

```
In [2]: import numpy as np
import random
import re
from PyDictionary import PyDictionary
dictionary = PyDictionary()
```

## CogSci 131 - Assignment 4

Selena Zhang

### Question 1

List of rules: **One variable:**

1. I <1> coffee -> OH REALLY. TELL ME MORE ABOUT WHY YOU <1> COFFEE
2. Drink is <1> -> <1> ISN'T THAT GOOD. TRY SOME OTHER DRINK?
3. Coffee makes me <1> -> MAYBE <1> IS A NATURAL SIDE EFFECT OF COFFEE DON'T YOU THINK?
4. I like <1> -> WELL I PREFER <1> SOMETIMES, BUT WHAT OTHER DRINKS DO YOU LIKE?
5. <1> cup -> IS <1> CUPS A DAY TOO MUCH FOR YOU?
6. <1> roast -> <1> MEANS YOU NEED TO DRINK MORE COFFEE
7. Yes <1> -> I AM GLAD YOU AGREE <1>.
8. No <1> -> VERY UNFORTUNATE THAT YOU DISAGREE <2>.
9. Not sure <1> -> WELL MAKE UP YOUR MIND <1>.
10. try <1> -> TRY <1> AS SOON AS YOU CAN.
11. OK <1> -> OK SURE.

**Two variables:**

1. <1> like <2> -> WHY DO <1> LIKE <2>.
2. favorite <1> is <2> -> THAT'S GOOD TO KNOW THAT YOUR FAVORITE <1> IS <2>.
3. <1> hate <2> -> IF <1> HATE <2>, THAT'S YOUR OWN OPINION.
4. <1> in the <2> -> CAN YOU TELL ME HOW <1> IN THE <2>?
5. <1> iced <2> -> IT IS TOO COLD OUTSIDE TO <1> ICED <2>, RIGHT?
6. <1> hot <2> -> HOT <2> IS THE BEST.

```

In [3]: #lists of rules in order of what's above
rules = [
    [r"I (.+) coffee", 'OH REALLY. TELL ME MORE ABOUT WHY YOU {} COFFEE.'],
    [r"drink is (.+)" , "{} ISN'T THAT GOOD. TRY SOME OTHER DRINK?"],
    [r"Coffee makes me (.+)", "MAYBE {} IS A NATURAL SIDE EFFECT OF COFFEE DON'T YOU THINK?"],
    [r"I like (.+)" , "WELL I PREFER {} SOMETIMES, BUT WHAT OTHER DRINKS DO YOU LIKE?"],
    [r"(.?) cup", "IS {} CUPS A DAY TOO MUCH FOR YOU?"],
    [r"(.+) roast", "{} ROAST MEANS YOU NEED TO DRINK MORE COFFEE. "],
    [r"Yes (.+)", "I AM GLAD YOU AGREE ON {}"],
    [r"No (.+)", "VERY UNFORTUNATE THAT YOU DISAGREE."],
    [r"Not sure (.+)", "WELL MAKE UP YOUR MIND ABOUT {}. "],
    [r" try (.+)", "TRY {} AS SOON AS YOU CAN."],
    [r"Ok (.+)", "OK SURE."],
    [r"favorite (.+) is (.+)", "THAT'S GOOD TO KNOW THAT YOUR FAVORITE {} IS {}. "],
    [r"(.+) like (.+)", "WHY DO {} LIKE {}"],
    [r"(.+) hate (.+)", "IF {} HATE {}, THAT'S YOUR OWN OPINION."],
],

    [r"(.+) in the (.+)", "CAN YOU TELL ME HOW {} IN THE {}?"],
    [r"(.+) iced (.+)", "IT IS TOO COLD OUTSIDE TO {} ICED {}, RIGHT?"],
    [r"(.+) hot (.+)", "{} HOT {} IS THE BEST."]
]

def eliza():
    #preamble
    print("Hi, I'm CoffeeBot. Talk to me about coffee-related matters!")
    print("(Typing 'Bye' will end this bot)")
    text = input("What do you want to say? ")
    #typing Bye ends the chat bot
    while text != 'Bye':
        #array with all possible responses
        matchlist = []
        #finding if there's a pattern match for any of the rules
        for pattern, elizaresponse in rules:
            match = re.search(pattern, text.strip())
            if match:
                #find the key words
                group = match.groups()
                #how many key words? 3 cases
                #1 key word
                if len(group) == 1:
                    grouplist = list(group)
                    response = elizaresponse.format(grouplist[0])
                    matchlist.append(response.upper())
                #no key words
                elif len(group) == 0:
                    pass
                #2 key words
                elif len(group) == 2:

