opposite from the way the text is drawn (from top to bottom of a column) just as in the received tradition. I am also happy to go with that notion.

Here is Jack's tabulation of the changes that occur for each of the divination numbers 4-9.

四	五	六	一（七）	八	九
4→4 x2 **4→6** x1 **4→1** x2	**5→5** x4 **5→6** x3 **5→1** x2	**6→6** x68 **6→1** x88	**1→1** x62 **1→6** x89	**8→8** x2 **8→6** x2 **8→9** x4	**9→9** x6 **9→6** x4 **9→1** x3

Jack notices that 6's and 7's very frequently change, which makes them seem unstable, but they only change from 6 to 7 or from 7 to 6. Also they are by far the most frequently occurring DNs. The interpretations discussed in the text focus

on "negative" situations for the DNs 4, 5, 8, and 9 which are already the least probable DNs. The most probable DNs (6 and 7) may change the situation, but they do not make things worse. The challenge is to find out the rule for such a flipping of DNs that (unlike the *Zhouyi* includes the highly probable DNs, 6's and 7's).

Note the "bell curve" distribution of occurrences among the examples in Jack's table (5, 9, 136, 151, 8, 13) that is distorted by an unexpectedly large number of 9's. We have 4 cases of 8 going to 9, and 9 cases of 9 staying 9. All these 9 outcomes occur in one special set of examples that have to do with divining about a husband, and hence a possible special rule about 9's. The cases of 4 staying 4 and 5 staying 5 are also very rare special cases, such as the extremely rare "straight" sequence from 4 to 9 and also may have special rules and interpretations. We must be aware that since these are examples brought up in the document rather than randomly generated hexagrams we may expect some skewing like this of the distribution of DNs in the document.

The numbers 4, 5, 8, and 9 all may change, but 8 changes in a way that is different from the other three.

The numbers 4, 5, and 9 can become 6 or 7 [and almost always do so].

The number 8 can become 6 or 9, but it does not become 7; instead it changes to 9. Jack wonders whether that was a scribal error and perhaps 8 should be able to go to 6 or 7 like the other three numbers. It may be just due to the examples given.

What follows for a while in this article is a translation or summary of Jack's article so you can get the sense of his analysis before I add my "streamlined" version. I may interpose comments along the way about Jack's article in brackets.

As for when the divination numbers change or do not change, 7 and 6 seem pretty reasonable to figure out, but for 4, 5, 8, and 9 we don't know where to start.

Jack initially hypothesizes that based on Zhang Zheng-lang's 張政烺 work on early DNs, there were 8 in use in early times, which would presumably be 2 through 9. A 6 or a 7 would remain stable; a 2 or a 3 would be written as a 6 or a 7 respectively, but would be unstable and change from 6 to 7 or from 7 to 6.

What about the other numbers? Perhaps there were not 8 DNs, but only the 6 numbers shown in the QHJ: 4, 5, 6, 7, 8, and 9. Perhaps when 6 and 7 change, it is not according to an unseen 2 or 3, but is due in some way to 4, 5, 8, and 9. However, it appears that the way 4, 5, 8, and 9 change is complicated, because when they change it is not just a single change, but may be two changes [e.g., from 9 to 6 through 7].

In the QHJ document there is a hexagram pair with the numbers in order from top to bottom (4,5,6,7,8,9) that appears not to change and is labeled "inner conquers outer". There is also an example with the numbers from top to bottom (9,8,7,6,5,4) and labeled "outer conquers inner", and again the numbers in the hexagram pair do not change. However, in Section 2 there is an example (listed top to bottom) 459776 to 667676 in which the 4, 5, and 9 each change; 4 goes to 6, 5 goes to 6 [via 7?], and 9 goes to 7. It does not involve the seasons because 4, 5, and 9 belong to different seasons. At one time only one or two lines change (in QHJ Spring and Summer are considered the same season; Fall and Winter are also one season.) It is not possible to have three DNs change at the same time. [Is this so? What about the example in Section 1 of 679766 changing into 766676 where 5 DNs change? Quite a few also have 4 line changes.] Moreover, if it is decided by season, then when all six divination numbers appear at the same time, at least one or two DNs should change.

Based on similar principles the theory of using *ganzhi* 干支 to decide changing or not changing can also be directly discarded.

[It seems at this point that all DNs are inherently subject to change if we understand the hexagram pairs correctly. In that case, how do we distinguish the special values of 4, 5, 8, and 9 relative to the commonly appearing 6 and 7? And what is the divination procedure used to decide which DNs change?]

Reverse Engineering

The above are the author's [Jack's] various theories, deductions, and attempted calculations before doing reverse engineering. Most can be rejected out of hand or easily rejected by a bit of testing.

We are left with a single possible hypothesis: the changing or non-changing of DN's is determined by some result that occurs during the process of divining with stalks.

