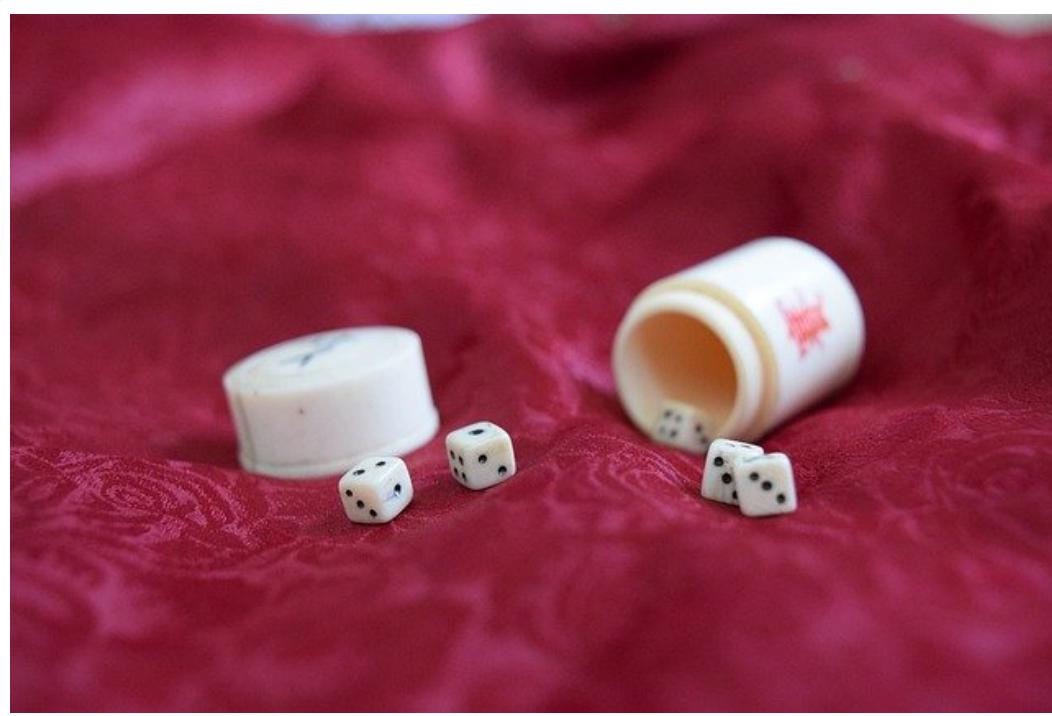


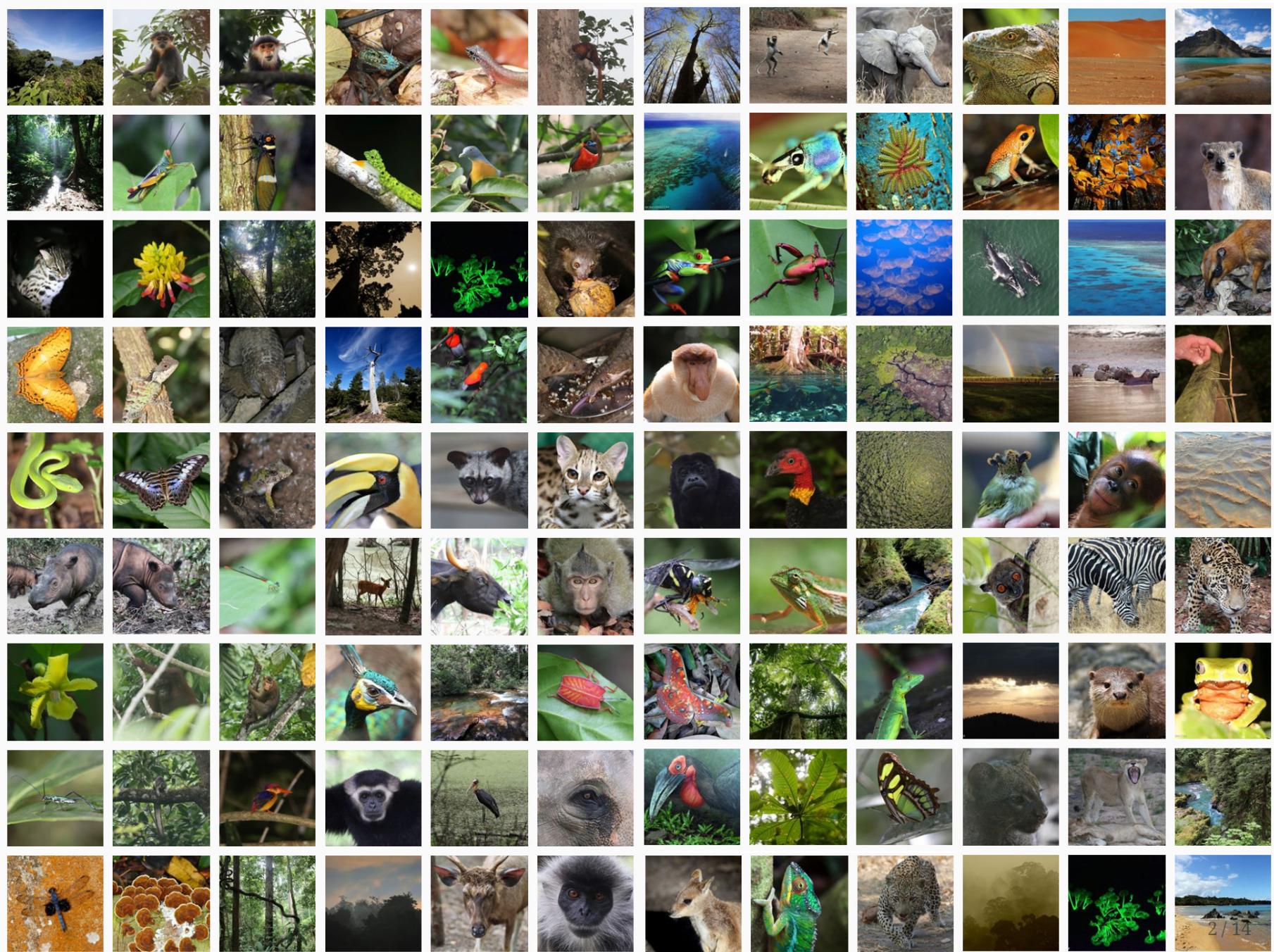
# *Rolling the Dice*

*evolution, chance and design*



George Matthews, Plymouth State University

2020



# *Darwinian Evolution*

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## *Descent with Modification*

1. Start with some self-replicating simple organisms.
2. Copy them with slight variations.
3. Allow them to compete for food, shelter and mates.
