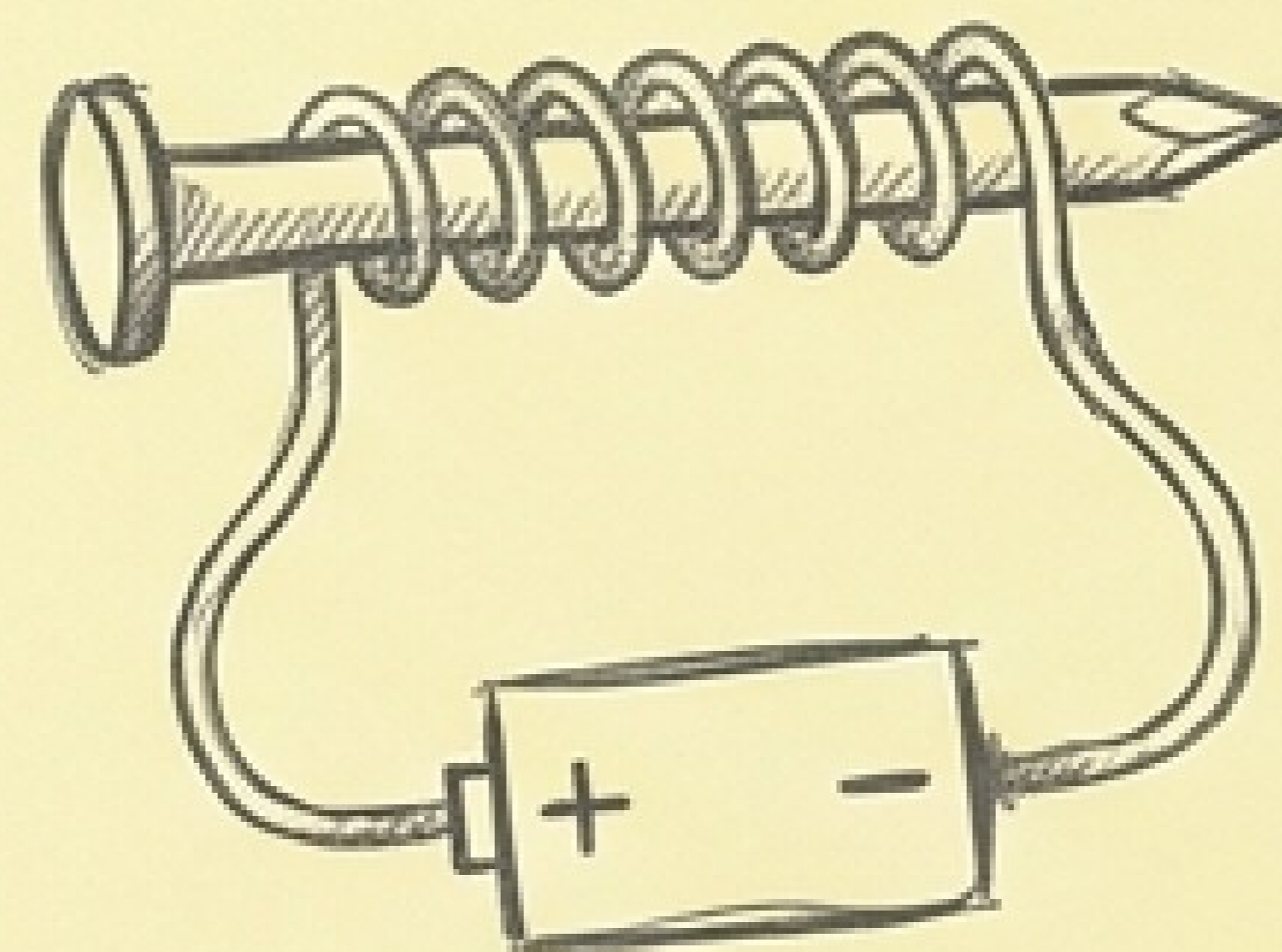
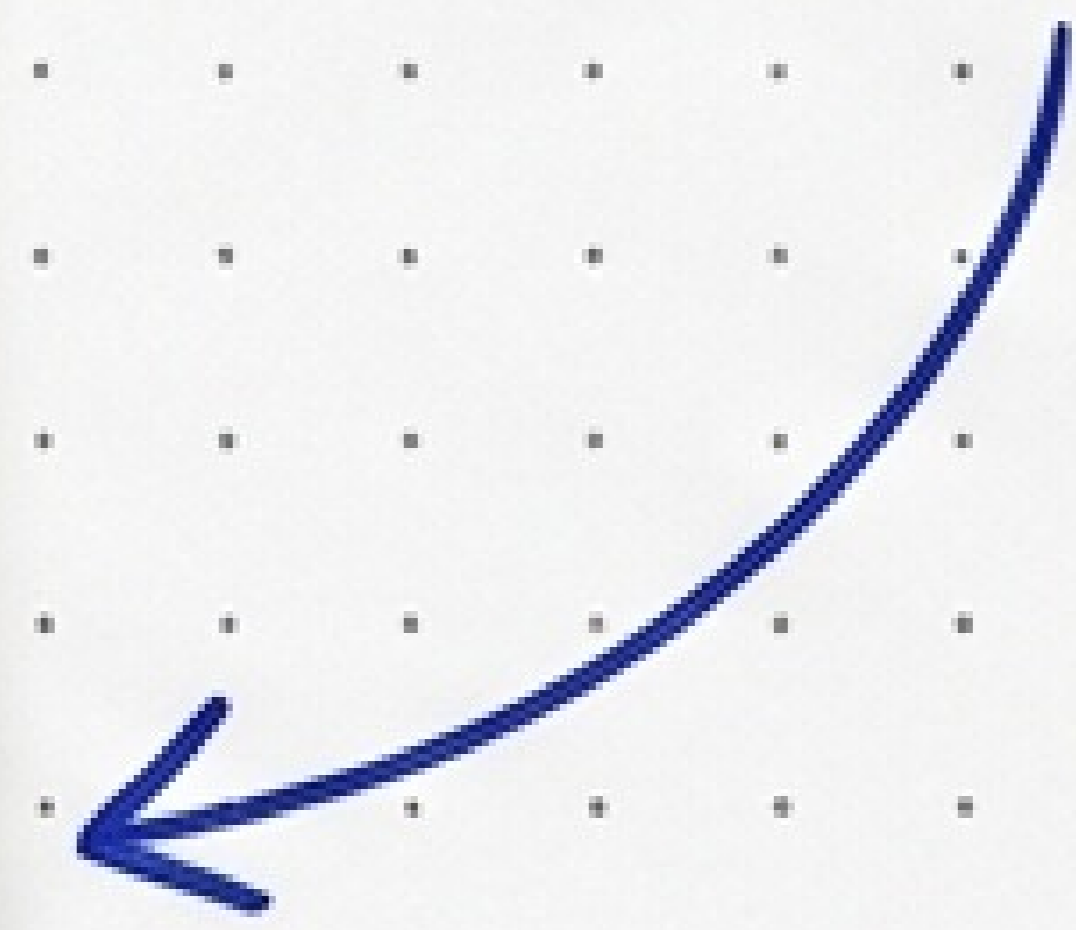


