

## 1.11: WHAT COULD POSSIBLY GO WRONG?



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As we saw in our earliest conversations with Python, we must communicate very precisely when we write Python code. The smallest deviation or mistake will cause Python to give up looking at your program.

Beginning programmers often take the fact that Python leaves no room for errors as evidence that Python is mean, hateful, and cruel. While Python seems to like everyone else, Python knows them personally and holds a grudge against them. Because of this grudge, Python takes our perfectly written programs and rejects them as "unfit" just to torment us.

```
>>> print 'Hello world!'
File "<stdin>", line 1
    print 'Hello world!'
          ^
SyntaxError: invalid syntax
>>> print ('Hello world')
Traceback (most recent call last):
File "<stdin>", line 1, in <module>
NameError: name 'print' is not defined

>>> I hate you Python!
File "<stdin>", line 1
    I hate you Python!
      ^
SyntaxError: invalid syntax
>>> if you come out of there, I would teach you a lesson
File "<stdin>", line 1
    if you come out of there, I would teach you a lesson
      ^
SyntaxError: invalid syntax
>>>
```

There is little to be gained by arguing with Python. It is just a tool. It has no emotions and it is happy and ready to serve you whenever you need it. Its error messages sound harsh, but they are just Python's call for help. It has looked at what you typed, and it simply cannot understand what you have entered.

Python is much more like a dog, loving you unconditionally, having a few key words that it understands, looking you with a sweet look on its face ( `>>>` ), and waiting for you to say something it understands. When Python says "SyntaxError: invalid syntax", it is simply wagging its tail and saying, "You seemed to say something but I just don't understand what you meant, but please keep talking to me ( `>>>` )."

As your programs become increasingly sophisticated, you will encounter three general types of errors:

### Syntax errors

These are the first errors you will make and the easiest to fix. A syntax error means that you have violated the "grammar" rules of Python. Python does its best to point right at the line and character where it noticed it was confused. The only tricky bit of syntax errors is that sometimes the mistake that needs fixing is actually earlier in the program than where Python *noticed* it was confused. So the line and character that Python indicates in a syntax error may just be a starting point for your investigation.

### Logic errors

A logic error is when your program has good syntax but there is a mistake in the order of the statements or perhaps a mistake in how the statements relate to one another. A good example of a logic error might be, "take a drink from your water bottle, put it in your backpack, walk to the library, and then put the top back on the bottle."

### Semantic errors

A semantic error is when your description of the steps to take is syntactically perfect and in the right order, but there is simply a mistake in the program. The program is perfectly correct but it does not do what you *intended* for it to do. A simple example would be if you were giving a person directions to a restaurant and said, "...when you reach the intersection with the gas station, turn left and go one mile and the restaurant is a red building on your left." Your friend is very late and calls you to tell you that they are on a farm and walking around behind a barn, with no sign of a restaurant. Then you say "did you turn left or right at the gas station?" and they say, "I followed your directions perfectly, I have them written down, it says turn left and go one mile at the gas station." Then you say, "I am very sorry, because while my instructions were syntactically correct, they sadly contained a small but undetected semantic error."

Again in all three types of errors, Python is merely trying its hardest to do exactly what you have asked.