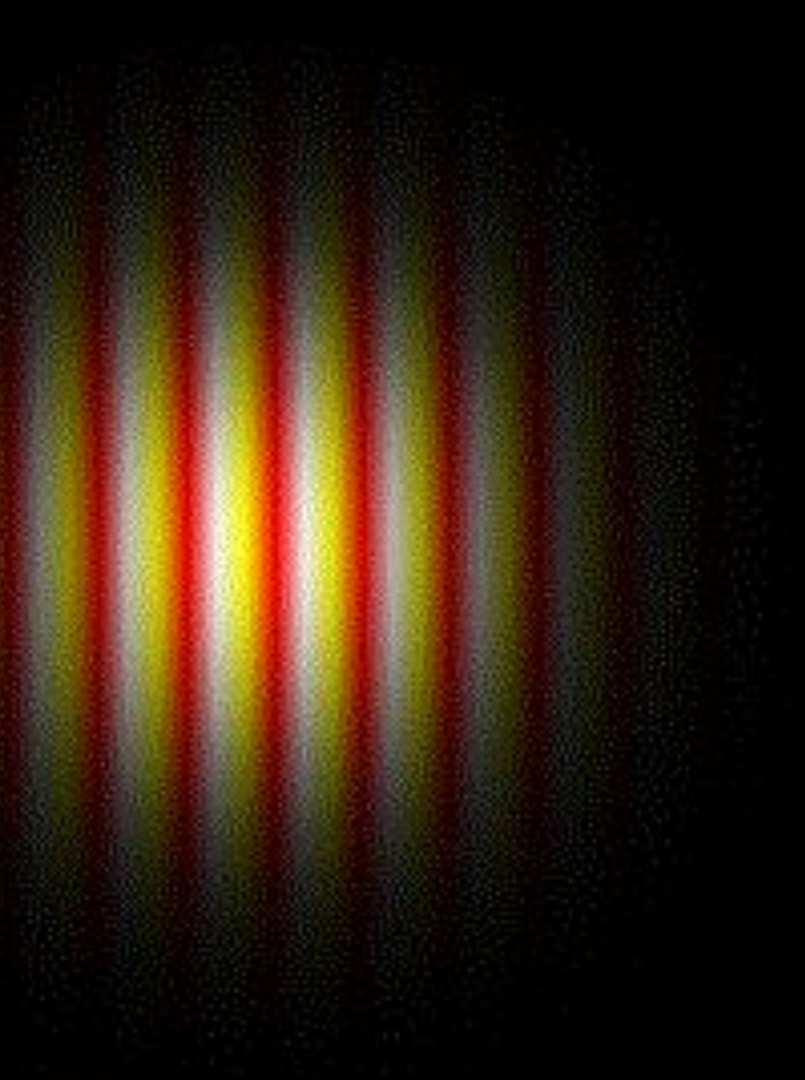
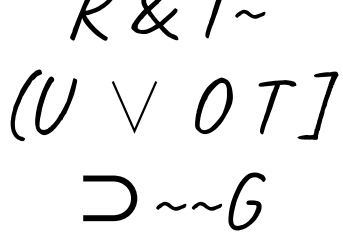


Pattern Recognition

Food for thought...

If your formulas are not well-formed according to the rules of grammar of TL, then you will encounter problems when you apply the techniques and rules of symbolic logic.
This is due to the fact that the rules we are learning are written so that they apply *only* to well-formed expressions.