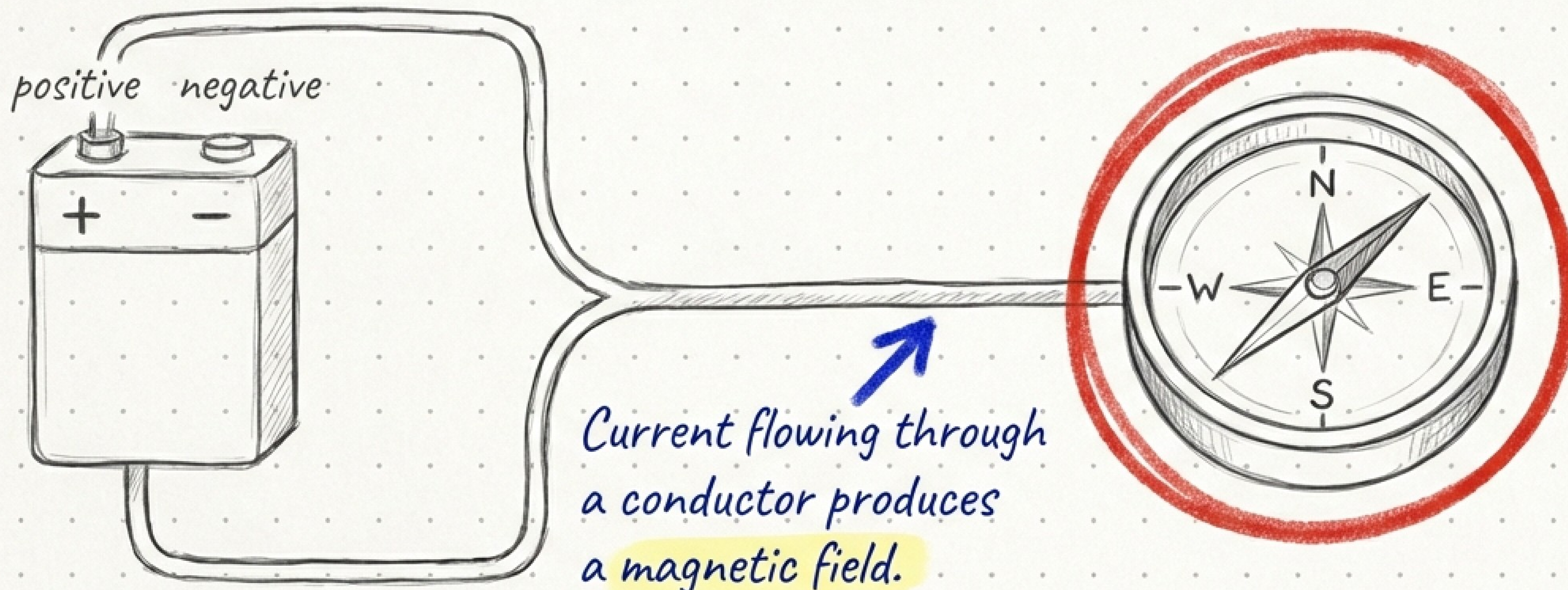
Mastering the Magnetic Effects of Electric Current



