Why Byte builds a different toy, every time

A Byte story about **non-determinism** in AI

by Dr. Joe Watkins

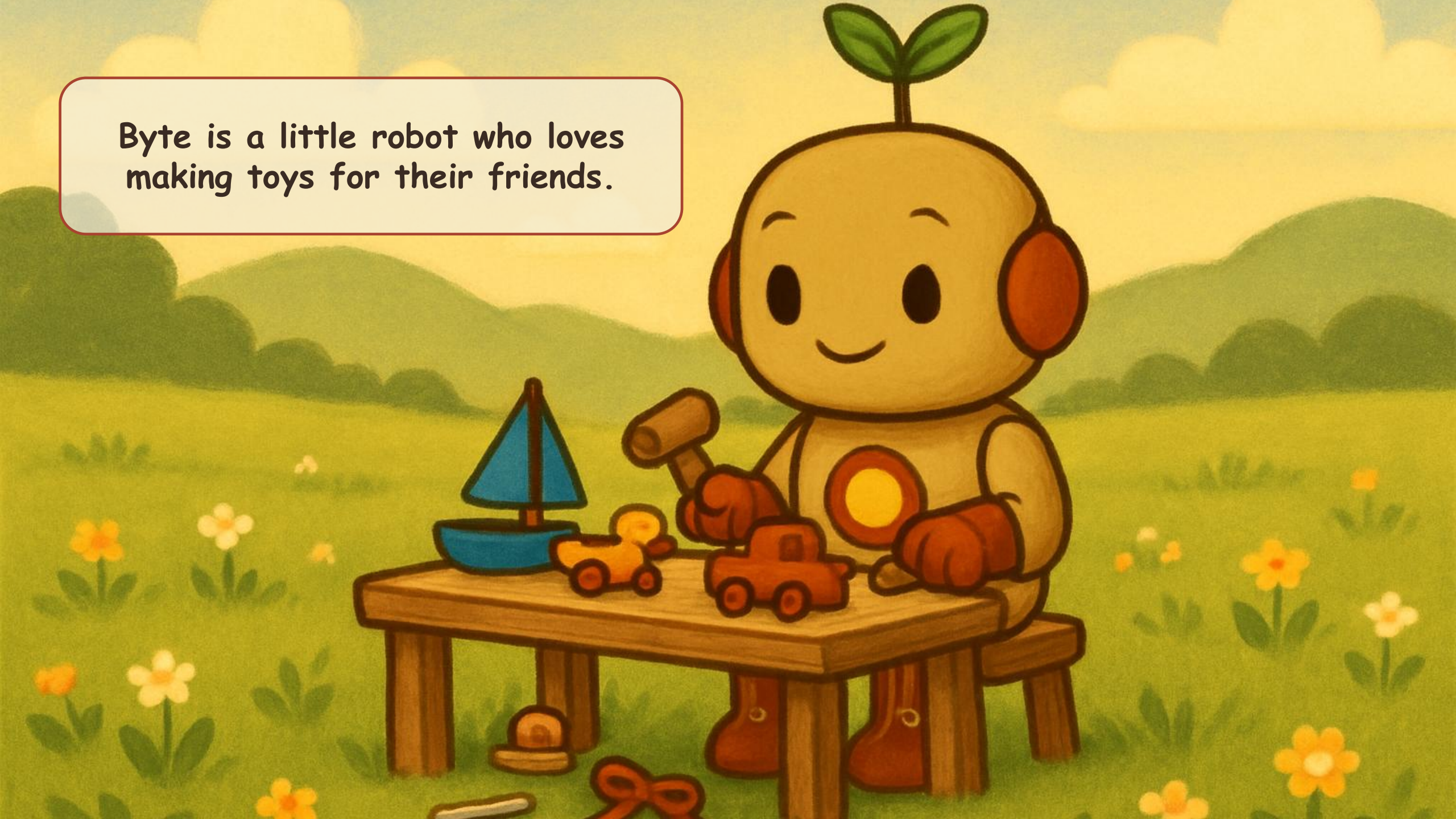


Before we begin — a note for grown-ups

Non-determinism means an AI can give a different answer to the very same question — and that is by design, not a fault. Each time it picks from many good options (a little built-in chance), which is what makes it inventive.

In this story, Byte builds a different toy from the same request every time … and can make the very same one again when you ask.

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Byte is a little robot who loves making toys for their friends.