However, the QHJ has not left any statements regarding the divination method. We have no clue as to how the divining stalks calculate a hexagram. [However, recall the clue that I mentioned earlier in my discussion of the last sentence of the bamboo document. We will come back to that after we examine Jack's reverse engineering.]

Therefore I made a big assumption: Can we make a modification of the *Zhouyi* divination method?

The idea is this: QHJ's divination method and the *Zhouyi* have a rather clear evolutionary relationship. The QHJ seems to be earlier than *Zhouyi* and preserves an earlier numerical divination method. But *Zhouyi* then seems to be a simplification of the QHJ method and a progressive abstraction. Speaking concretely the *Zhouyi* put the images of the lines and the images of the trigrams into the images of the eight trigrams, and reduced the six DNs (4, 5, 6, 7, 8, 9) down to four DNs (6, 7, 8, 9). Going further with the simplification and compression, we have only *yin* and *yang*. Thus the *Zhouyi* can be

considered a simplification of the *Guicang*. Well then, along those lines we can imagine that perhaps its divination method exists in the following kind of relationship: The method and the process are similar to the divination method in the currently existing *Zhouyi*. The difference is only in that this method requires putting out six DNs, and moreover these six DNs are existing in the changing relations in the above chart. Furthermore, from the six DNs being more than four, therefore the procedure is more complicated.

Taking our reverse engineering of the stalk divination method to this point we at least have a clue, but the question is, how many stalks do we start with? 50? Or some other number? This led me to think of the *Dayan* 大衍 passage in the *Xicizhuan* 繫辭傳 [A9].

"The *Dayan* numbers are 50, but we [do not use 1 and only] use 49. We divide into 2 to symbolize 2. We hang 1 to symbolize 3. Then we sort them by 4 to symbolize the 4 seasons. We return the rest to the *le* 扐 to symbolize the intercalary month. Every 5 years there is another intercalary, so we *le* again and then hang [or have a hexagram line]. The heavenly numbers are 5. The earthly numbers are 5. Of the 5 positions mutually attained, each has its cooperation. The heavenly numbers [added up] are 25. The earthly numbers [added up] are 30. All the numbers of heaven and earth are 50 and 5. This is how we accomplish the changes and move ghosts and spirits."

For two thousand years the numbers "*Dayan*'s numbers are 50" and "The numbers of heaven and earth are 50 and 5" have burned up nobody knows how much Chinese Confucian scholars' energy and research. These two numbers are clearly a beachhead for study of the **Changes**. Scholars of the **Changes** always get 5, 10, 15 as if they are shouting numbers in fist matches and use all their energy interpreting the philosophical meanings behind these two numbers in order to establish their position as a scholar of the **Changes**. But this author is not interested in the Confucian scholars' number fist matches; what draws my attention is the practical value of these numbers "5 10 5".

The number "五十" [50] has its practical meaning in divination. But what about 五十五 [55]?

I boldly hypothesize that this [passage about 55] is from before the *Zhouyi*, and is just the number of divination stalks used in the QHJ [method]. Well then, can we use this number of divination stalks for a method similar to the *Dayan* divination to calculate out these six DNs: 4, 5, 6, 7, 8, 9? And will it include a simple and reasonable DN changing principle?

The answer is yes! After a bit of calculating, I felt that it was very possible, and so I actually designed a divination method similar to the *Zhouyi* method that moreover can display these DNs, and after applying it in operation for a few days, proved its workability!

Reconstruction of the "Guicangyi" [歸藏易 GCY] Divination Method

Because the operation of the divination method is fairly complex, here I will only discuss a few big differences from the traditional divination method and such things as how to decipher the results. For the general operational method refer to the two articles below:

- Yijing bugua de yuandian: Dayan zhi shu dieguafa.

  易經卜卦的原點：大衍之數揲卦法

- Xiang tan dieshifa (huocheng "shifa", "Dayan dieguafa"

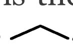
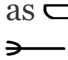
  詳談揲蓍法（或稱「筮法」，「大衍揲卦法」）

In the *Zhouyi* divination method each line has three changes [described in the above-mentioned articles on Jack's website]. The QHJ divination method, which we will just call GCY (Guicangyi), has five changes for each line. Except for the first change, the other four changes can generally follow the steps "divide in 2, hang 1, sort 4, return remainder". However, the method of how you return the remainder has some differences.