4. Repeat 10 gazillion times.

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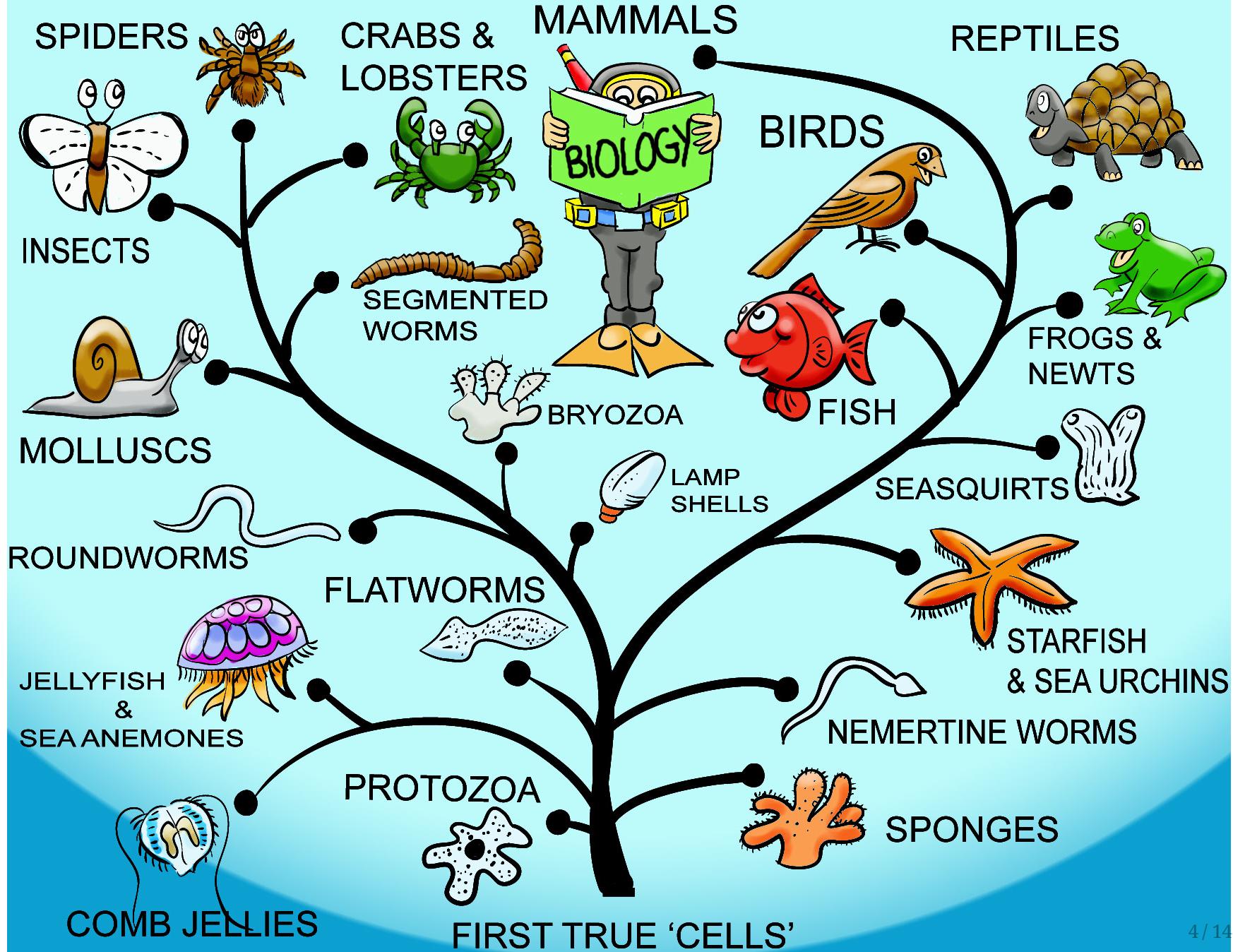
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- That is all we need to account for the staggering diversity and exquisite adaptation of life on Earth.
- Genetics and molecular biology provide mechanisms for this process.
- With minor adjustments the theory of evolution by natural selection remains the basis of modern biology.