```

```

        grouplist2 = list(group)
        response = elizaresponse.format(grouplist2[0], gr
ouplist2[1])
        matchlist.append(response.upper())
#randomly choose from the possible responses
        if len(matchlist) != 0:
            select = random.choice(matchlist)
            print("ELIZA: " + select)
            matchlist.clear()
        #if nothing matches
        else:
            print("ELIZA: I'm sorry. I don't understand. I can only t
alk about coffee")
        #repeat
        text = input("You: ")
    eliza()

```

```

Hi, I'm CoffeeBot. Talk to me about coffee-related matters!
(Typing 'Bye' will end this bot)
What do you want to say? I like coffee
ELIZA: OH REALLY. TELL ME MORE ABOUT WHY YOU LIKE COFFEE.
You: Bye

```

If more than one rule matched, I stored the response in an array and then used the `random.choice()` function to uniformly select one of the possible responses. For instance, if it only matched one rule, then the array would just have that one match, and a random sample of an array with one item will always give that one item. If there are more than one matches, the array will have more than one item, and the `random.choice()` function will uniformly pick between any one of them. Here are examples where I pass the same response four times, which matches Rule 1, 4, and 10.

Pseudocode: call `eliza()`: `user_input = "I like coffee"` while loop to check if `user_input` is not "Bye": iterate over pattern and responses in the rules `match = re.match` finds a match for `user_input` and the pattern if there is a match: create `matcharray = []` length = length of `match.groups()` tuple if length == 1: one variable, `response1 = responses.format(tuple[0])` append `response1` to `matcharray` else if length == 2: two variables `response2 = responses.format(tuple[0], tuple[1])` append `response2` to `matcharray` if length == 0: no variables or no match, pass. continue to iterate over every rule in rules: if there is a match, it will be appended `matcharray = [response1, response2, response.....]` randomly select something from `matcharray`.

In [106]: `eliza()`

```

Hi, I'm CoffeeBot. Talk to me about coffee-related matters!
(Typing 'Bye' will end this bot)
What do you want to say? I like coffee
ELIZA: OH REALLY. TELL ME MORE ABOUT WHY YOU LIKE COFFEE.
You: I like coffee
ELIZA: WELL I PREFER COFFEE SOMETIMES, BUT WHAT OTHER DRINKS DO YOU LI
KE?
You: I like coffee
ELIZA: WHY DO I LIKE COFFEE
You: Bye

```

## Question 2

Me interacting with the bot (on next 2 pages):

```
In [133]: eliza()
```

Hi, I'm CoffeeBot. Talk to me about coffee-related matters!  
(Typing 'Bye' will end this bot)  
What do you want to say? I like coffee  
ELIZA: OH REALLY. TELL ME MORE ABOUT WHY YOU LIKE COFFEE.  
You: Coffee makes me feel jittery  
ELIZA: MAYBE FEEL JITTERY IS A NATURAL SIDE EFFECT OF COFFEE DON'T YOU THINK?  
You: Yes maybe  
ELIZA: I AM GLAD YOU AGREE ON MAYBE  
You: My favorite drink is a flat white  
ELIZA: THAT'S GOOD TO KNOW THAT YOUR FAVORITE DRINK IS A FLAT WHITE.  
You: Sometimes I drink iced flat whites  
ELIZA: IT IS TOO COLD OUTSIDE TO SOMETIMES I DRINK ICED FLAT WHITES, RIGHT?  
You: Other times I drink hot flat whites  
ELIZA: OTHER TIMES I DRINK HOT FLAT WHITES IS THE BEST.  
You: I drink 3 cups a day  
ELIZA: IS 3 CUPS A DAY TOO MUCH FOR YOU?  
You: No not at all  
ELIZA: VERY UNFORTUNATE THAT YOU DISAGREE.  
You: Dark roast is good  
ELIZA: DARK ROAST MEANS YOU NEED TO DRINK MORE COFFEE.  
You: Yes this is true  
ELIZA: I AM GLAD YOU AGREE ON THIS IS TRUE  
You: Coffee makes me feel awake  
ELIZA: MAYBE FEEL AWAKE IS A NATURAL SIDE EFFECT OF COFFEE DON'T YOU THINK?  
You: I like flat whites  
ELIZA: WELL I PREFER FLAT WHITES SOMETIMES, BUT WHAT OTHER DRINKS DO YOU LIKE?  
You: I like cappuccinos  
ELIZA: WHY DO I LIKE CAPPUCINOS  
You: My favorite milk is oat milk  
ELIZA: THAT'S GOOD TO KNOW THAT YOUR FAVORITE MILK IS OAT MILK.  
You: I like hot oat milk  
ELIZA: WHY DO I LIKE HOT OAT MILK  
You: I want to try espresso  
ELIZA: TRY ESPRESSO AS SOON AS YOU CAN.  
You: How are you?  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Ok  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Ok thanks  
ELIZA: OK SURE.  
You: I hate tea  
ELIZA: IF I HATE TEA, THAT'S YOUR OWN OPINION.  
You: I pour milk into my flat white  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: I pour milk in the flat white  
ELIZA: CAN YOU TELL ME HOW I POUR MILK IN THE FLAT WHITE?  
You: No sorry  
ELIZA: VERY UNFORTUNATE THAT YOU DISAGREE.  
You: This was a fun conversation  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Bye