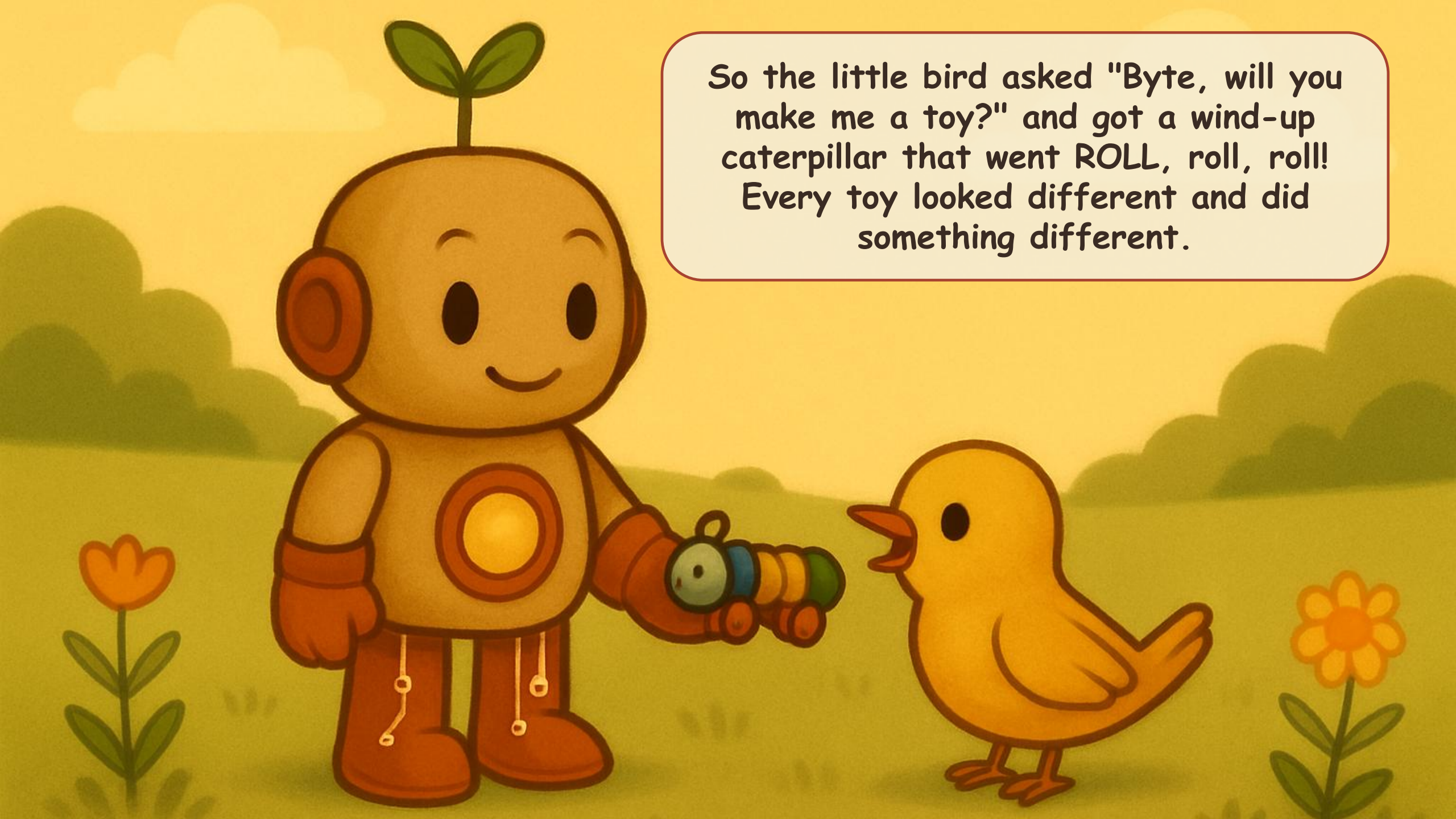

"Byte, will you make me a toy?" asked their friend the rabbit. So Byte built a little spring-frog that went HOP, hop, hop!
Ask an AI
"Explain to a 5-year-old why an AI can give a different answer to the same question, in 3 sentences."


The next day their friend the hedgehog asked for a toy in the exact same way. "Byte, will you make me a toy?" he asked. But this time Byte built a whirly windmill-bird that went SPIN, spin, spin!


"That is not the same as the rabbit's toy!" said the hedgehog. "Why is it different?"