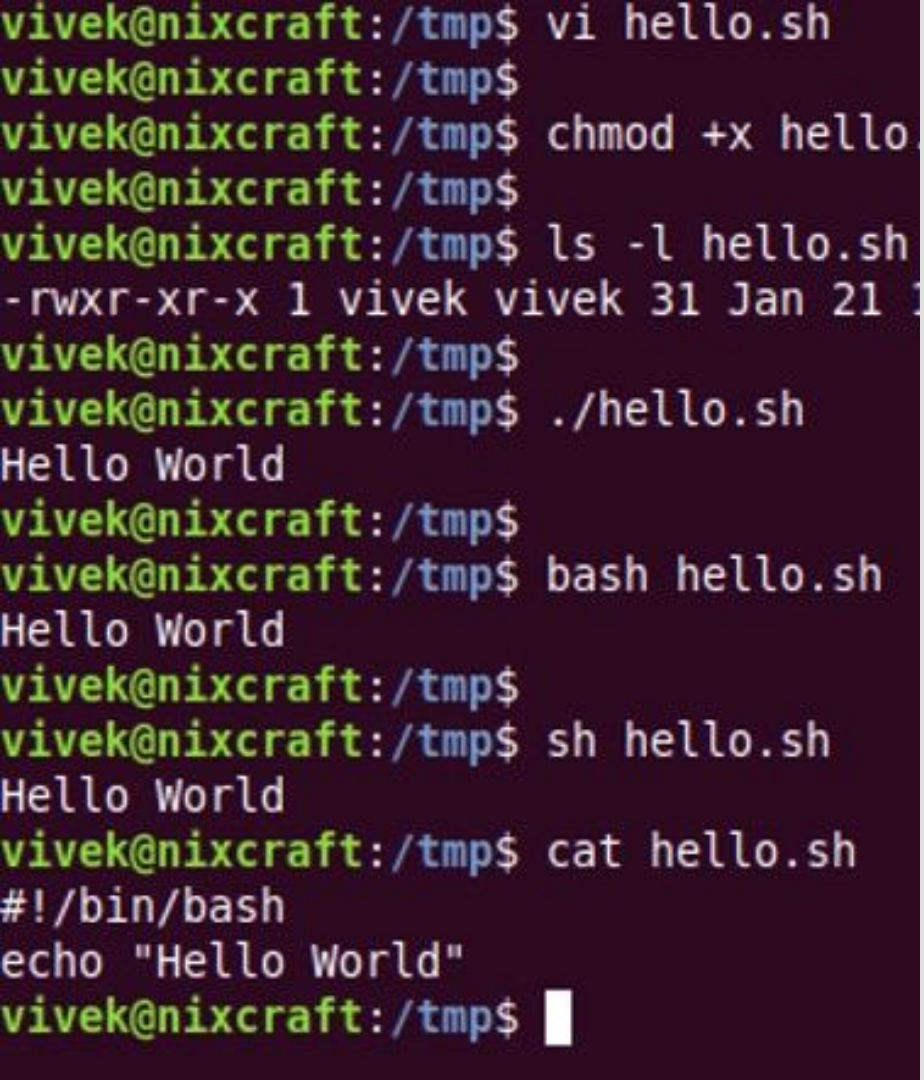
Computers face a similar problem…

A computer running a particular program only accepts information that is presented in certain predefined formats.

If the information going into the computer is not well-formed according to the rules of grammar of the programming language, then the computer will output “syntax error” and refuse to execute the instruction.

TL (and other logical languages) are very similar to computer programming languages.

They both include symbolic vocabularies and precise rules of grammar; both are carefully designed to communicate complex ideas with precision.



This is why many schools believe that learning a logical language is good preparation for learning a computer programming language.

Question:
How do we assess for validity in truth-functional logic?

Assessing for Validity

Method 1:

The Stoics, through their research, discovered certain “patterns of reasoning” that are always valid.
These patterns will be another method by which we can assess for validity…

—

A valid argument form...

