

## **A UNIQUE WAY OF PLAYING MUSIC USING MATH PART-1**

Playing the Virahanka Sequence on the Tabla (meant for Tabla players)

Hi everybody!! Today I am going to explain this very interesting concept related to both math and music.

There's something called 'The Fibonacci Sequence' (or rather, speaking realistically, the Virahanka Sequence) in Math. It goes something like this:

**1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144....**

As you can see, we can generate the numbers in the sequence by adding the 2 numbers preceding it.

Now, you will be shocked if I tell you that this sequence can be represented on the Tabla, an Indian Percussion instrument (well, not exactly the sequence but the Math of the sequence). This was originally discovered by Acharya Hemachandra, and Indian poet (he generally talked about music, not only Tabla)

Okay, before we get going, let me brief you with some tabla Bols. We have different Bols that have different time durations. For instance, for the time duration – 1, I can play (or anyone can play), the Bol- dha (it is a 1 beat Bol). And for the time duration – 2, I can play the Bol - Thira Kita (this sounds like 4, but actually takes the time duration of 2).

So 1 – Dha

2 – Thira Kita

Fine, now forget tabla. We have 1 and 2. Using these two numbers, how many ways are there to add up to another number?? How many different combinations of 1 and 2 to add up to any other number, say four??

As you may well have predicted, there are five ways.

- $2+2$
- $1+1+2$
- $1+2+1$
- $2+1+1$
- $1+1+1+1$

How many ways are there to add up to 5?

- $1+2+2$
- $2+1+2$
- $1+1+1+2$
- $2+2+1$
- $1+1+2+1$
- $1+2+1+1$
- $2+1+1+1$
- $1+1+1+1+1$

There are eight ways.

So, if we list the possibilities, we get:

- For 1: 1 possibility
- For 2: 2 possibilities
- For 3: 3 possibilities
- For 4: 5 possibilities
- For 5: 8 possibilities
- For 6: 13 possibilities
- For 7: 21 possibilities
- For 8: 34 possibilities
- For 9: 55 possibilities

If we list the possibilities in the form of a sequence with the terms above the sequence, we get:

1   2   3   4   5   6   7   8   9

1 2 3 5 8 13 21 34 55

Does this remind you of something?? It is the Virahanka sequence!!

Hence, to add up to 'n' using 1 and 2, the no. of possibilities would be the 'n'<sup>th</sup> term of the Fibonacci sequence.

Now, instead of using 1 and 2, if we use Dha and Tira Kita, to get four, the no. of combinations would still be 5, and the possibilities would be:

- Thira Kita Thira Kita
- Dha Dha Thira Kita
- Dha Thira Kita Dha
- Thira Kita Dha Dha
- Dha Dha Dha Dha

Thus, you Tabla players can list all the combination of 1 and 2, to add up to any number and, using the Fibonacci sequence as a reference, play all the combinations on the tabla while accompanying artists, or while giving solo performances.

I got to know of this from Prof. Manjul Bhargava's Arnold Ross lecture. He is a great Math professor at Princeton University, USA.

Thanks guys. Ciao!!

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