Complete revision
guide: Fields,
rules, and
applications.

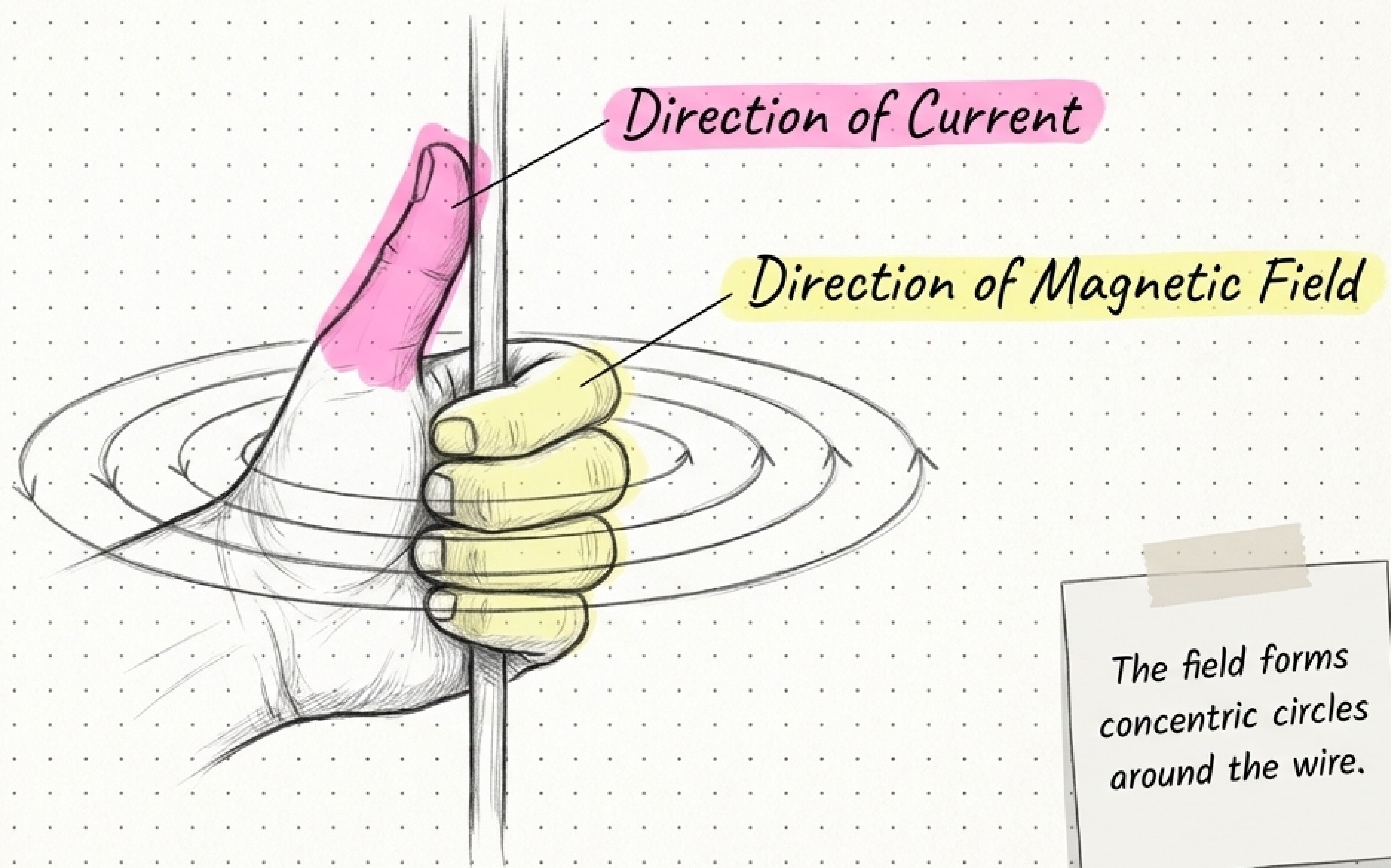


Electric current transforms a simple wire into a magnet