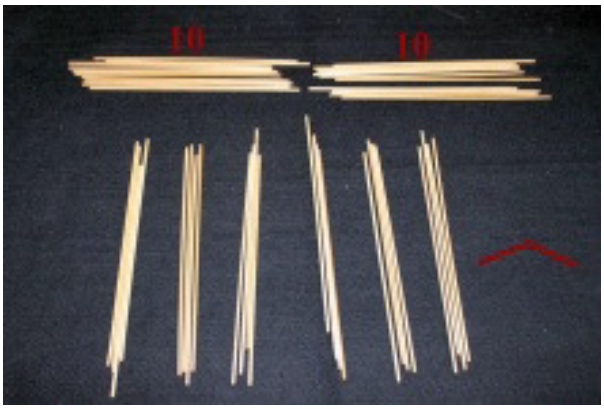
1. The first Change: Directly begin with the 55 divination stalks. You do not need to hang one, or "not use that one". Then divide into two, sort by four, and lastly take the remaining stalks from both sides (1-2, 2-1, 3-4, or 4-3) and hold them all between your fingers. In the end you will hold between your fingers 3 stalks, or 7 stalks. (The photo shows 7 stalks.)

2. The second to fifth Change: Do the operations to divide in two, hang one, sort by four, and return the remainder. However, here the return of the remainder is different from the *Zhouyi*. You must divide into two sides to return the remainder. The remainder stalks for the left side you place on the upper left. The remainder stalks for the right side you place on the upper right. Separately divide and place them on the left and right (as in the picture). Hang 1 with the former 3 or 7 together and set them apart. [The second remainder appears to be 3 in the photo and is placed above the sorted straws to left and right.]

3. Five Changes generate a line: According to the second change method continue the operation for the third, fourth, and fifth change. Because the second, third, fourth and fifth changes all hang one, therefore you will see in your hand, in addition to the first change's remainder stalks, when accumulating hanging, that four [hanging stalks] means you generated a line. At this time record the DN as in the picture. When the "hang one" stalks between your fingers reach four, you know you have already completed a line. Then prepare to record the DN. On how to record the DN, please see the explanation that follows. [I do not know why Jack keeps holding the first remainder straws. He could put them down somewhere and also could put the four "hanged" straws somewhere separate on the table as well, since they serve to keep track of how many operations you have done and keep the counting of straws on track mathematically, but do not need to be held.]

4. Recording the DN for the basic hexagram: At this time [having completed five sorting operations] count up the number of stalks [sorted out] on the table, four stalks per pile. However many [piles] there are altogether, that is the DN you record. Four piles is recorded as  , five as  , six as  , seven as  , eight as  , and nine as  .
5. Recording the DNs of the changing hexagram: The above DNs are for the basic hexagram. Next separately count the number of remaining stalks in the upper left and upper right piles. If the stalks on both sides have the same number, then the DN does not change, and the DN in the changing hexagram is the same as in the initial hexagram [except that a 4 or 8 becomes 6, and a 5 or 9 becomes 7]. (As in the following picture, the stalks that have been sorted will total six piles, and the DN you get will be 6.) If the remainder stalks left and right are all ten [as

in the photo], then this line does not change, and the changing hexagram's DN [for this line] is still 6.



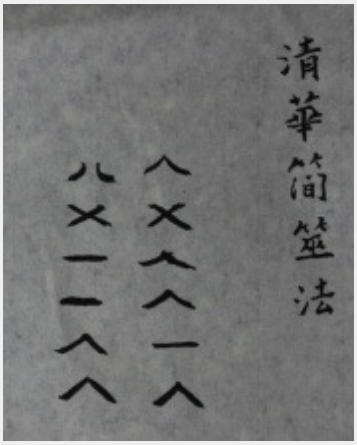
If the remainder straws on the left and right sides do not agree in number [are not equal], then the two numbers 6 and 7 exchange. But for 4, 5, 8, and 9 DNs, if the right side pile is bigger, then the DN changes to 7 or 9. If the right side is smaller, then the DN changes to 6. Speaking concretely, the six DN changes are as follows:

- 4 → Right side smaller, change to 6, right side larger, change to 7.
- 5 → Right side smaller, change to 6, right side larger, change to 7.
- 6 → Regardless of size difference, it changes to 7.
- 7 → Regardless of size difference, it changes to 6.
- 8 → Right side smaller, change to 6, right side larger, change to 9.
- 9 → Right side smaller, change to 6, right side larger, change to 7.

[The change from 8 to 9 is a puzzler. It may be due to a scribal error in the QHJ document, since it only seems to occur twice in a section that may have a very different interpretation and does not involve hexagrams with changing lines. Remember, our tabulation of examples may be skewed with regard to the actual probabilities, since the author of the bamboo document only gives us examples and not statistics.]

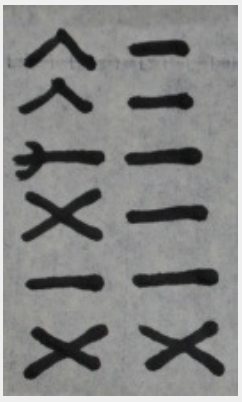
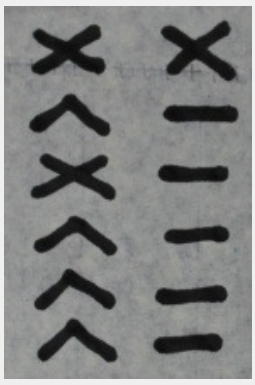
6. Six lines generate a hexagram: Repeat the above operation six times, to altogether get six DNs and complete a hexagram. You need to remember that the DN should change from the left to the right, and is drawn from the bottom up.