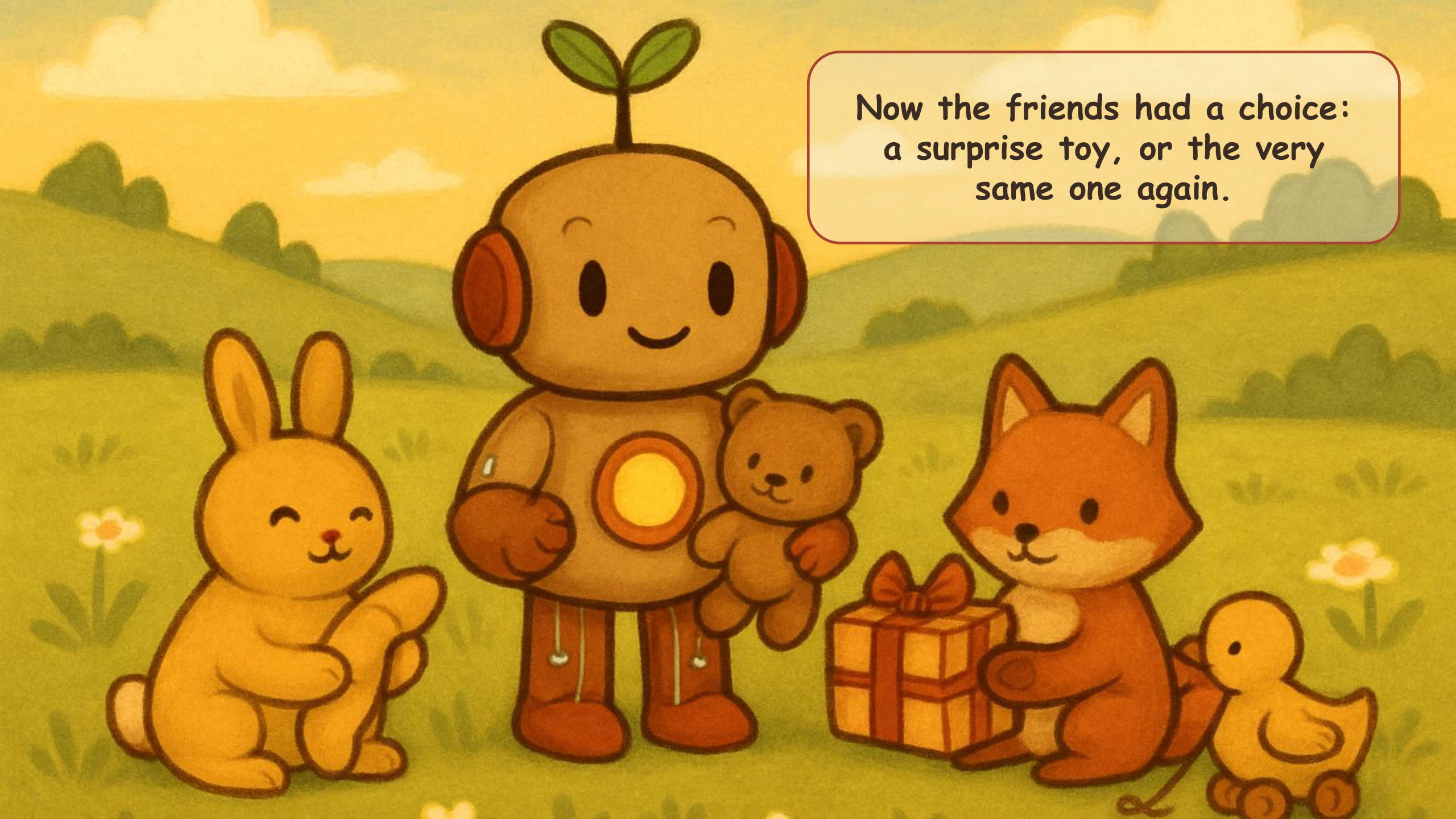

"I make a new toy fresh each time," said Byte. "You ask using the same words … and I build a different toy."
Ask an AI
"Explain why AI gives a different answer to the same question, suitable for a five year old."