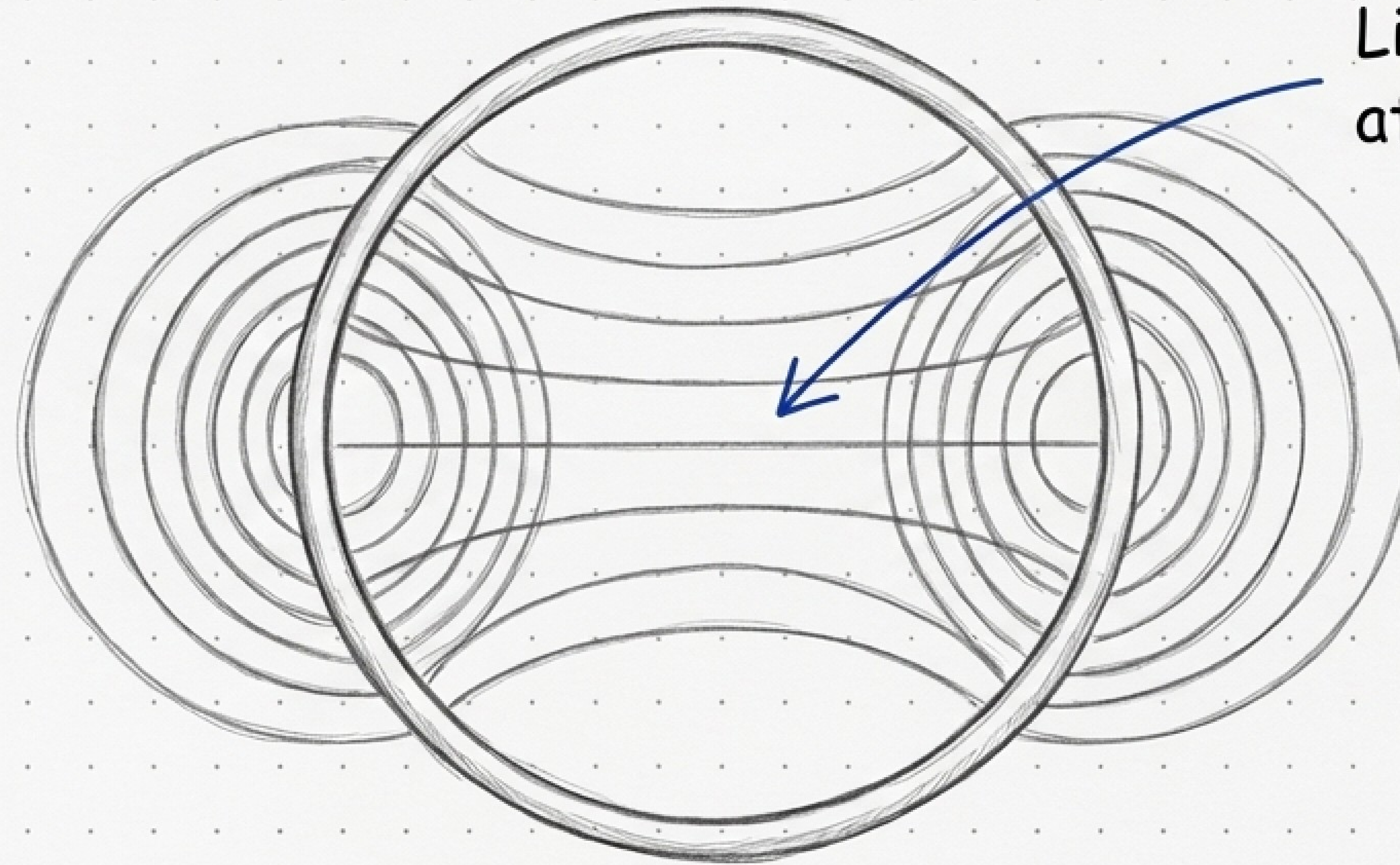
Proof: A compass needle deflects near a current-carrying wire. The wire behaves exactly like a magnet!