We will take as an example the results from a real operation recorded as below:

所得筮數	左-右歸奇策數	變爻	
第六爻：八	9-7	六	
第五爻：五	14-14	五	
第四爻：七	11-9	六	
第三爻：七	8-12	六	
第二爻：六	13-11	七	
第一爻：六	10-10	六	

[It seems to me based on the preponderance of QHJ evidence that the 5 in line five should automatically shift to a 7, not however changing its value from *yang* to *yin*. In the document only two very unusual cases show fives not changing, and they may involve special rules. Further unearthed evidence may settle that question.]

Below is another example of divining two pairs of hexagrams:

第六爻：六	10-14	七		第六爻：五	14-14	五	
第五爻：六	9-11	七		第五爻：六	13-11	七	
第四爻：九	5-7	七		第四爻：五	11-13	七	
第三爻：五	11-13	七		第三爻：六	11-13	七	
第二爻：七	8-8	七		第二爻：六	13-11	七	
第一爻：五	12-12	五		第一爻：六	11-9		

[The same is true of 5 passing through in the 1st place of the example on the left and 5 passing through in the 6th place on the right. In any case we end up with QIAN in both examples. What is the point of retaining a 5 in the changed hexagram unless it suggests a problem that remains unresolved? If all lines can change, what is the point of using 4, 5, 8, and 9? You could just call all even results 6 and all odd results 7 and then flip them according to Jack's rule about right-hand and left-hand remainders being equal or unequal.]

In deciding the reasons for the line changes I [Jack] considered whether the number of straws hung in the first change was large or small, because in the first change the possible remainder straws are 3 or 7. But I discovered that does not work, because under the conditions of DN 4 the first change is necessarily hanging 7 [in order to possibly reduce the sorted straws from 55 down to 4 piles of 4 at the end of 5 sortings]. If the DN is 9, then it must have a remainder 3 [and all other sortings for that DN must also produce 3 so as to end up with 36 straws in 9 piles of 4], and there is no way to have a change. [To get the other DNs 5, 6, 7, and 8, the first sort can produce **either** a 3 or a 7 remainder.]

This method shown above not only can successfully calculate the hexagram images in the QHJ, it also accords with the changing relationships among the numbers that appear in the QHJ. Moreover is it quite reasonable viewed from various different angles, regardless of whether from the reasonableness of probability or the mechanical operation of its changes. Furthermore, in each section of the document we can find evidence. Therefore, I believe this must be very near to the ancient method. If not right on, then it is not far off! Perhaps someday we will have new archaeological discoveries to substantiate it [one way or another.]

As for how we really use the QHJ method to interpret the fortunes or misfortunes of the above hexagram images, this will still await our slow figuring it out, practice, and testing.

This takes us to the end of Jack's article. Jack's "Reverse Engineering" is an excellent strategy. However, we can further clarify and simplify what Jack has achieved. First we want to tidy up the divination process and show clearly the mathematics of the straw system he has suggested.

I do not consider it very elegant to be holding various numbers of straws between fingers during the process. So I consider the character *le* 扐 in the text to be a noun representing a tube-like container usually made of leather (le 勒) or bamboo (le 筞) that can be placed on the table and used as a receptacle for the straws that are "hung" or the straws that are "retired" as a "remainder". This makes the process neater, easier, and more aesthetic. The tubes do not even have to have a bottom, as they will stand upright and hold the straws very

adequately. Certain types of toothpick or pencil holders also will do the job, but I prefer bamboo. For this divination procedure three tubes will be perfect. I use four for the Dayan method.

We begin with 55 straws and divide them into two bunches, one in each hand. As Jack says, we do not set aside a straw as a "transcendental" straw, nor do we "hang" a straw on the first sorting. Let us say we begin to sort them out 4 at a time from the left hand using the right hand (either hand will do). You may lay the sets of 4 separately or together on a table for the first four operations. You end the first sorting operation with 1, 2, 3, or 4 straws remaining in your left hand. From the bunch of straws in your right hand select the number of straws that will give you a total of 3 or 7 "remainder" straws (i.e., 2, 1, 4, or 3 respectively). Place the remainder straws from your left hand bunch in the leftmost tube and the "remainder" straws from your right hand bunch in the rightmost tube. (The middle tube is reserved for "hanging" straws.) You do not have to sort the right hand bunch of straws into groups of 4 (unless you want to), because you already know from the left hand results what the right hand results will be. You see how divination practice trains you to see the future quite precisely!