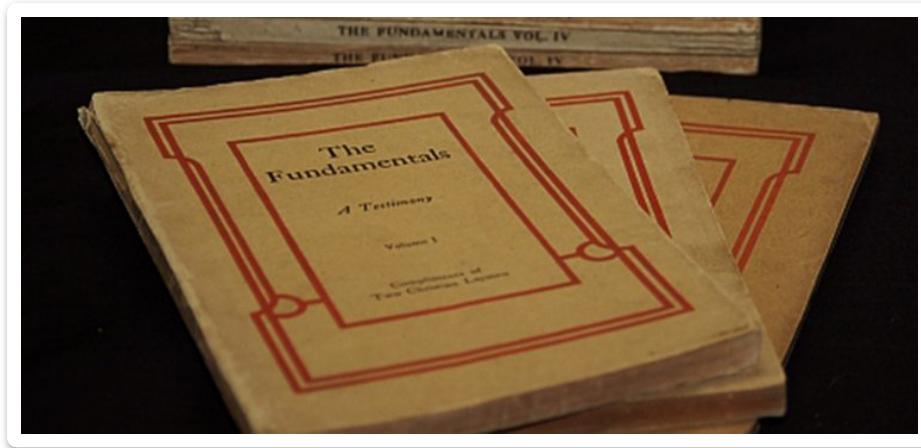
## *Objections to Evolution*

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1. It's just an automated procedure (an algorithm) and yet its results seem so creative and intelligent.
2. How can randomness lead to the solution of real-world problems in a reasonable amount of time?
3. Doesn't this theory undermine human dignity and the meaning of our lives?

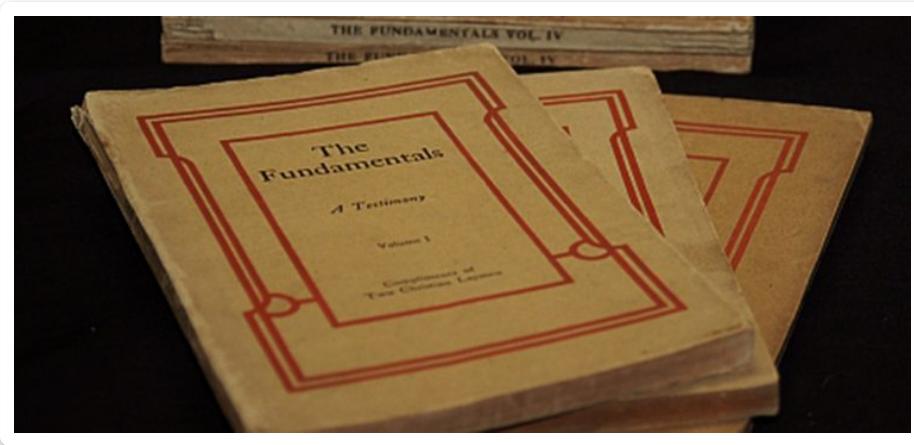
## *Modern religious fundamentalism*

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Response to two developments in 19th century science.

