

Culver and Cage's IC – Bias, Immobile and No Bias – Warren Burt

In Andrew Culver and John Cage's IC program, there are a number of options for the kind of random numbers you can generate, these are called bias, immobile bias, non-repeating, and no bias. No bias is the norm – if nothing is specified that's what you get. Bias is selected with -b, immobile with -i, and non-repeating with -nr.

For example, this command generates 1000 numbers between 1 and 12 with immobile bias:
ic 1000 1 12 -i

I wondered about these options – what were they. To find out, I generated 1000 numbers between 1 and 12 with the same parameters, only differing with bias, immobile or no bias. Here are the commands used:

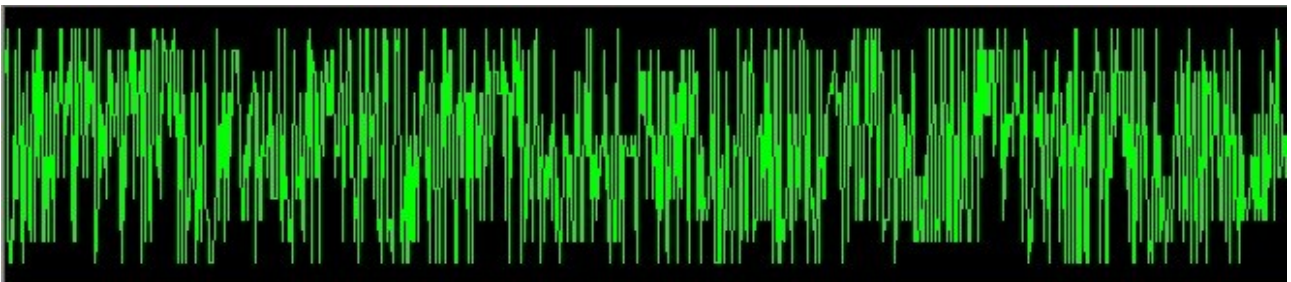
For bias numbers: ic 1000 1 12 -b

For immobile bias numbers: ic 1000 1 12 -i

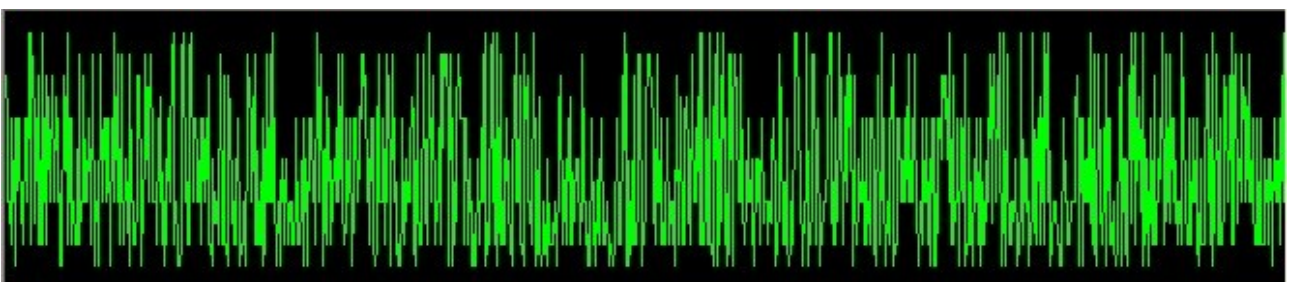
For no bias numbers: ic 1000 1 12

I saved the output of these runs as text files, which I loaded into the DataBin sub-program of John Dunn's ArtWonk, saving them as array files that ArtWonk could understand. ArtWonk then displayed the results as shown below:

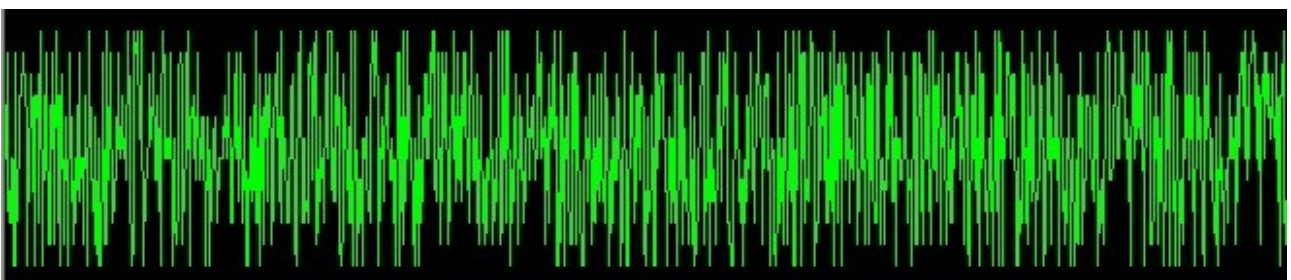
BIAS



IMMOBILE



NO BIAS



I think one can see what's going on from the pictures. In Bias, certain values are favoured, creating an uneven probability distribution, but which values are favoured constantly changes. Note how there seem to be “blocks” or “clumps” of values which then change level to other “blocks” or “clumps”. For Immobile, one uneven probability distribution is chosen, and then kept for the whole of the program's run. Note in that picture how the clumpings are very even, and don't change over the course of the picture. For No Bias, the results look more like random noise – even the areas where a particular value disappears or is favoured are very brief and are in line with what one would expect from something approaching equal-weighted random numbers.

Using an ArtWonk patch (shown at the end of this little document), I generated some piano (or other instrument) music using each distribution in turn. Pitch is the parameter the numbers are mapped to. Longer examples might be helpful, but even with 2 lines of each distribution, the differences between the kinds of distributions are immediately heard. Bias has more grouping of the values into “modal” formations, which quickly change to other modal formations, Immobile has a real feel of there being a “harmonic field” and that “harmonic field” sound is unchanging. No Bias sounds like an equally weighted distribution of the 12 pitches, at least to my ear.

IChingBiasDemo

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♩=120 BIAS

Solo

4

Solo

7

Solo

14 IMMOBILE

Solo

17

Solo

20

Solo

27 NO BIAS

Solo

29

Solo

I wondered if Cage ever used these in his pieces. William Brooks said he thought that Cage had worked with the Bias idea in the Freeman Etudes, and although I know it's not the case that the IC program was used with Cheap Imitation, the kind of changing of modes that Cage used there could be seen as a prototype of the kind of prototype of what would happen with the Bias setting. But the existence of these options shows that Cage's understanding of randomness and it's mappings was very sophisticated. The Bias option could generate pretty interesting results, I think.

Just before writing this document, however, I wrote to James Pritchett and asked him what he knew about Cage's use of "bias." His reply:

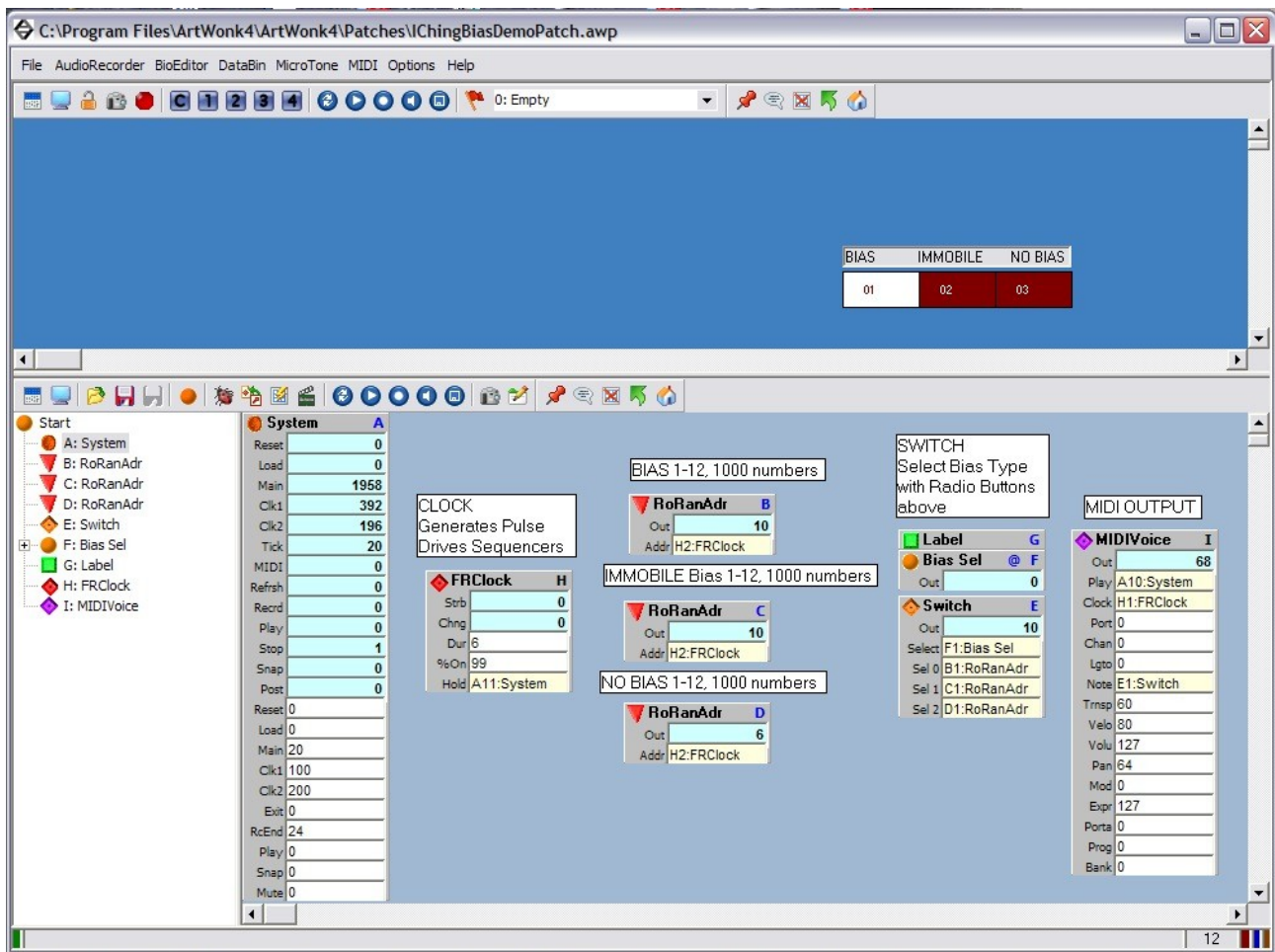
"Regarding "bias" and Cage's use of the I Ching: This is described in Cage's article "To Describe the Process of Composition Used in Music for Piano 21-52" (Silence, pp. 60-61). The term "bias" isn't used here, but the principle is the same. Note particularly step 6 (p. 61): "The sixty-four possibilities of the I-Ching are divided by chance operations into three groups For example, having tossed numbers 6 and 44, a number 1 through 5 will produce a normal; 6 through 43 a muted; 44 through 64 a plucked tone. A certain weight of probability exists in favor of the second and third categories."

In his compositional process, Cage needed to map various choices onto the 64 possibilities of the I Ching. In the case of the Music for Piano above, he needed to map 3 onto 64. There are two ways to do this: evenly (or as evenly as possible), where each choice is equally likely; or unevenly, where some choices may be more likely than others. In the case of Music for Piano, he decided to do it unevenly, thus producing "bias". The bias itself was randomly determined: he used the I Ching to determine the two boundaries for the partition (in this case, 6 and 44). If he used that bias throughout, it would be "fixed bias". In many pieces, he would make this kind of partition repeatedly throughout the piece, changing it at randomly-determined points -- "movable bias". Usually this would be done by getting an additional I Ching reading that would determine the number of decisions to be made before changing the bias again.

I hope that makes it clear! You're not the first person to ask about it."

So, on the basis of his answer, I can see that even by the early 50s, Cage was dealing with the idea of weightings in randomness. His understanding of randomness was already very sophisticated by then. So the "bias" and "immobile bias" well preceded the writing of the ic program, although the particular implementation of "bias" and "immobile bias" is probably a product of the mid-80s.

The ArtWonk patch that generated the music is shown on the next page, below.



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