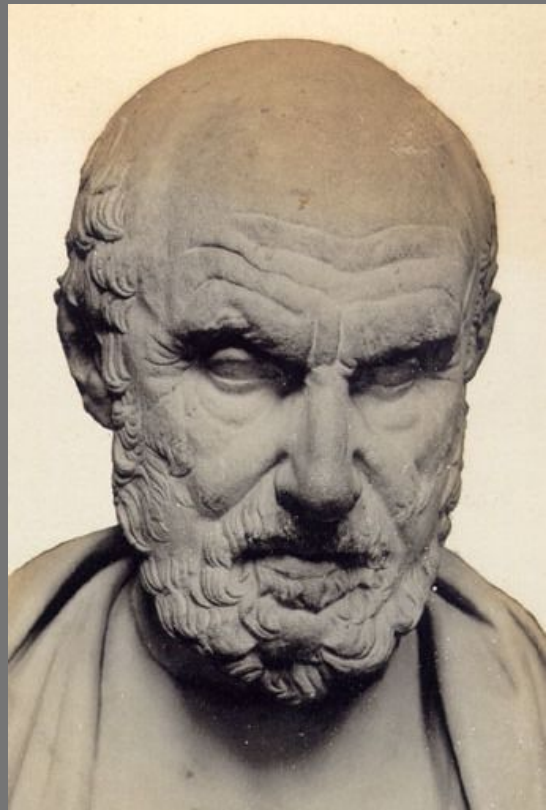
... is an abstract pattern of reasoning that an argument can take, regardless of the subject matter, that is always valid.

—

A formal fallacy...

... is an erroneous pattern of reasoning where the fault hinges on the logical words and how they connect the propositions.

The following argument forms are always valid.



Modus Ponens

A modus ponens is an argument that begins with a conditional and then reaches a conclusion by affirming the antecedent.

1. **P ⊃ Q**
2. **P**
3. **∴ Q**

1. If it is sunny, then we will cut the grass.
2. It is sunny.
3. Therefore, we'll cut the grass.

___

Modus Tollens

A modus tollens is an argument that begins with a conditional and then reaches a conclusion by denying the consequent.

1. **P ⊃ Q**
2. **~Q**
3. **∴ ~P**

1. If the store is open, the lights will be on.
2. The lights are not on.
3. Therefore, the store is not open.

___

Disjunctive Syllogisms

A disjunctive syllogism is an argument that begins with a disjunction, ie either **P** or **Q**, then draws a conclusion by denying the truth of one of the disjuncts.

1. **P ∨ Q**
2. **~P**
3. **∴ Q**

1. We'll eat at Dick's Drive-In or we'll eat at Spud's Fish and Chips.
2. We will not eat at Dick's Drive-in.
3. Therefore, we will eat at Spud's.

___

“Not Both” Form

An argument in the “not both” form is an argument that begins with the negation of a conjunction, ie ~(**P** and **Q**), then draws a conclusion by affirming the truth of one of the conjuncts.

1. ~(**P** & **Q**)
2. **P**
3. **∴ ~Q**

1. It is not the case that Iron Man is currently fighting Captain America and Tony Stark is having lunch with Pepper Potts.
2. Iron Man is currently fighting Captain America.
3. Therefore, Tony is not having lunch with Pepper.

___

The following are formal fallacies; they are always invalid.

The Fallacy of Affirming the Consequent

1. **P ⊃ Q**
2. **Q**
3. **∴ P**

1. If there is fire, then there is oxygen present.
2. There is oxygen present.
3. Therefore, there is fire.

The fallacy of denying the antecedent

1. **P ⊃ Q**
2. **~P**
3. **∴ ~Q**

1. If there is fire, then there is oxygen present.
2. There is no fire.
3. Therefore, there is no oxygen present.

Instructions: Translate the following into TL. Then, using the pattern recognition method, assess for validity. Lastly, identify the relevant valid argument form or formal fallacy.

a. If there is no reliable way to tell that you are dreaming, you can't be sure you're not dreaming right now. There is no reliable way to tell you're dreaming. Therefore, you can't be sure you're not dreaming right now.
b. If you never read your textbooks, you should stop buying them. I stopped buying them. So it must be that I didn't read them.
c. Either you're the teacher or you're a student. It is not the case that you're a student. So you must be the teacher.
d. If God exists, then there would be no unnecessary suffering. But it is not the case that there is no unnecessary suffering. Therefore, God does not exist.
e. It's not possible that both RCG is dating Shakira and Piqué is married to Shakira. RCG is dating Shakira. So Piqué is not married to Shakira. ;)

Homework!
Learn the
truth-tables for the
truth-functions!!!