Next you gather up all the straws except for the remainder straws you put in the tubes and repeat the sorting process. However, this second sort (and sorts 3, 4, and 5) begins by hanging one straw in the third (middle) tube. Hanging the straw in a separate location helps you keep track of how many sortings you have done. It also makes sure you will end up with a remainder of 3 or 7 at the end of each sort. Together with the hanged straw you have 4 or 8 after sortings 2 through 5. You repeat the process altogether 4 times in the same manner as the first time, except that you hang one straw before sorting each time. You will hang 4 straws and complete the sorting and remaindering four more times (for a total of 5 sortings). Each time in sortings 2 through 5 you place the remainder from the left hand in the leftmost tube and the remainder from the right hand in the rightmost tube. You then have completed altogether 5 sortings. **On the last sorting be sure to sort the straws remaining in both hands**, -- placing the straws on the table in front of you in groups of 4. You will find that you have six possible such groups: 4, 5, 6, 7, 8, or 9. Here is the math.

55 - 7 - 7 - 7 - 7 - 7 - 4 = 16 = 4 groups of 4 straws.

55 - 7 - 7 - 7 - 7 - 3 - 4 = 20 = 5 groups of 4 straws.

55 - 7 - 7 - 7 - 3 - 3 - 4 = 24 = 6 groups of 4 straws.

55 - 7 - 7 - 3 - 3 - 3 - 4 = 28 = 7 groups of 4 straws.

55 - 7 - 3 - 3 - 3 - 3 - 4 = 32 = 8 groups of 4 straws.

55 - 3 - 3 - 3 - 3 - 3 - 4 =36 = 9 groups of 4 straws.

The above remainder sequences are NOT in any specific order. (See Jack's comments about the first sorting.) The number 4 represents the 4 straws that you hang to keep track of the sortings.

Starting from 55 straws we have nicely arrived at the DNs used in the GCY system.

The probabilities for the various outcomes are as follows: 1, 5, 10, 10, 5, 1. Thus 6 and 7 are the most probable DN outcomes, and 4 and 9 are the least probable DN outcomes. Notice how the probabilities just happen to show 5, 10, and then go back down to 5. (五十有五 = 五、十、又五) So the number 55 is not merely the sum of the numbers from 1 to 10, it is also a code for the probabilities of the divination operation!

Next we must determine whether or not the line's DN changes. In this system a 6 can only change into a 7 or vice versa; 6 and 7 are the most probable, and therefore are "endpoint" numbers. If a 4 or an 8 does not change, it still becomes a 6. If it changes, then it becomes a 7. (If you wish you may have a rule that a changing 8 turns into a 9, a situation that, if correct serves to distinguish 8's and to explain why the bell curve is distorted by extra 9's showing up.) If a 5 or a 9 does not change, it still becomes a 7. If it changes, then it becomes a 6. So the *zhigua* 之卦(changed hexagram) is always made of 6's and 7's in this early GCY system. Later the system shifted to using only 6, 7, 8, and 9 as DNs, so the *zhigua* always ended up made of 7's and 8's in the received tradition.

For Jack a non-changing 5 remains a 5, and a changing 8 becomes a 9. I do not know how one interprets a 5 or a 9 in the changed hexagram or what procedures make it change. The examples in the document show only a few cases in which 4, 5, 8, or 9 carry over into the outcome hexagram. There must be some procedure and rules to cause that. The examples do not give us data on that. But we know that 4, 5, 8, and 9 are warnings that come up in the initial hexagram. In most cases given in the examples the "negative" issues subside, but some probabilities may exist for retaining them. Perhaps equal remainders on left and right keep those DNs from changing. So, for now until we understand better, I let non-changing 5 or changing 8 become a 7. If the issue gets cleared up, then we can easily adjust the number changes. In any case the *yin* and *yang* conditions remain correct.

The QHJ document possibly suggests that in certain extremely rare situations when a 6-number DN "straight" occurs (4, 5, 6, 7, 8, 9 or 9, 8, 7, 6, 5, 4) the lines do not change. Perhaps even when a double of 4, 5, 8, or 9 occurs in the middle of a hexagram (e.g., 765577 → 665576), the double does not change. How such cases were interpreted is an interesting question unresolved thus far in my mind.

Jack suggests that the way to decide whether a line changes or not is to go by the relative number of remainder straws in the two remainder tubes. Here is my tentative version:

- 4 → Right side bunch small, change to 6, right side large, change to 7.
- 5 → Right side bunch small, change to 6, right side large, change to 7.
- 6 → Any size difference, changes it to 7. No change if both sides are equal.
- 7 → Any size difference, changes it to 6. No change if both sides are equal.
- 8 → Right side bunch small, change to 6, right side large, change to 7.
- 9 → Right side bunch small, change to 6, right side large, change to 7.