Straight conductors create concentric circular magnetic fields



The field forms concentric circles around the wire.

Bending the wire into a loop aligns and strengthens the field

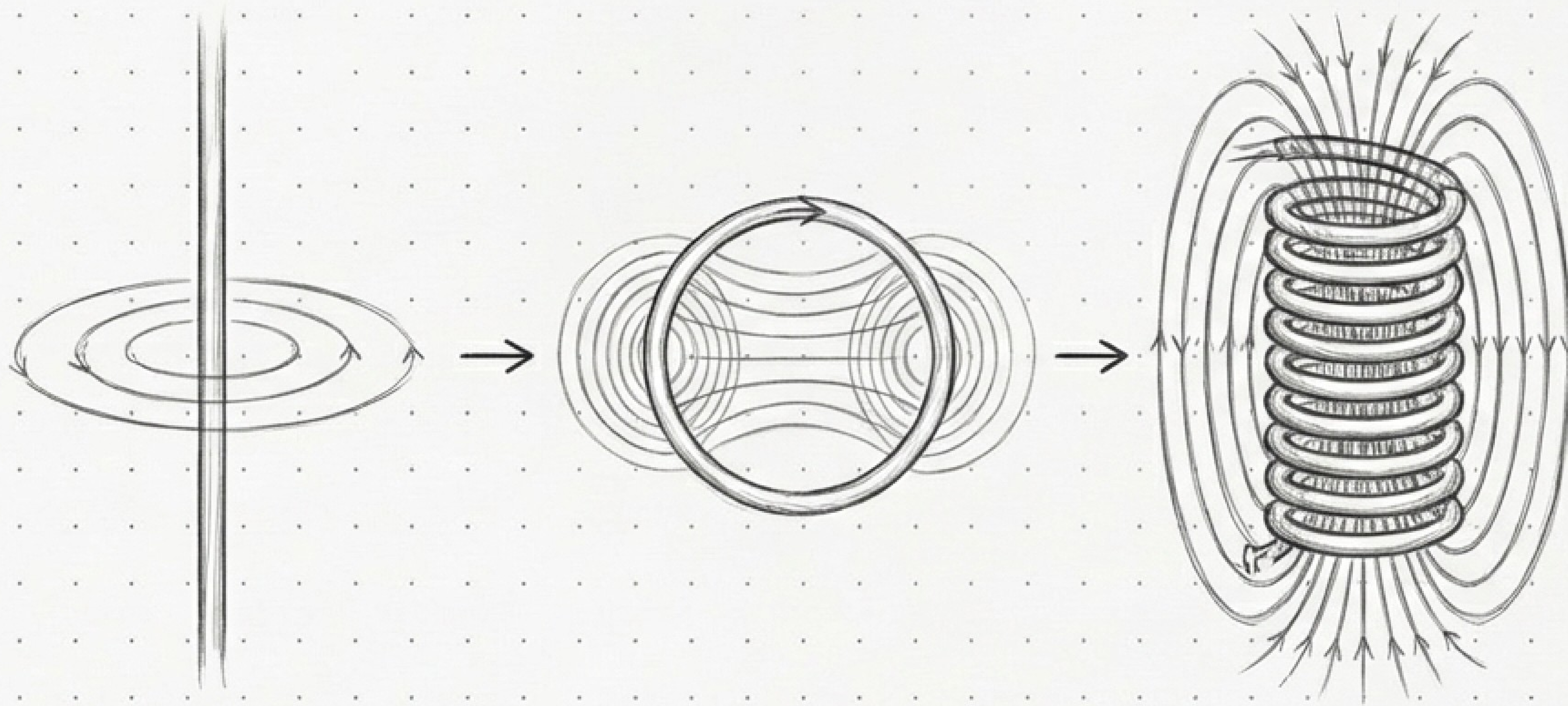


Lines become parallel at the centre.

