Using Random Numbers to Create Art

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A **random number** is a number chosen by chance.

**Key property:** Each choice is independent of previous choices.
A **random number** is a number chosen by chance.

**Key property:** Each choice is independent of previous choices.

**Which feels more random?**

**List A:**

4, 3, 2, 2, 3, 3, 3, 3, 2, 4, 3, 4, 4, 4, 4, 1, 3, 3, 4, 3, 3, 1, 3, 1, 4, 1, 1, 1, 3, 3, 1, 1, 4, 3, 3, 2, 3, 1, 1, 1, 3, 4, 3, 1

**List B:**

1, 3, 4, 2, 1, 1, 3, 3, 2, 4, 1, 2, 3, 1, 3, 4, 4, 2, 1, 4, 2, 3, 4, 1, 3, 1, 2, 3, 4, 1, 3, 4, 2, 2, 3, 1, 3, 1, 4, 2, 3, 1, 4, 2
Generating Random Numbers

Tour of Accounting

Over here we have our random number generator.

Nine nine nine nine nine.

Are you sure that's random?

That's the problem with randomness: you can never be sure.
Generating Random Numbers

- Flip a coin
- Roll a die
Generating Random Numbers

- Flip a coin
- Roll a die
- Tables in books
Generating Random Numbers

• Flip a coin

• Roll a die

• Tables in books

• Noise from outer space (random.org)
Generating Random Numbers

- Flip a coin
- Roll a die
- Tables in books
- Noise from outer space (random.org)
- Use a computer?
Mathematics + Art

Bathsheba Sculpture
Mathematics + Art

Bathsheba Sculpture

Henry Segerman
Mathematics + Art?

Bathsheba Sculpture

Henry Segerman

- Repetition
- Symmetry
- Geometry
- Higher Dimensions
Use a computer to program an algorithm:

• Specify **objects**
Use a computer to program an algorithm:

- Specify **objects**
- Give **rules** for placement
Use a computer to program an **algorithm**:

- **Specify objects**
- **Give rules** for placement
- **Add randomness**
Use a computer to program an algorithm:

• Specify objects
• Give rules for placement
• Add randomness
Use a computer to program an algorithm:

• Specify **objects**

• Give **rules** for placement

• Add **randomness**
A **spline** is a piecewise function that is a smooth curve and approximates given data points.
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These points were generated using different randomization techniques.

Which is the most random?

Which is the most beautiful?
• Choose random points that are not too close
• Choose random size tori
• Export and print on a 3D printer
The **Voronoi Diagram** for a set of points is the division of the region into pieces based on closeness.
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Beautiful things happen when the set of points is random.
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Beautiful things happen when the set of points is random.
Random Growth

Create blips at random places
Create blips at random places
Create blips at random places
Random Growth

Create blips at random places
Create bumps at random places
Random Growth

Create bumps at random places
Add bumps together
Create bumps at random places
Add bumps together
Wrap around a cylinder
Choose random partitions of a triangle’s boundary:
Choose random partitions of a triangle’s boundary:
Choose random partitions of a triangle’s boundary:
Choose random partitions of a triangle’s boundary:

Do it many times:
Thanks! Questions? Real-time Art!? 

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Real-time Art

Art that’s never been seen before