If the remainders for a 4, 5, 8, or 9 are equal between the two remainder tubes, then 4 and 8 go to 6, and 5 and 9 go to 7. Or perhaps they stay the same and do not change. (I differ with Jack on the details of 5 and 8, but that is easily resolved once we have more detailed understanding.) The probabilities for stable DNs such as 6 or 7 to change seem a bit high to me, but that may be because we are used to thinking of the probable DNs as "stable". For the QHJ system maybe they are just less "negative". In any case the probabilities of change can be adjusted by changing the definition of what makes a 6 or 7 change.

The Clue that Supports Jack's Hypothesis about Changing DNs

In the very last strip of the QHJ, that incidentally ends with a rhymed couplet for emphasis, we find an eloquent and illuminating phrase that supports Jack's theory of using the "remainder sticks" to determine how a DN line changes: 凡是，各當其卦，乃力占之。占之必力，卦乃不忒. ***Fan shi, ge dang qi kui, nai le zhan zhi. Zhan zhi bi le, kui nai bu te.*** **Each of these [divination topics] takes its [basic] hexagram (*kui* = *gua*) [as its reading for the moment], and then you prognosticate from its "tubed" [remainder sticks to get the changing hexagram], so the [basic] hexagram does not overbalance [the reading].** The older GCY method allowed many lines to change regardless of the value of the DNs. The DNs were apparently involved in other subtle ways to interpret the reading (as for example in the case of divining about a husband in Section 14). All the DN numbers had at least an even chance of changing, and when changing, the DNs 4, 5, 8, and 9 could change to 6 or 7 or stay the same. The old method was to place the initial hexagram and the outcome hexagram side by side and interpret them in a very interactive manner. The basic hexagram covered the topic in question primarily at the time of divination. The changing hexagram covered the evolution of the situation as it developed in the future with hints at how to manage the situation. The overall interpretation involved reading the lines and trigrams of the pair as a whole. Both hexagrams were equally important. The changing lines and outcome hexagram should be given equal weight in the reading. This is the advice with which the author of the QHJ ends his manual on the "GCY" method. It summarizes nicely the style of reading hexagrams in pairs by their component trigrams and DNs presented in this chapter and throughout the book. It also illuminates the importance of the technical term *le* that by the time of the Sung Neo-Confucian scholars had dwindled to a virtually meaningless term. Once the method shifted to using only 6, 7, 8, and 9 as DNs, the DN itself determined whether a line changed or not. Thus the whole point of storing up the remainders

was merely to subtract from the main bundle until the last set of four-stick piles indicated the DN, giving both the line and whether or not it changed. Hence, it is no surprise that by Song times (and perhaps even as early as Han times) scholars were reduced to figuring out where to put the now relatively useless "remainders" from the various sortings.

Overall we now have a logical method, and the QHJ document tends to support this assumption with a few loose ends about interpretation of the less frequent DNs.

A Simpler Way

Some people prefer not to go through all the tedious sorting of straws involved with the ancient method. A popular traditional shortcut way to generate a hexagram has been to use 3 coins. If coins are not preferred, another way is to use 3 bamboo strips (such as were commonly used as writing material for books and records.) Using 3 strips is appropriate for the received tradition of divination. Each strip must be marked in some way to tell one side from the other. This method is well known and understood. Each strip or coin can be assigned a 3 for Heads and a 2 for Tails. Each toss produces the probabilities of 1, 3, 3, 1 out of 8 possibilities for DNs with sums of 6, 7, 8, and 9. The stable DNs are 7 and 8, and the unstable changing DNs are 6 and 9. However, for the more complex GCY version the shortcut method requires a minimum of 6 bamboo strips (or coins), 5 for determining a line's DN, and 1 for determining whether or not the DN changes. With this approach each line has a 50% chance of changing. Each strip must be marked so as to tell one side from the other. We will use H for "heads" (the side with a mark) and T for "tails" (the unmarked side). The sixth strip also needs to be marked not only with a dot or character on one side, but also with a different color or in some other special way on both sides to distinguish it from the other 5 strips if you want to use the strips all at once. (Or else all 6 strips have to be marked distinctly on both sides.)

Hold the 6 strips in your grasp and then gently toss them onto the table or a divination board. The five strips tell you the DN of the basic hexagram line.

5T = 4;

4T, 1H = 5;

3T, 2H = 6;

2T, 3H = 7;

1T, 4H = 8;

5H = 9.

The probabilities of this method are exactly the same as with the complicated sorting of straws: 1, 5, 10, 10, 5, 1.

The sixth strip is used to determine whether the line changes or not. H means the DN changes, and T means it does not change. This gives a 50/50 chance that any line will change. DNs 4, 5, 8, or 9 always go to DNs 6 or 7 (with a few special exceptions I mention below). H means the DN changes odd to even or even to odd. T means the DN does not change its even or odd status (e.g., 5H → 7, 5T → 6; 6H → 7, 6T → 6).