Crucial concept for building electromagnets.

The field inside the loop is stronger and nearly uniform.

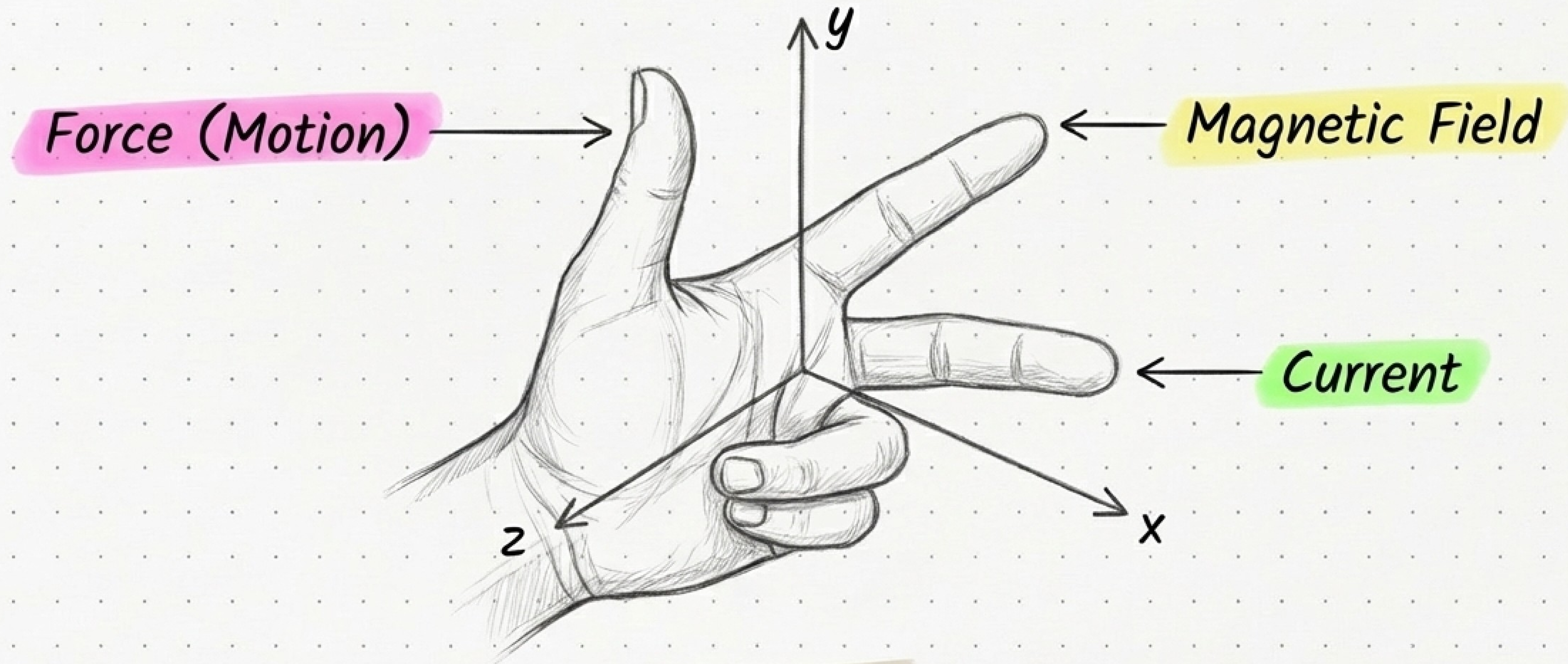
Three parameters amplify magnetic field strength



- Increase the current
- Increase the number of turns (create a coil)
- Decrease the distance from the conductor