My friend interacting with the bot (on next 2 pages):

```
In [4]: eliza()
```



Hi, I'm CoffeeBot. Talk to me about coffee-related matters!  
(Typing 'Bye' will end this bot)  
What do you want to say? What is italian espresso  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: do you like coffee  
ELIZA: WHY DO DO YOU LIKE COFFEE  
You: because it tastes nice and bitter  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: It tastes nice  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Do you take coffee with milk  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: coffee or tea?  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: coffee  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: flat white  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: What is coffee  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Why does coffee taste good?  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Is coffee fun?  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: I like coffee  
ELIZA: WHY DO I LIKE COFFEE  
You: I like coffee because it tastes nice and bitter  
ELIZA: WHY DO I LIKE COFFEE BECAUSE IT TASTES NICE AND BITTER  
You: Coffee is my favorite drink  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Coffee in the morning is a great way to start your day  
ELIZA: CAN YOU TELL ME HOW COFFEE IN THE MORNING IS A GREAT WAY TO STA  
RT YOUR DAY?  
You: It wakes me up, gives me energy, and keeps me focused throughout  
the day  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Coffee makes me feel happy and invigorated  
ELIZA: MAYBE FEEL HAPPY AND INVIGORATED IS A NATURAL SIDE EFFECT OF CO  
FFEE DON'T YOU THINK?  
You: yes it is because coffee is meant to caffeinate the body signific  
antly  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: I prefer coffee over tea  
ELIZA: OH REALLY. TELL ME MORE ABOUT WHY YOU PREFER COFFEE.  
You: I prefer coffee because it gives me more energy and tastes better  
ELIZA: OH REALLY. TELL ME MORE ABOUT WHY YOU PREFER COFFEE.  
You: I prefer coffee furthermore because it's bitter  
ELIZA: OH REALLY. TELL ME MORE ABOUT WHY YOU PREFER COFFEE.  
You: I like pouring milk in coffee  
ELIZA: WHY DO I LIKE POURING MILK IN COFFEE  
You: Coffee should be poured in the river  
ELIZA: CAN YOU TELL ME HOW COFFEE SHOULD BE POURED IN THE RIVER?  
You: It should be poured vigorously with full effort and gigantic amou  
nts of force  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Coffee is only for Stanfurd losers  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee

You: Coffee is only for stanford losers  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Coffee is only for stanford losers  
ELIZA: I'm sorry. I don't understand. I can only talk about coffee  
You: Bye

Vinay's impressions: this chatbot is useless, cannot hold a conversation at any length, no audio visual cortex, cannot form words and sentences properly, does not have command of the English language, he would suggest artificial intelligence. However, it performs as expected, and its pretty fast, so it's pretty efficient. It speaks faster than a human so it is very satisfying.

### **Question 3**

There are several ways I would have improved the bot: First, I would have included a function to modify each word so that it was more grammatically correct in the context of the response. This could include "mirroring" pronouns so then that way if the person said "I" or "my", the bot would be able to change the bot to say "You, your," as well as changing the tense of each word ("walk" to "walked", etc) for it to sound better in the sentence.

### **Question 4**

"Tell me how tall the Campanile is". No one's bot is programmed to handle questions and write back an answer, because it is trying to look for key words and then fill them in to a prewritten response. A human would tell you that "the Campanile is 300 feet" with no problem (or at least give a reasonable estimate), but a bot may end up mistaking the question altogether ("Tell me about your thoughts on the Campanile"... ) because it does not have outside information unless a coder specifically accounted for it