Special Exceptions

When a DN 8 or a 9 occurs in lines 3 or 6 of a hexagram that turns into QIAN, then those two lines become or remain 9 and there is a special interpretation.

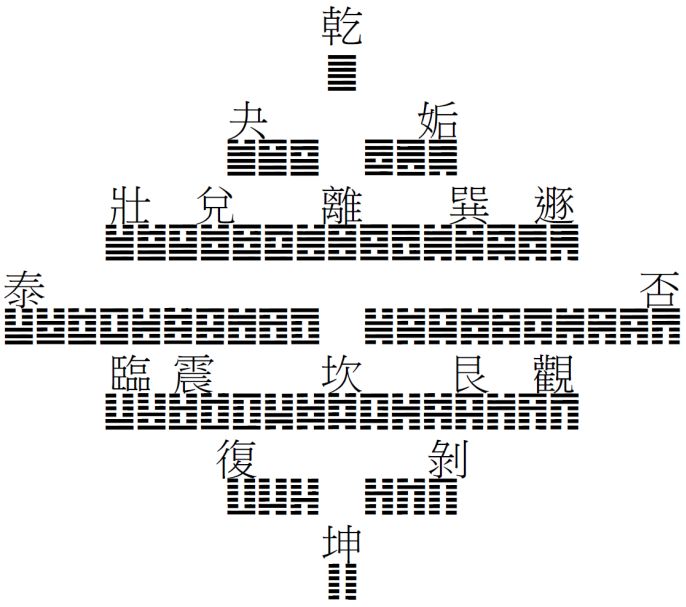
When the six lines' DNs form a straight sequence 4-9 or 9-4, the DNs do not change and there is a special reading.

If lines 3 and 4 are both DN 5, then they do not change and there is a special reading.

There may be other special rules hinted at in the text, such as a trigram that is all 5s or all 9s. At present we can only go by the examples and reading methods described in the text.

Usually the DNs 4, 5, 8, and 9 ameliorate to 6's or 7's and the threatening problem can be averted or reduced according to the reading of the stable outcome and the mixture of trigrams in the hexagram pair.

If you use all six strips to get a single unchanging hexagram, you must toss them so that the sticks fall in a sequence. This gives the probabilities 1, 6, 15, 20, 15, 6, 1. The diamond layout of hexagrams displays this graphically.



The Diamond Layout

Pascal's Triangle	
1	Taiji
1 1	Yin-Yang
1 2 1	4 Phases
1 3 3 1	8 Trigrams
1 4 6 4 1	16
1 5 10 10 5 1	32
1 6 15 20 15 6 1	64 Hexagrams
. . . . .	

Pascal's Triangle shows how to predict the coefficients of the binomial $(a + b)$ to any power.

The roles of DNs 4, 5, 8, and 9 in the interpreting of hexagrams is something that will have to await further research and experiment exploring the guidelines provided in the QHJ manual. The extra complication of the larger numbers of DNs in the Warring States QHJ text suggests how over time the system was streamlined, reducing the DNs to 6, 7 , 8, and 9 and compacting the changing status as well as the line type into those four DNs. Perhaps, the use of 6 DNs was just a more primitive version of the divination method, or perhaps it was more elaborate with subtle ways of distinguishing the values of 4, 5, 8, and 9. The QHJ text seems to keep discussion focused on the images rather than the numbers.

Interestingly enough, the ancient Egyptians had a game called Senet that was played for gambling or entertainment, but also was commonly used for divination. The players or diviners used 4 or 5 wooden throwing sticks that when using 5 sticks produced exactly the same probable outcomes as the system with 5 bamboo strips just described. The throwing sticks usually served to determine how a player's pawns could move on the board. However, the entire Senet board with 30 squares could be encompassed with a single throw of the sticks, since, when we read the sticks in a sequence, we get 32 possible outcomes, and the rare possibility of 5 of a kind can be discounted or given a special interpretation. Thus a single throw of 5 sticks could precisely select a given square on the board. (See suggested Senet Oracle Board Divination Chart below.)

	10101,	10110,	10111,	11000,	11001,	11010,	11011,	11100,	11101,	11110,	11111
	01011,	01100,	01101,	01110,	01111,	10000,	10001,	10010,	10011,	10100,	
00000,	00001,	00010,	00011,	00100,	00101,	00110,	00111,	01000,	01001,	01010.	

The binary numbers 00000 and 11111 represent transcendental values. 00000 is Amen  , the invisible Source of the Oracle Game Board. His name means “Dear Foundation” and contains the glyph for the board and a glyph of a reed, source of a pen for recording the divination.