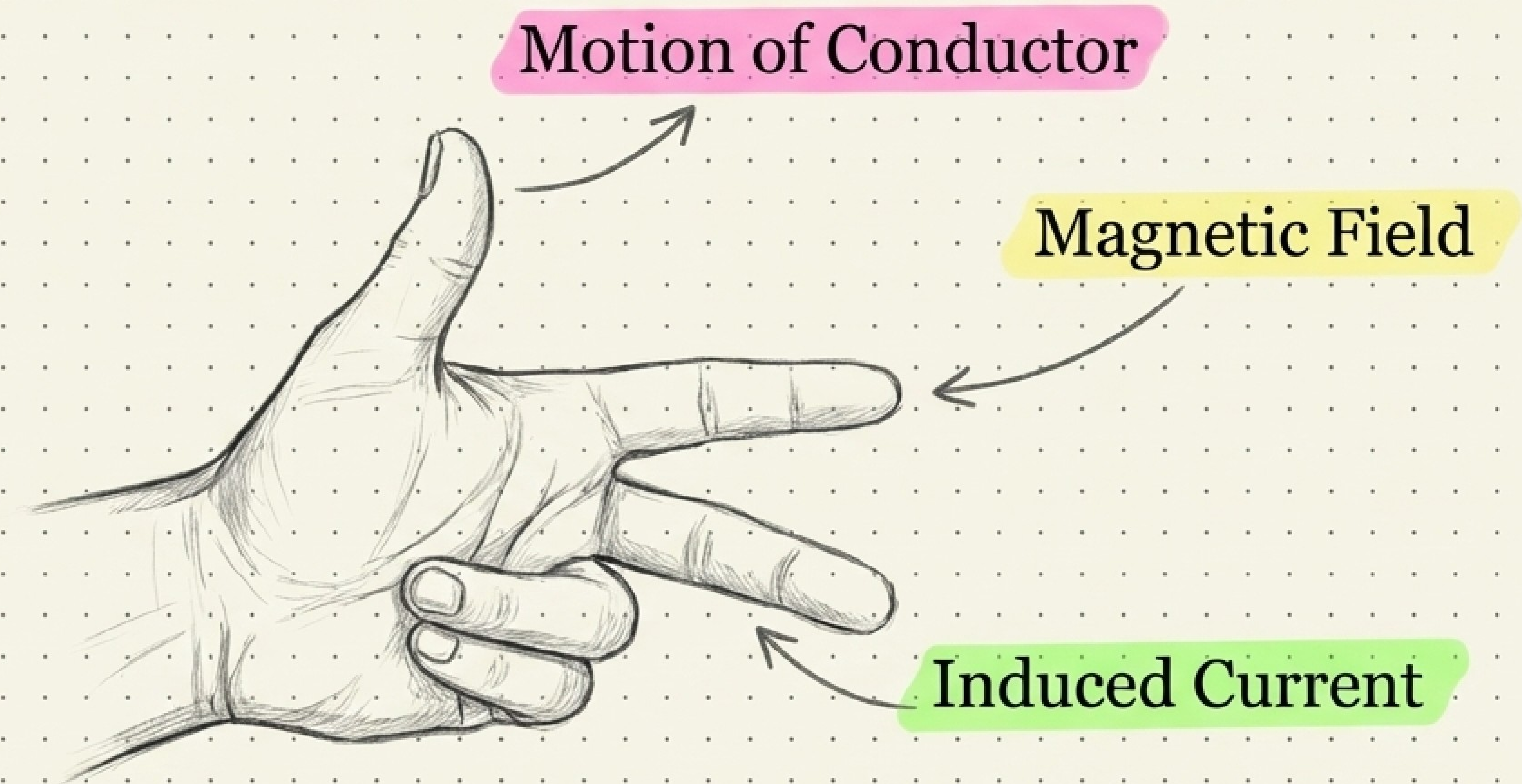
A coiled wire inherently produces a vastly stronger field than a straight wire.

Fleming's Left-Hand Rule predicts physical motion in motors



Application: This is the working principle behind every Electric Motor.

