

HOW TO FIND EUCLIDEAN RHYTHMS

Ian Myers ©2012

Ever since Godfried Toussaint published his paper entitled “The Euclidean Algorithm Generates Traditional Musical Rhythms”, the interest in Euclidean Rhythms has grown. Strictly speaking it is not the Euclidean Algorithm that is used in the creation of Euclidean Rhythms but a different formulation known as the Bjorklund Algorithm.

A Euclidean rhythm is a distribution of a number of pulses evenly (or as evenly as possible) distributed throughout a number of available spaces. The pattern so formed is then repeated cyclically. The Bjorklund Algorithm is the tool used to find these rhythms.

k pulses distributed throughout n locations is denoted as B(k,n) thus the Euclidean rhythm formed by five pulses distributed through eight locations would be symbolised as B(5,8). Here is how the algorithm works for this example.

B(5,8)

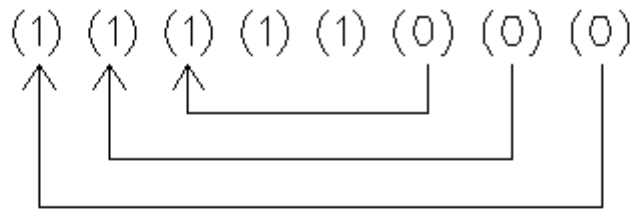
thats 8 locations

with 5 pulses

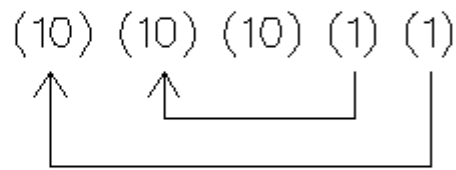
1 1 1 1 1 0 0 0

where the 1 indicates a pulse

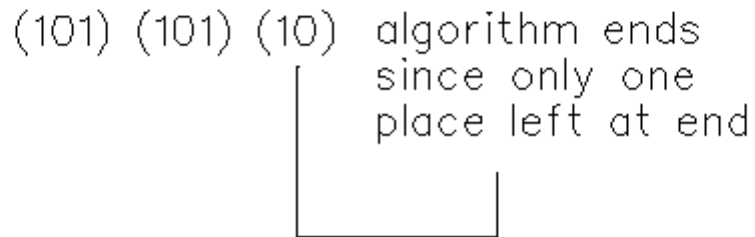
the algorithm proceeds as follows



move 0's to 1's



move 1's to 10's



thus $B(5,8) = (101)(101)(10) = 10110110$

therefore the rhythm is $2 + 1 + 2 + 1 + 2$

Here is another example.

$B(7,17)$

that's 17 spaces with 7 pulses

(1) (1) (1) (1) (1) (1) (1) (0) (0) (0) (0) (0) (0) (0) (0) (0)

moving 0's to 1's we get

(10) (10) (10) (10) (10) (10) (10) (0) (0) (0)

moving 0's to 10's

(100)(100) (100) (10) (10) (10) (10)

moving 10's to 100's

(10010) (10010) (10010) (10)

algorithm ends

therefore $B(7,17) = (10010) (10010) (10010) (10)$

$=10010100101001010$

$= 3 + 2 + 3 + 2 + 3 + 2 + 2$

The various rhythms generated by such method are played against one another to produce more complicated patterns. In a sense each rhythm becomes a generator that are then synchronised together to form a rhythmic resultant.

The following is a list of Euclidean Rhythms that Toussaint found in world rhythms.

B(1,2)	2
B(1,3)	3
B(1,4)	4
B(2,3)	1+2
B(2,5)	2+3

B(2,7)	3+4
B(3,4)	1+1+2
B(3,5)	2 + 2 + 1
B(3,8)	3 + 3 + 2
B(3,10)	3 + 3 + 4
B(3,11)	4 + 4 + 3
B(3,14)	5 + 5 + 4
B(4,5)	1+1+1+2
B(4,7)	2+2+2+1
B(4,9)	2+2+2+3
B(4,11)	3+3+3+2
B(4,15)	4+4+4+3
B(5,6)	1+1+1+1+2
B(5,7)	2+1+2+1+1
B(5,8)	2+1+2+1+2
B(5,9)	2+2+2+2+1
B(5,11)	2+2+2+2+3
B(5,12)	3+2+3+2+2
B(5,13)	3+2+3+2+3
B(5,16)	3+3+3+3+4
B(6,7)	1+1+1+1+1+2
B(6,13)	2+2+2+2+2+3
B(7,8)	1+1+1+1+1+1+1+2
B(7,9)	2+1+1+2+1+1+1
B(7,10)	2+1+2+1+2+1+1
B(7,12)	2+1+2+2+1+2+2
B(7,15)	2+2+2+2+2+2+3
B(7,16)	3+2+2+3+2+2+2
B(7,17)	3+2+3+2+3+2+2
B(7,18)	3+2+3+2+3+2+3

B(8,17)	2+2+2+2+2+2+2+3
B(8,19)	3+2+2+3+2+2+3+2
B(9,13)	2+1+2+1+2+1+2+1+1
B(9,14)	2+1+2+1+2+1+2+1+2
B(9,16)	2+1+2+2+2+1+2+2+2
B(9,20)	3+2+2+2+3+2+2+2+2
B(9,22)	3+2+3+2+3+2+3+2+2
B(9,23)	3+2+3+2+3+2+3+2+3
B(11,12)	1+1+1+1+1+1+1+1+1+1+1+1+2
B(11,20)	2+1+2+2+2+2+2+1+2+2+2+2
B(11,24)	3+2+2+2+2+3+2+2+2+2+2
B(13,24)	2+1+2+2+2+2+2+2+1+2+2+2+2+2
B(15,34)	3+2+2+2+2+3+2+2+2+2+3+2+2+2+2+3+2+2
B(19,30)	2+1+2+2+1+1+2+1+2+1+2+2+1+2+1+2+1+2+ 2+1