11111 represents Transcendental Love, the Spirit of the Cosmic Game. My books, **The Cosmic Game**, and The **Senet Tarot of Ancient Egypt**, Vol. 1, (free downloads at www.dpedtech.com/StoreMenuE.htm) contain detailed discussion and analysis of these Egyptian games and oracles.

GCY and Liubo 六博

The QHJ document dates from the Warring States period, roughly 305 B.C. Around this same time a popular game arose in China called *Liubo* 六博. Its popularity continued throughout the Han dynasty and even into the Wei and Jin period. This game was often depicted in art and mentioned in literature as being quite intense and sometimes even raucous. Evidently it was at times a gambling game -- hence the association of gambling with the word bo 博. The character 六 *liu* (six) refers to the six bamboo strips used as throwing sticks in the game. The throwing sticks served as a kind of dice and during the game were used to determine the number of squares a player's pawn could move.

The *Liubo* game board (despite its abstract artistic design) effectively is an 8-by-8 square grid, which makes it naturally a complete set of 64 hexagrams. A single throw of the sticks when read in a prescribed sequence would precisely indicate a hexagram and hence a square on the board. An example has been found of a *Liubo* board with the 60 *ganzhi* written on it. The QHJ document indicates that the *ganzhi* were associated with the interpretation of hexagrams. Hence we may surmise that the *Liubo* board and throwing sticks may have been used for divination in the QHJ manner as well as gambling and entertainment. In this case it is possible that the six throwing sticks were used just as I described above to generate with a single throw either a single hexagram or (in the manner of the GCY shortcut method) to generate a single hexagram line and an indication whether or not it changed. This then constitutes solid indirect physical evidence that during the same era of the Warring States a system was developed using 6 bamboo or wooden strips as throwing sticks for random number generation.

At this stage of the game we still are not certain about the reality of direct or indirect cultural contact between ancient Egypt and ancient China during the Zhou period. It is possible that both cultures independently developed a binary mathematical system along with cosmic checkerboard games that exemplified the system and provided creative ways to play with them and divine about the mysteries of life. It may be that the various similarities are no more than coincidences. Perhaps any sufficiently developed civilization eventually comes to the realization that binary contrasting is the simplest way to encode information. All other forms of data encoding and processing involve the use of higher bases and the "macros" they involve. Such macros are for convenience and speed of complex calculations to be done by clumsy apes. The ironic surprise is that computing is done fastest with simple binary contrasts in mechanical devices. These devices put together by foolish apes then shrink to a size that is not even visible to the clumsy apes. Strange changes in the game.

The Egyptians adopted a mathematical notation based on a concrete visual symbol derived from the physical world -- an eye and its components. The Chinese opted for a much more abstract notation that evolved from the symbols for their numbers and eventually became a system of solid and broken lines that is very close to the primitive modern notation of Morse code. Then the ancient Chinese correlated this extremely abstract notation to their physical world. Such a process applied to such an abstract notation required time and was necessarily rather arbitrary and subject to trial and error. The ironic part of it is that once they arrived at a canonical interpretation of what the correlations "really" were and fixed the correlations in that classical form, the system was no longer the **Changes** because it could not change. Perhaps the remarkable appearance of a mischievous monkey out of the black soil of China is a reminder that when the human mind imposes on the world an idea of how things "really" are and fixes that as dogma, it is only fooling itself.

The other pole of Egyptian civilization that dominated its exoteric and esoteric life was an exuberant polytheistic culture that was unified by the notion that all the deities are emanations of a single source being, variously identified by different groups, but nicely exemplified by the Amen-Ra viewpoint. European culture adopted the Egyptian approach in its widespread decision to follow a monotheistic religion that somehow includes a trinity and a vast company of angels and saints. On the entertainment level the Europeans (and their Muslim brothers) preserved another version of this culture in the form of playing cards, that were variously known as the Tarok, Tarot, Naibbe, or Naipe, expressions that I suspect descended from Egyptian words for a "gift of holistic knowledge" (Da Rekh Neby ). According to tradition the highest card in the set of 22 major archetypes (also known as Arcana) was called the Fool. The identity of the Fool in ancient Egypt was a whimsical baboon transformation of the magisterial Thoth, the Grand Designer of communication systems, science, and technology. Baba the baboon was so foolish that he took the form of a human avatar born as the firstborn son of Osiris, the founding pharaoh of Egyptian civilization. For some crazy reason Baba, the son and heir of the king, was not interested in succeeding Osiris as pharaoh. Instead he went off to live in a cave and practice meditation, breathing exercises, yoga, and esoteric physiological researches. When his uncle Set and his father Osiris had a falling out, Baba remained loyal to both sides and helped resolve the internecine struggles of the family. From the background this Foolish One helped his brother Horus (an avatar of Ra, the sun) to restore order in society and a return to harmony with nature.

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Fairfield, Iowa August, 2015