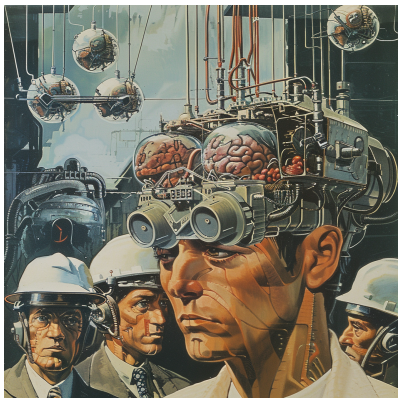
Debugging Strategies

Essential Skills for Every Coder *Your best debugging tool is something you already have: your brain!*

Getting errors is totally normal - it happens to every programmer, every time they write code.

Start with Your Brain



Be Specific About the Problem

- Don't say: "I wanted to draw a flower but it's not working"
- Do say: "I expected a red circle in the upper-left corner, but I only see half a circle at the top"

Read Your Code Line by Line

- Double-check spelling, capitalization, keywords, and symbols
- Use paper and pencil to trace through your code
- Write down variable values as you go
- Don't assume - take it one line at a time
- Reading out loud can help!

Three Types of Errors

1. **Syntax Errors** - The Computer can't understand your code

```
function draw {  // Missing () parentheses!
  background(220);
}
// Error: Unexpected token '{'
```

2. **Runtime Errors** - Code runs but breaks during execution.

```
function draw() {
  background(myColor);  // myColor is not defined!
}
// Error: myColor is not defined
```

3. **Logic Errors** - Code runs but does something unexpected

```
// Circle appears in wrong place because width/height
// are calculated before createCanvas()
```

Research Errors Effectively

- *Copy the exact error message* and search for it
- Add "p5.js" or "JavaScript" to your search
- Use quotes for exact matches: '"Unexpected token"'
- Look for Stack Overflow and Processing forum posts
- Sometimes search only part of the error (without your variable names)
- Use AI with an active learning approach

Best Debugging Practices

Start Small and Test Often

1. Don't write your whole program at once!
2. Test after every few lines of code
3. It's easier to find bugs in code you just wrote
4. Create small example programs (MCVE*) to isolate problems

**Minimal Complete Verifiable Example*

Other Powerful Techniques

Start Small and Test Often

- **Rubber Duck Debugging** - Explain your problem out loud to anything
- Take Breaks - Solutions often come when you step away
- Comment Out Code - Use // to temporarily disable problematic sections
- Use Browser Developer Tools - Press F12 for advanced debugging
- Use AI support tools with active engagement