# *Modern religious fundamentalism*

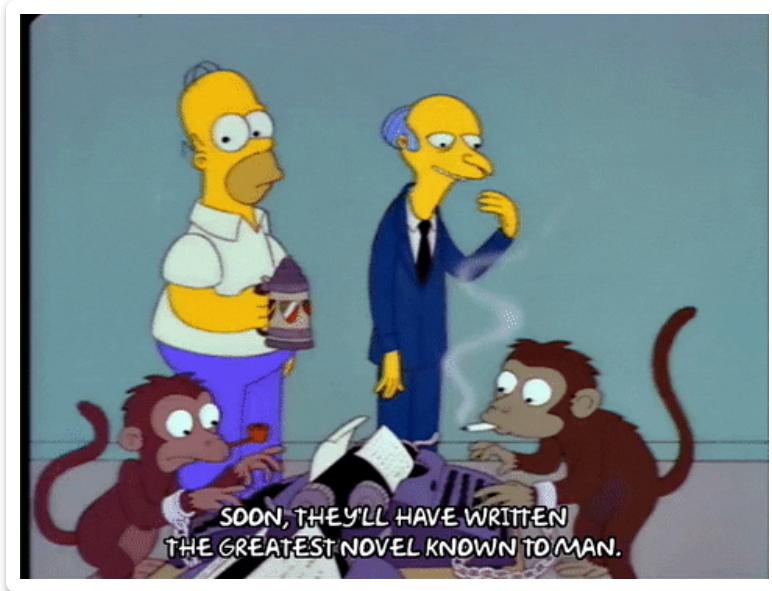


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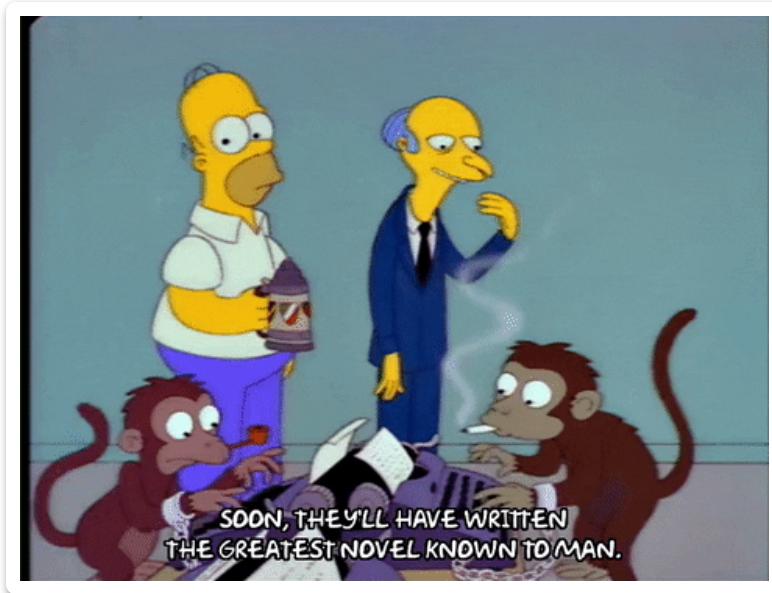
1. Darwin's theory of evolution which did away with the idea that God was needed as a creator of life.
2. Modern Biblical scholarship which looked at the Bible as a collection of ancient literature and not as God's eternal and unchanging word.

*How many monkeys would it take to write a novel?*

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# *How many monkeys would it take to write a novel?*



Not as many as you might think.

## *The Gambler's Fallacy*



"I just flipped five heads in a row, so there must be a higher probability of tails coming up next."

## *The Hot Hand Fallacy*



"Get her the ball quick, she is shooting way above her average today -- she is on fire!"

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11101101 10010001 01111100 00011110 11011100 00111001 11101111 10101101 10010000

## *The Tough love Fallacy*

When the team plays exceptionally well and I praise them afterwards, they don't play as well in the next game.

When the team plays really poorly and I scream at them in the locker room afterwards, they play better next time.

---

So positive reinforcement fails and negative reinforcement works.

## *The Monty Hall problem*



Behind one door is a new car, behind the other two are goats.

- You picked door number one.
- Monty shows you the goat behind door number two.
- Should you switch to door number three when given the choice?



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