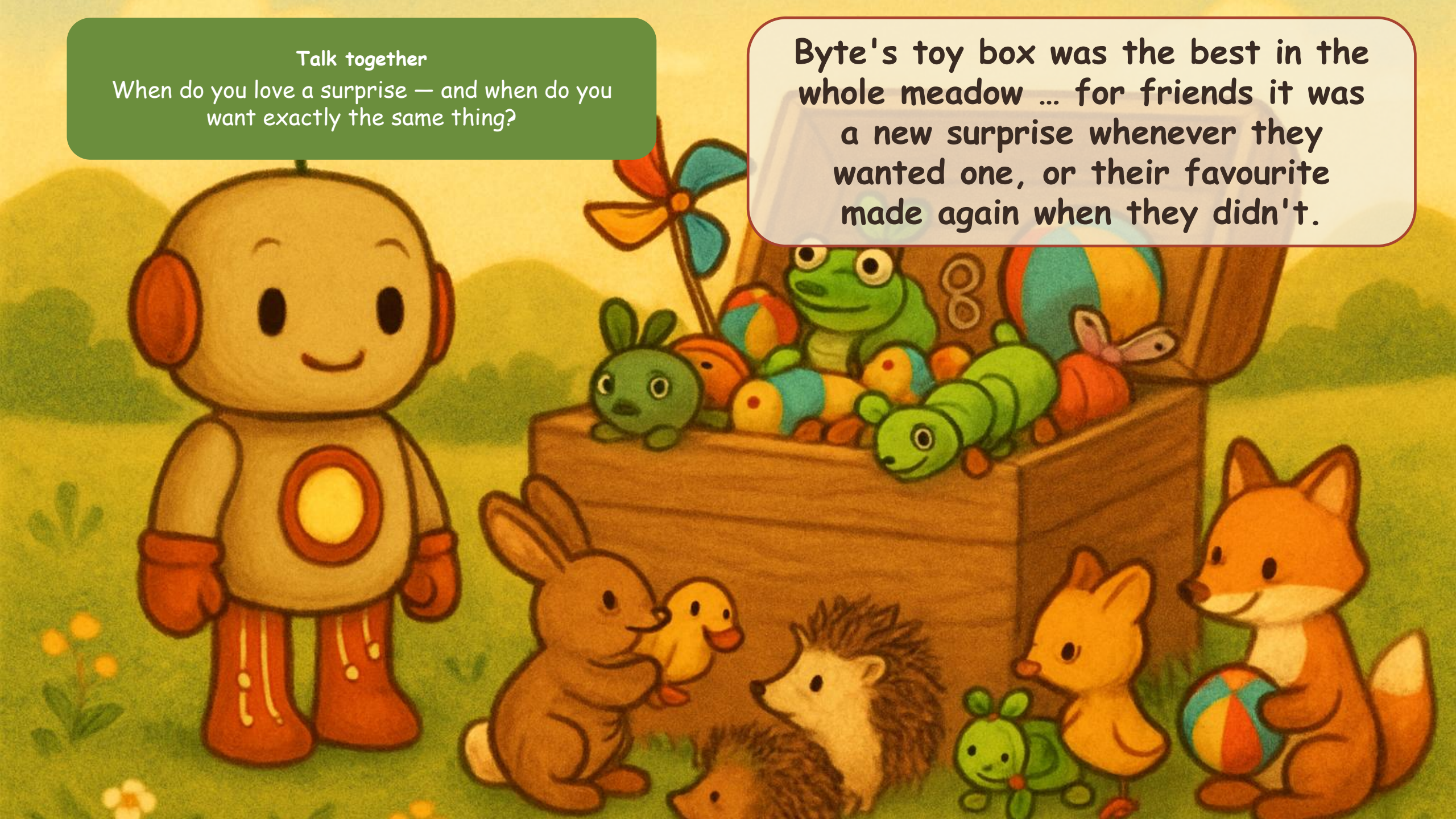

In Byte's workshop was a big box of bits and bright ideas. Each time they were asked to build a toy, Byte reached in and picked different pieces … and so a different toy popped out.