Fleming's Right-Hand Rule maps electrical induction in generators



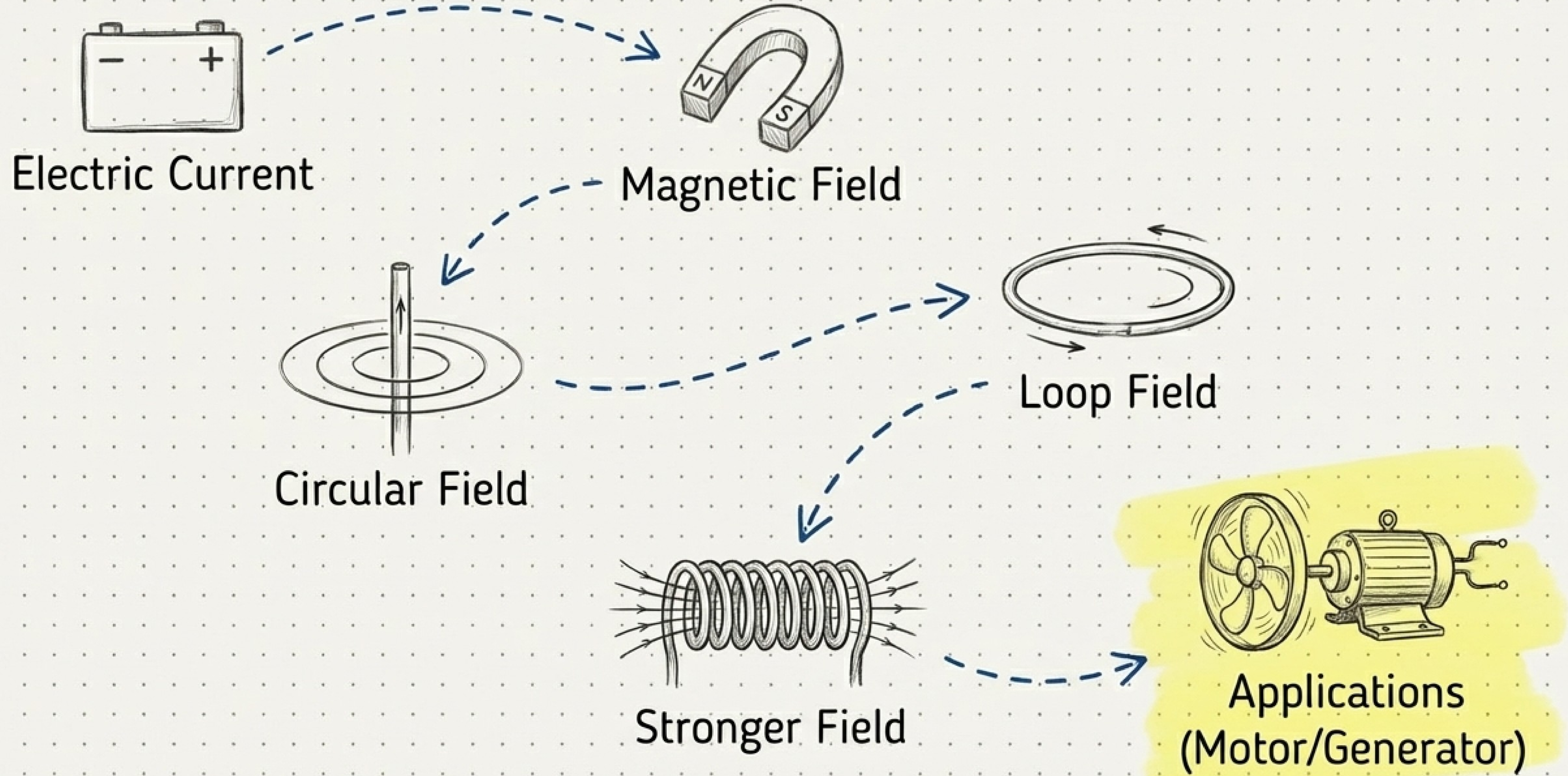
Application: This is how an Electric Generator creates power.

Diagnostic Matrix: Choosing the correct hand rule

[Feature]	[Left-Hand Rule]	[Right-Hand Rule]
Primary Use	Motors	Generators
What are we looking for?	Finding Force (Motion)	Finding Induced Current
Middle Finger represents	Existing Current	Induced Current

Tip: Left = Movement (Motor).
Right = Resulting Current (Generator).

The Electromagnetism Roadmap



Test Yourself: Question 1

Magnetic field around a straight wire is:

(a) Straight

(b) Circular

(c) Random

(d) None

Remember the Right-Hand Thumb Rule sketch! The fingers curl in concentric circles.

Test Yourself: Question 2

Fleming's Left-Hand Rule is used in:

(a) Generator

(b) Motor ✓

(c) Battery

(d) Cell

$L \rightleftharpoons M$

Left = Motor.
We use the left hand when a current already exists and we want to create physical force.

Test Yourself: Question 3

Magnetic field strength increases with:

- (a) Current
- (b) Turns
- (c) Distance decrease
- (d) All

All three! More current = more power. More turns (coils) = compounded field. Closer proximity = stronger effect.

Test Yourself: Question 4

Right-Hand Rule gives direction of:

- (a) Field
- (b) Force
- (c) Current
- (d) Heat



Careful! This refers to the Right-Hand *Thumb* Rule for straight wires (finding the Field), NOT Fleming's Right-Hand Rule (which finds induced current).