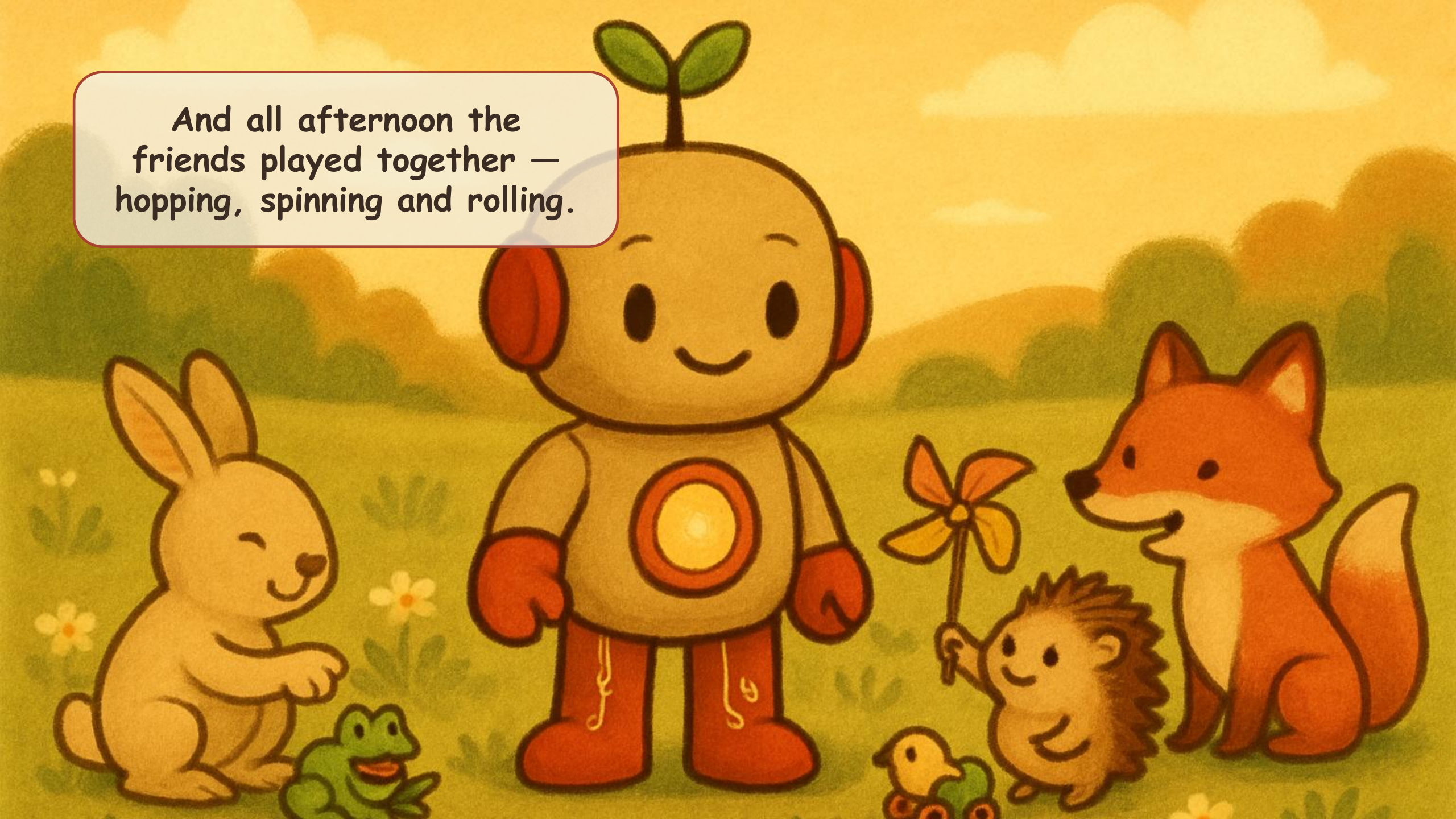

So the little bird asked "Byte, will you make me a toy?" and got a wind-up caterpillar that went ROLL, roll, roll! Every toy looked different and did something different.


Some friends loved the surprise.
But the wise fox wanted a hopping frog, just like the rabbit's.


Ask an AI
"Please explain the concept of 'temperature' in AI, suitable for primary school age."
"Then ask me for that one," said Byte, "and I'll build it the same." And Byte made another spring-frog, exactly like before.


Now the friends had a choice: a surprise toy, or the very same one again.


Talk together
When do you love a surprise — and when do you want exactly the same thing?
Byte's toy box was the best in the whole meadow … for friends it was a new surprise whenever they wanted one, or their favourite made again when they didn't.


And all afternoon the
friends played together —
hopping, spinning and rolling.

Let's talk about it together ☘

- Byte made a different toy from the very same words. Can you think why?
- Which of Byte's toys would you like and would the next one be the same?
- When is a surprise the best thing? When would you want exactly the same thing every time?
- How could you ask Byte for a surprise? How could you ask for the same toy again?
- Is a different answer always a wrong answer?

🔍 **Spot the AI!**
Every picture here was generated by an AI — and AIs make funny little mistakes. See how many you can find: does Byte's antenna, chest-light or silver circuitry change from page to page? Do the animals shift or swap? Noticing what AI gets wrong is a real AI-literacy superpower.

Scan to find the full lesson set on non-determinism in AI at the AI Literacy Lab